



**Integrated Natural Resources Management Plan**  
**Naval Air Station Corpus Christi**  
**Corpus Christi, Texas**

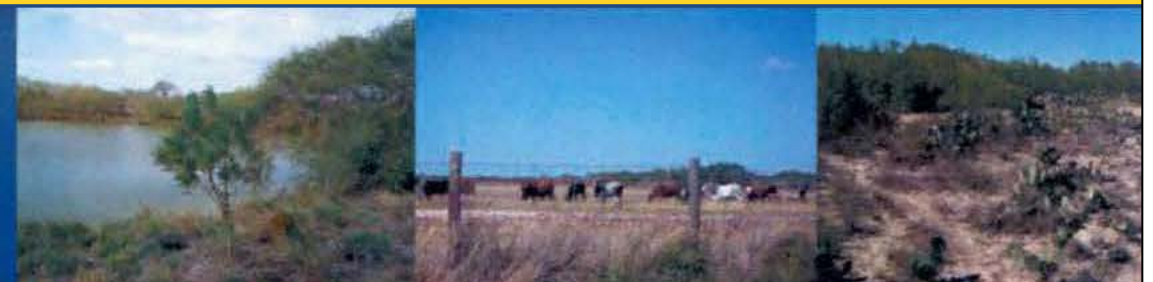
**2019**



**Integrated Natural Resources Management Plan**  
**Naval Air Station Corpus Christi**  
**Corpus Christi, Texas**



**2019 Update**





Naval Air Station  
Corpus Christi, Texas  
Integrated Natural Resources  
Management Plan  
2019 Update

Prepared for:  
The U.S. Department of the Navy  
Naval Facilities Engineering Command Southeast

Prepared by:  
Tetra Tech, Inc.  
2200 Wilson Blvd., Suite 400  
Arlington, VA 22201

Updated in 2019 by:  
Naval Facilities Engineering Command, Southeast  
Box 30, Bldg. 135N, Ajax Street  
NAS Jacksonville, FL 32212



---

**NAVAL AIR STATION CORPUS CHRISTI  
CORPUS CHRISTI, TEXAS  
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN  
(INRMP) - 2019 OPERATIONS AND EFFECT CONCURRENCE**

---

The Sikes Act and Department of Defense instruction require that annual and 5-year operation and effect reviews of INRMPs occur with federal and state partners. Representatives of the Navy, U.S. Fish & Wildlife Service, Texas Parks and Wildlife Department, and National Marine Fisheries Service are invited annually to participate in the yearly Naval Air Station Corpus Christi INRMP and Natural Resources Metric review. The last operation and effect review of this INRMP was completed in May 2014. We have revised the installation INRMP with input from the signatory partners as part of the required 5-year review process. By signing below, the partners concur that the management actions prescribed in the INRMP and implemented will contribute to the conservation and rehabilitation of installation natural resources.

_____ <b>Commanding Officer, Naval Air Station Corpus Christi</b>	_____ <b>Date</b>
_____ <b>Natural Resources Manager, Naval Air Station Corpus Christi</b>	_____ <b>Date</b>
_____ <b>U.S. Navy Region Southeast Environmental Program Manager</b>	_____ <b>Date</b>
_____ <b>Natural Resources Manager, Commander Navy Region SE</b>	_____ <b>Date</b>
_____ <b>U.S. Fish and Wildlife Service</b>	_____ <b>Date</b>
_____ <b>Texas Parks and Wildlife Department</b>	_____ <b>Date</b>
_____ <b>National Marine Fisheries Service</b>	_____ <b>Date</b>



## EXECUTIVE SUMMARY

### ES.1 Type of Document

This is an Integrated Natural Resources Management Plan (INRMP) update to the INRMP prepared in 2006.

### ES.2 Purpose of Document

The purpose of this document is to meet statutory requirements under the Sikes Act Improvement Act (SAIA), Public Law 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017–2019, 2020–2022. In November 1997 the Sikes Act, 16 United States Code (USC) § 670a et seq., was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate this program, the amendments require the Secretaries of military departments to prepare and implement INRMPs for each military installation in the United States (U.S.) unless the absence of significant natural resources on a particular installation makes preparation of a plan for the installation inappropriate. The SAIA also mandated that these military installations prepare and implement their INRMPs by 17 November 2001. The U.S Department of the Navy (Navy) has prepared this INRMP for management of natural resources of Naval Air Station Corpus Christi and associated properties (NASCC or Installation).

The INRMP is a long-term planning document to guide the Installation Commanding Officer in the management of natural resources to support the Installation mission, while protecting and enhancing the Installation's resources for multiple use, sustainable yield, and biological integrity. The primary purpose of the INRMP is to ensure natural resources conservation measures and military operations on the Installation are integrated and consistent with stewardship and legal requirements. This INRMP covers a five-year plan period, but will be reviewed annually to accommodate for changes in natural resources and ecosystems management and military mission.

### ES.3 Goals and Objectives of the INRMP

The goal of the INRMP is to implement an ecosystem-based conservation program that provides for conservation and rehabilitation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides public access for use of natural resources subject to safety and military security considerations. This INRMP includes adaptive natural resources management objectives and practices to be utilized at the Installation.

Ecosystems management goals and objectives have been identified for the Installation, including four comprehensive ecosystems management goals and 24 objectives. The objectives developed

to implement each goal are related to natural resources issues facing the Installation. Following are the goals, issues, and objectives for the Installation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Issue:** Development and training activities have a significant potential to affect land area at the Installation; as a result, land management decisions and practices are important aspects of ecosystems management. The use and management of lands for military mission needs, and the decision-making process regarding such land use, directly affects the sustainability of the ecosystem.

Land and water management decisions will become increasingly important at the Installation as development and training activities increase. Land and water use during military training, and the decision-making progress regarding such land and water use, directly affect ecosystems sustainability. To protect and maintain natural resources while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objectives:

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.2:** Achieve no net loss of wetlands.

**Objective 1.3:** Improve and enhance water quality by reducing nonpoint source (NPS) pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

**Objective 1.5:** Maintain vegetation to reduce bird/wildlife aircraft strike hazard (BASH) potential.

**Objective 1.6:** Maintain vegetation to reduce wildland fire hazards.

**Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.

**Objective 1.8:** Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.

**Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and



snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.

**Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, executive orders (EOs), regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.

**Issue:** Human activities at the Installation and in the surrounding community have removed native vegetative communities and altered natural habitats. Environmental resources at the Installation provide vital habitat for fish and wildlife, especially in view of the considerable development and economic growth in the surrounding regions of the parcels located in Nueces County and Goliad County. To protect and maintain wildlife habitats while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objective:

**Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

**Issue:** Occasionally, nuisance wildlife species (e.g., feral cats, wild hog, and some bird species) become overpopulated or congregate in areas creating a threat to human health and/or the military mission. In such cases, these wildlife species must be controlled to prevent problems. To protect, maintain, and restore habitat for native plants and wildlife, while preventing nuisance wildlife from negatively impacting quality of life and the military mission, the Installation will implement programs to address the following objective:

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

**Issue:** Federally or state-listed plant and animal species that occur at the Installation have been identified as conservation priorities and require special protection efforts. Managing federally listed threatened and endangered species, and other rare species, is important to achieving no net loss in mission capability. To provide for protection and conservation of the state and federal rare, threatened or endangered species known or with the potential to occur at the Installation, the Installation will implement programs to address the following objective:

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for U.S. Department of Defense (DoD) personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and**

---

**Installation contractors, if such opportunities are available and within DoD security standards.**

**Issue:** In accordance with the SAIA, an INRMP shall, to the extent appropriate and applicable, provide for public access to an installation for use of natural resources, including outdoor recreation, subject to safety, military security considerations, and the military mission. Additionally, public access for the use of the natural resources for outdoor recreation should not result in degradation of installation natural resources. In addition to traditional outdoor recreation activities such as hiking, wildlife watching, outdoor recreation activities can include educational programs that foster a sense of responsible stewardship for military personnel and the general public who are authorized access to an installation for these recreational purposes. The following objectives were developed to address Goal 2.

**Objective 2.1:** Evaluate additional opportunities for natural resources-related outdoor recreation.

**Objective 2.2:** Provide and promote outdoor recreation opportunities (e.g., wildlife observation) to DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors.

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Issue:** Plans and programs for maintaining and managing natural resources at the Installation need to fully consider the interrelationships of resources and insuring no net loss in mission capability. Often in the past, existing programs and plans have frequently focused on the management of individual resources in accordance with federal or state laws. Ecosystems management cannot be accomplished solely through the implementation of programs and plans focused on individual resources. A coordinated effort among all programs and personnel, from tenant commands to decision-making authorities, is necessary to protect the interdependent components of communities that define an ecosystem. The coordinated effort will address the consequences of actions on related resources, and will resolve conflicts between competing programs and plans for use of the natural resources at the Installation.

Ecosystems management is a holistic, adaptive management concept that transcends human-made boundaries, both internal and external to the Installation. Management intended to promote sustainable ecosystems requires awareness, education and training, and responsible participation of all individuals potentially affecting the ecosystem, as well as adjustments in management principles and practices to respond to new knowledge and dynamic conditions. To participate in adaptive ecosystems management, the Installation will implement programs to meet the following objectives:

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the Natural Resources Program (NRP) at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.4:** Establish a planning team to review and update the INRMP in accordance with Chief of Naval Operations Instructions (OPNAVINST) 5090.1C-Ch.1.
- Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Issue:** The input and cooperation of regulatory agencies and other experts will ensure the success of the plans and programs implemented as part of this INRMP.

- Objective 4.1:** Maintain interagency cooperation with U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD).
- Objective 4.2:** Develop partnerships with U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS), Texas Commission on Environmental Quality (TCEQ), Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD Partners in Flight (PIF), Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.
- Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

#### **ES.4 Functional Areas and Management Focuses**

To facilitate effective management of the natural resources of the Installation, and to achieve the goals and objectives that have been established for the INRMP, natural resources management is considered for each of the functional areas or parcels. The functional areas or parcels reflect the spatial separation of the parcels, the use of each parcel for its military purpose, and the potential for natural resources management. Within each functional area, natural resources management focuses are identified. Natural resources management is considered under three functional areas: land, fish and wildlife, and outdoor recreation management (see Figures 4-1, 4-2, and 4-3 in Section 4.0). Additionally, this INRMP includes a fourth natural resources management focus:

integrated ecosystems management and partnering. This management focus is more broadly applied across the Installation, and is not identified specifically on natural resources management maps included in Section 4.0. A management focus includes the primary practices and activities necessary to achieve the long-term goals and objectives of the INRMP.

Land management at the Installation includes protection of land and water resources. The Installation will continue to implement land management practices that have been occurring in association the operational military mission requirements, and federal and state regulatory and permitting requirements, as well as those recommended by this INRMP, as funding allows. Land management actions include creating and implementing programs and plans that meet the goals and objectives established for this INRMP as stated above in ES.3. Land management actions provide for proactively managing land areas with natural resources value, including management of water resources, including watersheds and floodplains, wetlands, and water quality; coastal zone areas; vegetation and habitats, including riparian areas, management of vegetation to reduce BASH potential; invasive plants and noxious weeds; grounds maintenance and landscaping; agricultural outleasings; wildland fire; rare and sensitive ecosystems; and rare, threatened and endangered plants. All land management actions must be conducted in compliance with and consideration of BASH Program requirements and recommendations to maintain airfield safety.

Fish and wildlife management at the Installation includes proactive management of wildlife and their habitats; migratory birds; fisheries and aquatic species; BASH reduction; invasive and nuisance wildlife species; zoonosis prevention; and rare, threatened, and endangered wildlife species. The Installation will continue to implement fish and wildlife management practices that have been occurring in association the operational military mission requirements, and federal and state regulatory and permitting requirements, as well as those recommended by this INRMP, as funding allows. Fish and wildlife management actions include creating and implementing programs and plans that meet the goals and objectives established for this INRMP as state above. All fish and wildlife management actions must comply with and consideration of BASH Program requirements and recommendations to maintain airfield safety.

Outdoor recreation management at the Installation includes management of outdoor recreation resources and programs, public access, and educational outreach. Public access for participation in outdoor recreation activities is limited to authorized DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors. Outdoor recreation management actions include promoting outdoor recreation and education. As described for land, fish, and wildlife management, management measures to improve outdoor recreation opportunities should be considered and implemented with consideration of BASH Program requirements.

Integrated ecosystems management and partnering includes training of natural resources personnel; natural resources law enforcement; geographic information system, data integration, access and reporting; and partnering with federal and state agencies, universities and non-governmental organizations. Integrated ecosystems management actions includes providing adequate staffing, equipment, technology and training for the Installation natural resources program to ensure proper implementation of this INRMP; and implementing training, education, and stewardship initiatives. Partnering actions include maintaining interagency cooperation with

federal and state agencies, and development of partnerships to implement wildlife monitoring and protection programs.

## **ES.5 Physical Environment and Ecosystems**

The Installation comprises five parcels totaling approximately 5,665.5 acres (ac) (2,292.8 hectares [ha]) in southeast Texas within Nueces and Goliad counties. The Installation is strategically located to meet operational and training requirements of the Navy. The Installation's primary mission is to provide operational and support facilities for the Naval Air Training Command and associated activities, through operation of four airfields and supporting facilities.

Three of the Installation airfields are located in Nueces County, the Main Station, Naval Outlying Landing Field (NOLF) Cabaniss, and NOLF Waldron. The fourth airfield, NOLF Goliad, is located in Goliad County. New information for NOLF Goliad is included in this INRMP as this parcel was recently reacquired by the Navy from Goliad County. The Peary Place Transmitter Site located in Nueces County is the fifth parcel; however, this former transmitter site is not used to support the military mission. A portion of the Peary Place Transmitter Site is currently used by Gulf Coast Soccer Club as an outdoor recreational area through a license agreement. Natural resources at the Peary Place Transmitter Site are not described in this INRMP, as direct natural resources management of this site is not required.

The Main Station is largely developed, and includes facilities to support the major operations, including the airfield and the support facilities required to meet the military mission, as well as recreational land uses such as athletic fields and the Gulf Winds Golf Course. The majority of land use at NOLF Cabaniss is previously disturbed land, and includes the airfield and the support facilities required to meet the military mission, as well as several agricultural outlease areas. Land at NOLF Waldron is untouched and previously disturbed lands that include the airfield and the support facilities required to meet the military mission, which includes areas that are mowed in support of the BASH Program. Several agricultural outleases areas are located at NOLF Waldron, as well as recreational areas that are leased from the Navy by a private organization. Land at NOLF Goliad is primarily agricultural outlease and mowed land surrounding the airfield, and includes airfield and several support facilities required to meet the military mission. Additionally, since the Main Station borders tidal waters and has structures extending into those waters, NASCC manages operations to avoid indirect water quality impacts, such as spills and runoff, which could impact sensitive resources.

Within the developed areas of the Installation, natural resources management activities primarily are associated with protection of water resources, control of nuisance and invasive plants and wildlife, BASH reduction, landscape and grounds maintenance, and protection and management of federally protected species and designated Critical Habitat. The federally-threatened piping plover (*Charadrius melodus*) and red knot (*Calidris canutus* ssp. *rufa*) occur at NASCC, and Critical Habitat has been designated for wintering piping plover at the Main Station and vicinity.

The Installation is located within the Gulf Coastal Plains Province of Texas, which includes Coastal Prairies, Interior Coastal Prairies, and Blackland Prairies subprovinces. With the

exception of NOLF Goliad, the Installation parcels are located in the Coastal Prairies Subprovince. Elevations within this subprovince range from at or near mean sea level (MSL) to 300 ft (91.4 m) above MSL (University of Texas – Austin, Bureau of Economic Geology 1996). The Coastal Prairies Subprovince extends inland from the Gulf of Mexico for 30–60 mi (48–97 km) along the coast from the Sabine River to the Lower Rio Grande Valley (Texas State Historical Association no date [n.d.] a).

NOLF Goliad is located within the Interior Coastal Plains Subprovince. Elevations within this subprovince range from 300 to 800 ft (91.4 to 243.7 m) above MSL. This subprovince is comprised of alternating belts of resistant uncemented sands mixed with weaker shales that erode to form long, sandy ridges (University of Texas – Austin 2011). This region of east Texas is characterized by pine and hardwood forests, with numerous permanent streams present. The area between San Antonio and Laredo, Texas is dominated by chaparral brush and sparse grasses.

The Main Station contains designated Critical Habitat for wintering piping plover, and suitable habitat exists at the Main Station to support this species, which has been positively identified in winter. The Main Station provides habitat that supports the wintering population of piping plover and red knot, both federally-threatened species.

The Main Station, NOLF Cabaniss, and NOLF Waldron are located in the Nueces-Rio Grande Coastal Basin, which is located on the Texas Coast between the Nueces and Guadalupe-San Antonio river basins. The drainage area of the basin is approximately 10,442 mi<sup>2</sup> (27,045 km<sup>2</sup>). The basin drains eastward toward the coast, eventually emptying to the Laguna Madre Estuary system. There are no perennial streams within the drainage area (Texas Water Development Board [TWDB] 2010a). The Main Station lies on a peninsula bordered by Oso Bay, Corpus Christi Bay and the Laguna Madre Estuary. Within the Nueces-Rio Coastal Basin the Main Station is located within the Coastal Bend Bay System. The Coastal Bend Bay System, including Corpus Christi Bay, Oso Bay, Nueces Bay, the Laguna Madre Estuary, and other bays are part of the Estuary of National Significance program that was established in by the U.S. Congress through the Water Quality Act of 1987.

NOLF Goliad is part of the South Central Texas Region, which includes parts of the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca river basins, and part of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces coastal basins. NOLF Goliad lies on the border of the San Antonio-Nueces Coastal Basin and the San Antonio River Basin. The San Antonio River Basin drains a total area of 4,180 mi<sup>2</sup> (10,826 km<sup>2</sup>) that drains towards the Gulf of Mexico.

## **ES.6 Projects of the INRMP**

Projects are discrete actions for fulfilling objectives. Projects may be required in order for the Installation to fulfill regulatory requirements regarding natural resources management and to enhance existing measures to ensure compliance. Projects planned for the INRMP plan period are shown in Appendix K, Table K-1. Also included in Appendix K are 1-page descriptions for each project. Projects associated with management actions are listed in the management discussions provided in Section 3.0.

---

Funding for implementation of the INRMP will come from the Installation Commander, Naval Installations Command, or Naval Facilities Engineering Command natural resources funding sources. Funding will be acquired to implement DoD compliance projects in the most timely manner possible. Stewardship projects will be funded through the Installation operations, management budget, and other funding sources identified in partnerships with federal and state resources agencies, forestry revenues, agriculture outleases, Legacy Resource Management Program, and other funding sources as available.

### **ES.7 Mission Sustainability**

The primary mission of the Installation is to “*maintain and operate facilities and provide services and material to support operations of aviation activities and units of the Naval Air Training Command and other tenant activities and units*” (Navy n.d. a). In general terms, the primary objective of the Installation is to serve as a center for training Navy jet pilots.

To carry out its mission, the Installation must build and maintain facilities to (1) provide support to permanently and temporarily assigned Navy aircraft and personnel, (2) provide administrative and logistic support for naval aircraft operations, and (3) provide for the training and MWR needs of Navy personnel assigned to the Installation training units and tenant military units. Training and support of the Installation military mission is best supported by functional and resilient ecosystems, which are better able to support day-to-day military readiness and the military mission. Preserving and enhancing that functionality and resiliency is the primary purpose of this INRMP and all natural resources management actions at the Installation. Particular emphasis is placed on using existing ecosystems to reduce the potential for BASH and on practicing responsible stewardship of natural resources.

The goal at the Installation is to maintain and enhance the capability of military lands to support the training mission, while conserving the area’s natural resources. Implementation of the INRMP will primarily focus on enhancing and sustaining the military mission, but at the same time, the Installation will implement projects designed to enhance and protect the natural resources under their jurisdiction. Issues such implementing improvements to wildlife habitat must consider BASH Program requirements to ensure the safety of airfield operations and support of the military mission.

### **ES.8 Species Management**

The natural resource management actions described in this INRMP are for the benefit of the plants, animals, and ecosystems occurring at the Installation. Special attention is given to rare, threatened, and endangered species, and their habitats, through management actions identified in Section 3.0, and the INRMP Projects table and descriptions included in Appendix K. These actions are long-term conservation measures that provide benefits for terrestrial and aquatic habitats on the Installation, and enhancement of the natural environment while promoting mission objectives.

The Installation does not contain any federally-endangered plant species. Designated Critical Habitat for wintering piping plover is present at the Main Station and vicinity, and this federally-threatened species has been documented during winter at the Main Station. Piping plover and red

knot, both federally-threatened species, are the only federally endangered wildlife species known to occur. Conservation and management measures identified in this INRMP will provide protection of designated Critical Habitat for wintering piping plover, and also provide benefits to the the red knot, including preservation of grassland habitat and prescribed burns. All of the INRMP Projects identified in Appendix K will directly benefit these federally protected bird species, including biological inventory (Project Number [No.] 1); rare, threatened, and endangered species habitat management (Project No. 2); invasive species control (Project No. 3); NASCC INRMP updates (Project No. 4); prescribed fire management (Project No. 5); neotropical bird survey (Project No. 6); habitat management and restoration (Project No. 7); and natural resources outreach (Project No. 8). Other management actions that will benefit wintering piping plovers and red knots include conducting internal and agency consultation during project planning for actions as required for projects that may impact designated Critical Habitat and/or federally listed species. Routine monitoring of migratory birds by the BASH Program will also provide valuable information on the Installation populations of piping plovers and red knots, and their preferred habitat locations at the Installation. Projects and management actions that may indirectly these three bird species are related to habitat management and bird control measures conducted in support of the BASH Program.

#### **ES.9 INRMP Crosswalk Table**

Table ES-1 provides a cross reference of the discussions presented in this INRMP and the April 2006 Navy Guidance for INRMPs. Sections that are not applicable for the Installation also are identified.



**Table ES-1. Cross Reference of the Office of the Under Secretary of Defense Integrated Natural Resources Management Plan (INRMP) Format to INRMP Format Used in this INRMP.**

Office of the Secretary of Defense Recommended INRMP Format	Cross Reference to Required Information in the Installation INRMP
Cover Page	Cover Page
Signature Page	Signature Page
Executive Summary	Executive Summary
Table of Contents	Table of Contents
<b>Chapter 1 – Overview</b>	<b>1.0 Introduction</b>
1.a. – Purpose	1.1.1 INRMP Purpose
1.b – Scope	1.1.2 INRMP Scope
1. c – Goals and Objectives Summary	1.1.5 Management Strategies and Focuses
1.d – Responsibilities of Stakeholders	1.4.4 Internal Stakeholders and 1.4.5 External Stakeholders
1. e – Commitment of Regulatory Agencies	1.1.1 INRMP Purpose
1. f - Authority	1.5 Authority
1.g – Stewardship of Compliance Statement	1.1.6 Stewardship and Compliance
1. h – Review and Revision Process	1.1.4 INRMP Review and Revision Process
1. i – Management Strategies	1.1.5 Management Strategies and Focuses
1. j – Integration with Other Plans	1.1.7 Integration with Other Plans
<b>Chapter 2 – Current Conditions and Use</b>	<b>2.0 Existing Conditions</b>
2.0 – Installation Information	1.2.1 Location, 1.2.2 History, and 1.2.4 Operations and Activities
2.a.1 – Location Statement (concise)	1.2.1 Location
2.a.2 – Regional Land Use	2.2.4 Regional Land Use
2.a.3 – History and Pre-Military Land Use (abbreviated)	1.2.2 History
2.a.4 – Military Mission (concise)	1.2.3 Military Mission
2.a.5 – Operations and Activities	1.2.4 Operations and Activities
2.a.6 – Constraints Map	Figures 2-4, 2-5, and 2-6 and 2.1.2 Natural Resources Constraints and Opportunities
2.a.7 – Opportunities Map	Figures 2-4, 2-5, and 2-6 and 2.1.2 Natural Resources Constraints and Opportunities
2.b – General Physical Environment and Ecosystems	2.0 Existing Conditions
2.c – General Biotic Environment	2.0 Existing Conditions

Office of the Secretary of Defense Recommended INRMP Format	Cross Reference to Required Information in the Installation INRMP
2.c.1 – Threatened and Endangered Species and Species of Concern	2.2.10 Rare, Threatened and Endangered Plant Species and 2.3.6 Rare, Threatened and Endangered Wildlife Species
2.c.2 – Wetlands and Deep Water Habitats	2.2.6.5 Wetlands
2.c.3 – Fauna	2.3 Fish and Wildlife Resources
2.c.4 – Flora	2.2.7 Natural Communities and Vegetation
<b>Chapter 3 – Environmental Management Strategy and Mission Sustainability</b>	<b>1.1.5 Management Strategies and Focuses and 5.1 Supporting Sustainability of the Military Mission and the Natural Environment</b>
3.a – Supporting Sustainability of the Military Mission and the Natural Environment	5.1 Supporting Sustainability of the Military Mission and the Natural Environment
3.a.1 – Integrate Military Mission and Sustainability Land Use	5.1.1 Integration of the Military Mission and Land Use
3.a.2 – Define Impact to the Military Mission	5.1.2 Impacts to the Military Mission
3a.3 – Describe Relationship to Range Complex Management Plan or Other Operational Area Plans	5.1.3 Relationship of Range Management Plan or Other Operation Area Plan
3.b – Natural Resources Consultation Requirements (Section 7, EFH)	5.2 Natural Resources Consultation Requirements
3.c – NEPA Compliance	5.4 NEPA Compliance
3.d – Opportunities for Beneficial Partnerships and Collaborative Resource Planning	3.2.4.4 Partnering with Federal and State Agencies, Universities, and NGOs
3.e – Public Access and Outreach	3.2.3.1 Public Access and 3.2.3.2 Educational Outreach
3.e.1 – Public Access and Outdoor Recreation	3.2.3.1 Public Access
3.e.2 – Public Outreach	3.2.3.2 Educational Outreach
3.e.3 – Encroachment Partnering	2.1.2 Natural Resources Constraints and Opportunities
3.e.4 – State Comprehensive Wildlife Plans (SCWP) Integration	3.2.2.1 Wildlife Management and Habitat Enhancement
<b>Chapter 4 – Program Elements</b>	<b>3.0 Natural Resources Management</b>
4.a – Threatened and Endangered Species and Species Benefit, Critical Habitat, Species of Concern Management	3.2.1.7 Rare, Threatened, and Endangered Plant Species Management, 3.2.1.6 Rare and Sensitive Ecosystems Management, and 3.2.2.7 Rare, Threatened, and Endangered Wildlife Species Management
4.b – Wetlands and Deep Water Habitats	3.2.1.1.2 Wetlands Management
4.c – Law Enforcement	3.2.4.2 Natural Resources Law Enforcement
4.d – Fish and Wildlife	3.2.2 Fish and Wildlife Management
4.e – Forestry	n/a

Office of the Secretary of Defense Recommended INRMP Format	Cross Reference to Required Information in the Installation INRMP
4.f – Vegetation	3.2.1.3 Vegetation and Habitat Enhancement
4.g – Migratory Birds	3.2.2.2 Migratory Bird Management
4.h – Invasive Species	3.2.1.3.3 Invasive Plants and Noxious Weeds Management and 3.2.2.5 Invasive and Nuisance Wildlife Management
4.i – Pest Management	3.2.1.3.4 Grounds Maintenance and Landscaping Management, 3.2.1.3.3 Invasive Plants and Noxious Weeds Management, and 3.2.2.5 Invasive, and Nuisance Wildlife Management
4.j – Land Management	3.2.1 Land Management
4.k – Agricultural outleasing	3.2.1.4 Agricultural Outleases Management
4.l – GIS Management, Data Integration, Access, and Reporting	3.2.4.3 GIS, Data Integration, Access, and Reporting
4.m – Outdoor Recreation	3.2.3 Outdoor Recreation Management
4.n – Bird Aircraft Strike Hazard	3.2.1.3.2 Management of Vegetation to Reduce BASH Potential and 3.2.2.4 BASH Reduction
4.o – Wildland Fire	3.2.1.5 Wildland Fire Management
4.p – Training of Natural Resource Personnel	3.2.4.1 Training of Natural Resources Personnel
4.q – Coastal/Marine	3.2.1.2 Coastal Zone Management
4.r – Floodplains	3.2.1.1.1 Watershed and Floodplains Management
4.s – Other Leases	3.2.1.4 Agricultural Outleases Management
<b>Chapter 5 – Implementation</b>	<b>5.0 INRMP Implementation</b>
5.a – Summary of Project Prescription Development Process	5.5 Project Development and Classification
5.b – Achieving No Net Loss	5.3 Achieving No Net Loss
5.c – Use of Cooperative Agreements	5.8 Use of Cooperative Agreement and Partnerships
5.d – Funding Process	5.6 Funding Sources
<b>Appendices</b>	
Appendix 1. Acronyms	Acronyms and Abbreviations (follows Table of Contents)
Appendix 2. Detailed Natural Resources Prescriptions	Appendix K – INRMP Project Data and Section 3.0
Appendix 3. List of Projects	Appendix K – INRMP Project Data
N/A	Appendix A – Agency Correspondence
N/A	Appendix B – NASCC BASH Instruction and Depredation Permits
N/A	Appendix C –Wildlife Hazard Management Plan

Office of the Secretary of Defense Recommended INRMP Format	Cross Reference to Required Information in the Installation INRMP
N/A	Appendix D –Applicable Regulations and Public Laws
N/A	Appendix E – Flora and Fauna Lists
N/A	Appendix F – Native Landscaping Plants
N/A	Appendix G – Invasive and Noxious Species
N/A	Appendix H –Zoonoses of Concern
N/A	Appendix I –Soil and Water Conservation Plan
N/A	Appendix J –NASCC 2004 Wetland Delineation Re-verification
N/A	Appendix L – Biological Survey Reports and Environmental Assessments

## TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 INTRODUCTION.....</b>	<b>1-1</b>
1.1 PURPOSE .....	1-1
1.1.1 INRMP Purpose .....	1-2
1.1.2 INRMP Scope .....	1-2
1.1.3 INRMP Organization .....	1-5
1.1.4 INRMP Review and Revision Process .....	1-5
1.1.5 Management Strategies and Focuses .....	1-7
1.1.6 Stewardship and Compliance.....	1-10
1.1.7 Integration with Other Plans .....	1-11
1.1.8 Policies and Regulations .....	1-11
1.2 NAS CORPUS CHRISTI LOCATION, HISTORY, AND MILITARY MISSION .....	1-11
1.2.1 Location .....	1-11
1.2.2 History.....	1-12
1.2.3 Military Mission.....	1-13
1.2.4 Operations and Activities.....	1-14
1.3 INRMP GOALS AND OBJECTIVES .....	1-15
1.4 RESPONSIBILITIES .....	1-20
1.4.1 INRMP Funding.....	1-20
1.4.2 INRMP Implementation Responsibilities .....	1-20
1.4.3 Agency Coordination .....	1-20
1.4.4 Internal Stakeholders .....	1-21
1.4.5 External Stakeholders .....	1-21
1.5 AUTHORITY .....	1-22
<b>2.0 EXISTING CONDITIONS .....</b>	<b>2-1</b>
2.1 SITE CONDITIONS.....	2-1
2.1.1 Site Conditions.....	2-1
2.1.2 Natural Resources Constraints and Opportunities .....	2-2
2.2 LAND RESOURCES.....	2-10
2.2.1 Physiographic Location .....	2-10
2.2.2 Climate.....	2-11
2.2.3 Land Use .....	2-12
2.2.4 Regional Land Use.....	2-14
2.2.5 Geology, Topography, and Soil.....	2-21
2.2.6 Water Resources .....	2-30
2.2.7 Natural Communities and Vegetation.....	2-40
2.2.8 Nuisance and Invasive Plant Species.....	2-51
2.2.9 Sensitive Wildlife Habitat and Rare Ecosystems.....	2-52
2.2.10 Rare, Threatened, and Endangered Plants Species .....	2-53
2.2.11 Regional Conservation Lands .....	2-54

---

2.3	FISH AND WILDLIFE RESOURCES .....	2-56
2.3.1	Fish.....	2-57
2.3.2	Amphibians and Reptiles .....	2-57
2.3.3	Birds .....	2-59
2.3.4	Mammals.....	2-63
2.3.5	Nuisance and Invasive Wildlife Species.....	2-65
2.3.6	Rare, Threatened, and Endangered Wildlife Species.....	2-65
2.4	FORESTRY RESOURCES .....	2-77
<b>3.0</b>	<b>NATURAL RESOURCES MANAGEMENT .....</b>	<b>3-1</b>
3.1	GOALS, OBJECTIVES, AND STRATEGIES .....	3-1
3.1.1	Definitions.....	3-1
3.1.2	Goals, Issues, and Objectives Specific to the Installation .....	3-1
3.2	NATURAL RESOURCES MANAGEMENT FOCUSES.....	3-6
3.2.1	Land Management .....	3-6
3.2.2	Fish and Wildlife Management.....	3-69
3.2.3	Outdoor Recreation Management .....	3-119
3.2.4	Integrated Ecosystems Management and Partnering .....	3-127
<b>4.0</b>	<b>NATURAL RESOURCES MANAGEMENT FOCUSES.....</b>	<b>4-1</b>
<b>5.0</b>	<b>INRMP IMPLEMENTATION.....</b>	<b>5-1</b>
5.1	SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT.....	5-1
5.1.1	Integration of the Military Mission and Land Use.....	5-1
5.1.2	Impacts to the Military Mission.....	5-2
5.1.3	Relationship of Range Management Plan or Other Operation Area Plan .....	5-2
5.2	NATURAL RESOURCES CONSULTATION REQUIREMENTS.....	5-3
5.3	ACHIEVING NO NET LOSS.....	5-4
5.4	NEPA COMPLIANCE .....	5-4
5.5	PROJECT DEVELOPMENT AND CLASSIFICATION .....	5-7
5.6	FUNDING SOURCES .....	5-7
5.6.1	O&MN Funds .....	5-7
5.6.2	The Legacy Resource Management Program.....	5-8
5.6.3	Forestry Revenues.....	5-8
5.6.4	Agricultural Outleasing.....	5-9
5.6.5	Fish and Wildlife Fees .....	5-9
5.6.6	Recycling Funds.....	5-10
5.6.7	Strategic Environmental Research and Development Program (SERDP) Funds.....	5-10
5.6.8	Non-DoD Funds.....	5-10
5.7	COMMITMENT .....	5-10
5.8	USE OF COOPERATIVE AGREEMENTS AND PARTNERSHIPS .....	5-10
<b>6.0</b>	<b>REFERENCES.....</b>	<b>6-1</b>
<b>7.0</b>	<b>LIST OF PREPARERS.....</b>	<b>7-1</b>

---

---

## APPENDICES

	<u>Page</u>
<b>APPENDIX A AGENCY CORRESPONDENCE .....</b>	<b>A-1</b>
<b>APPENDIX B NASCC BASH INSTRUCTION AND DEPREDATION PERMITS.....</b>	<b>B-1</b>
<b>APPENDIX C WILDLIFE HAZARD MANAGEMENT PLAN .....</b>	<b>C-1</b>
<b>APPENDIX D APPLICABLE REGULATIONS AND PUBLIC LAWS .....</b>	<b>D-1</b>
<b>APPENDIX E NASCC FLORA AND FAUNA LISTS .....</b>	<b>E-1</b>
<b>APPENDIX F NATIVE LANDSCAPING PLANTS AND LOCAL NURSERIES .....</b>	<b>F-1</b>
<b>APPENDIX G INVASIVE AND NOXIOUS SPECIES .....</b>	<b>G-1</b>
<b>APPENDIX H ZONUSES OF CONCERN .....</b>	<b>H-1</b>
<b>APPENDIX I SOIL AND WATER CONSERVATION PLAN .....</b>	<b>I-1</b>
<b>APPENDIX J NASCC 2004 WETLAND DELINEATION RE-VERIFICATION .....</b>	<b>J-1</b>
<b>APPENDIX K INRMP PROJECT DATA .....</b>	<b>K-1</b>
<b>APPENDIX L BIOLOGICAL SURVEY REPORTS AND ENVIRONMENTAL ASSESSMENTS .....</b>	<b>L-1</b>

---

## LIST OF FIGURES

	<u>Page</u>
Figure 1-1. General Location of NASCC.....	1-3
Figure 2-1. Main Station Site Details. ....	2-3
Figure 2-2. NOLF Cabaniss, NOLF Waldron, and Peary Place Transmitter Site Details. ....	2-4
Figure 2-4. Main Station Opportunities and Constraints.....	2-6
Figure 2-5. NOLF Cabaniss and NOLF Waldron Opportunities and Constraints . ....	2-7
Figure 2-6. NOLF Goliad Opportunities and Constraints. ....	2-8
Figure 2-7. Main Station Land Use. ....	2-15
Figure 2-8. NOLF Cabaniss and NOLF Waldron Land Use. ....	2-16
Figure 2-9. NOLF Goliad Land Use.....	2-17
Figure 2-10. Main Station Topography. ....	2-23
Figure 2-11. NOLF Cabaniss and NOLF Waldron Topography. ....	2-24
Figure 2-12. NOLF Goliad Topography.....	2-25
Figure 2-13. Main Station Soils.....	2-26
Figure 2-14. NOLF Cabaniss and NOLF Waldron Soils. ....	2-27
Figure 2-15. NOLF Goliad Soils. ....	2-28
Figure 2-16. Main Station Water Resources.....	2-33
Figure 2-17. NOLF Cabaniss and NOLF Waldron Water Resources. ....	2-34
Figure 2-18. NOLF Goliad Water Resources.....	2-35
Figure 2-19. Main Station Natural Communities. ....	2-41
Figure 2-20. NOLF Cabaniss and NOLF Waldron Natural Communities.....	2-42
Figure 2-21. NOLF Goliad Natural Communities.....	2-43
Figure 2-22. USFWS Birds of Conservation Concern Regions for NASCC. ....	2-61
Figure 2-23. Piping Plover Critical Habitat in Vicinity of NASCC.....	2-67
Figure 2-24. Main Station and NOLF Waldron Maritime Pocket Gopher Systems. ....	2-73
Figure 4-1. Main Station Natural Resources Management. ....	4-3
Figure 4-2. NOLF Cabaniss and NOLF Waldron Natural Resources Management. ....	4-4
Figure 4-3. NOLF Goliad Natural Resources Management.....	4-5



---

## LIST OF TABLES

	<u>Page</u>
Table 1-1. Acreage of Installation Properties.....	1-12
Table 1-2. Stakeholders of Natural Resources on the Installation. ....	1-22
Table 2-1. Installation Wetland Acreages. ....	2-39
Table 2-2. Summary of Installation Surveys that Collected Natural Community and Vegetation Data.....	2-45
Table 2-3. Summary of Installation Surveys that Collected Rare, Threatened, and Endangered Plants Data. ....	2-53
Table 2-4. Summary of Installation Surveys that Collected Fish Data. ....	2-57
Table 2-5. Summary of Installation Surveys that Collected Amphibian and Reptile Data. ....	2-58
Table 2-6. Summary of Installation Surveys that Collected Bird Data.....	2-59
Table 2-7. Summary of Installation Surveys that Collected Mammal Data. ....	2-63
Table 2-8. Summary of Installation Surveys that Collected Nuisance and Invasive Wildlife Data.....	2-65
Table 2-9. Summary of Installation Surveys that Collected Rare, Threatened, and Endangered Wildlife Data.....	2-66
Table 3-1. Crosswalk of Management Areas with INRMP Goals and Objectives. ....	3-7
Table 3-2. Crosswalk of Rare, Threatened, and Endangered Plants and Wildlife with Management Areas and INRMP Projects. ....	3-103
Table 3-3. Natural Resources Training Opportunities. ....	3-130

---

## ACRONYMS AND ABBREVIATIONS

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
ACSP	Audubon Cooperative Sanctuary Program
APHIS	Animal and Plant Health Inspection Service
BASH	bird/wildlife aircraft strike hazard
BCC	birds of conservation concern
BCR	Bird Conservation Region
BHWG	Bird Hazard Working Group
BMPs	best management practices
Ch	Change Transmittal
cm	centimeter(s)
CBBEP	Coastal Bend Bays & Estuaries Program
CBOD <sub>5</sub>	carbonaceous biochemical oxygen demand
CCAD	Corpus Christi Army Depot
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMP	Coastal Management Program
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order

---

EPA	U.S. Environmental Protection Agency
EPR	Environmental Program Requirements
ESA	Endangered Species Act
ESCP	erosion and sediment control plan
FAA	Federal Aviation Authority
FR	Federal Register
ft	feet
GCD	Groundwater Conservation District
GIS	Geographic Information System
GPS	global positioning system
ha	hectare(s)
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
Installation	Naval Air Station Corpus Christi
IPM	Integrated Pest Management
JLUS	Joint Land Use Study
km	kilometer(s)
km <sup>2</sup>	square kilometer(s)
Legacy Program	Legacy Resource Management Program
m	meter(s)
Main Station	Naval Air Station Corpus Christi
MBTA	Migratory Bird Treaty Act
mg/l	milligrams per liter
mi	mile(s)
mi <sup>2</sup>	square mile(s)
MOU	Memorandum of Understanding
MSA	Magnuson–Stevens Fisheries Conservation and Management Act
MSL	mean sea level
MWR	Morale, Welfare, and Recreation
n.d.	no date

---

NOLF	Naval Outlying Landing Field
NAS	Naval Air Station
NASCC	Naval Air Station Corpus Christi
NASCORPCINST	Naval Air Station Corpus Christi Instruction
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Department of the Navy
NDAA	National Defense Authorization Act
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOLF	Naval Outlying Land Field
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NRCS	Natural Resources Conservation Service
NRM	natural resources manager
NRP	Natural Resources Program
O&MN	Operations and Maintenance, Navy
OSD	Office of the Secretary of Defense
OPNAVINST	Chief of Naval Operations Instructions
PIF	Partners in Flight
QRP	Qualified Recycling Program
SAIA	Sikes Act Improvement Act
SERDP	Strategic Environmental Research and Development Program
Sikes Act	Sikes Act Improvement Act
SW3P	Storm Water Pollution Prevention Plan
SWCD	soil and water conservation district
TCELCP	Texas Coastal and Estuarine Land Conservation Program
TCEQ	Texas Commission on Environmental Quality

TIPPC	Texas Invasive Plant and Pest Council
TNC	The Nature Conservancy
TNRCC	Texas Natural Resource Conservation Commission
TPWD	Texas Parks and Wildlife Department
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TX-11	Critical Habitat Texas Unit 11
TX-12	Critical Habitat Texas Unit 12
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	wildlife management area

This page intentionally left blank.

## **1.0 INTRODUCTION**

Section 101(a)(1)(B) of the Sikes Act Improvement Act (SAIA or Sikes Act) (16 United States Code [USC] §670 et seq.) requires that each Military Department prepare and implement an Integrated Natural Resources Management Plan (INRMP) for installations that contain significant natural resources, unless the Secretary of Defense determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate. Accordingly, this INRMP addresses natural resources management on those lands associated with Naval Air Station Corpus Christi that are:

- owned by the United States (U.S.) and administered by the U.S. Department of the Navy (Navy);
- used by the Navy via license, permit, or lease for which the Navy has been assigned management responsibility;
- withdrawn from the public domain for use by the Navy for which the Navy has been assigned management responsibility; and
- leased on Installation properties and occupied by non-U.S. Department of Defense (DoD) entities.

### **1.1 PURPOSE**

Naval Air Station Corpus Christi and associated properties (NASCC or Installation) is a DoD installation that comprises five parcels totaling approximately 5,665.5 acres (ac) (2,292.8 hectares [ha]) in southeast Texas within Nueces and Goliad counties (Figure 1-1). The Installations are strategically located to meet operational and training requirements of the Navy. The Installation's primary mission is to provide operational and support facilities for the Naval Air Training Command and associated activities, through operation of four airfields and supporting facilities.

Three of the Installation airfields are located in Nueces County, the Main Station, Naval Outlying Landing Field (NOLF) Cabaniss, and NOLF Waldron. The fourth airfield, NOLF Goliad, is located in Goliad County. New information for NOLF Goliad is included in this INRMP as this parcel was recently reacquired by the Navy from Goliad County. The Peary Place Transmitter Site located in Nueces County is the fifth parcel; however, this former transmitter site is not used to support the military mission. A portion of the Peary Place Transmitter Site is currently used by Gulf Coast Soccer Club as an outdoor recreational area through a license agreement. Natural resources at the Peary Place Transmitter Site are not described in this INRMP, as direct natural resources management of this site is not required.

This INRMP was prepared as an update to the INRMP prepared for the Installation in 2006. The primary purpose of this INRMP is to guide the Installation natural resource management program for a five-year plan period in accordance with the following regulations and guidance documents:

- SAIA;
- U.S. Department of Defense Instruction (DoDI) 4715.03, Natural Resources Conservation Program (18 March 2011);
- Chief of Naval Operations Instructions (OPNAVINST) 5090.1D Change Transmittal 1 (5090.1D-Ch.1), Environmental Readiness Program Manual Chapter 12: Natural Resources Management (10 January 2014);
- Endangered Species Act (ESA) of 1973 (16 USC §1531 et seq.);
- Naval Facilities Engineering Command (NAVFAC) Natural Resources Management Procedural Manual (P-73, Chapter 2: Integrated Natural Resources Management Plans dated 7 December 2005); and
- Navy INRMP Guidance (10 April 2006).

### **1.1.1 INRMP Purpose**

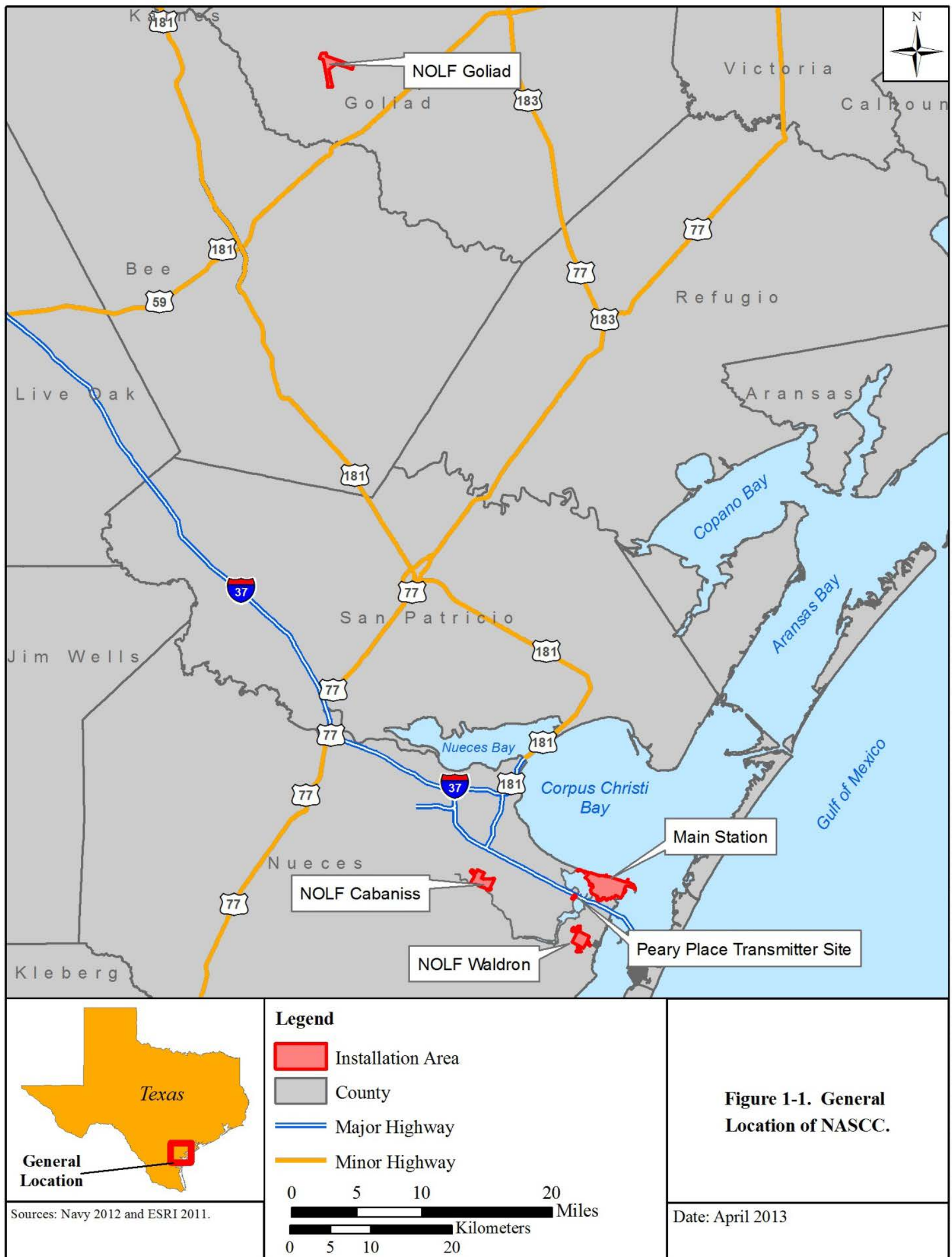
Navy installations are required to implement and maintain an integrated program to manage natural resources under their administration through multiple-use, protection and enhancement of natural resources. Maintaining sustainable yields and biological integrity are requirements under DoDI 4715.03 and OPNAVINST 5090.1D. SAIA requires military installations having significant natural resources to prepare an INRMP. INRMPs serve as a planning tool for natural resources managers (NRMs) to conserve and restore installation natural resources in a coordinated manner within the context of the operational military mission. The primary INRMP user is the Installation NRM; however, environmental planners also will find the INRMP useful in preparation of environmental assessments (EAs). The INRMP provides natural resources guidance for integrated management of land, fish and wildlife, and outdoor recreation resources. It also identifies relevant natural resource laws and regulations that should be considered for implementing the military mission and/or natural resources management actions.

An INRMP is designed to support the military mission by protecting and enhancing the lands upon which the mission is critically dependent. To effectively integrate the INRMP with the operations that support the mission of the installation, the INRMP must conform to the functional elements of the installation. The functional elements of the Installation include training, maintenance support, logistics support, administrative services, community services, recreation, health care, and housing. The activities associated with these functional elements are essential in accomplishing the military mission of the Installation. This INRMP will promote these activities and, where possible, incorporate and balance these activities with the protection and enhancement of the natural environment.

### **1.1.2 INRMP Scope**

This INRMP outlines conservation efforts and establishes procedures to ensure compliance with related environmental laws and regulations for the five-year INRMP implementation period. This INRMP provides the direction for natural resources management at the Installation; however, it does not replace or affect any federal laws or state responsibility and authority for protecting fish and wildlife resources. The Navy requested input from state and federal stakeholders during the development of this INRMP. In accordance with the SAIA, this INRMP has been prepared in





Z:\projects\NAVFAC\100\_NRS\_T23330\_JM03\_CRPS\_CHRSTGIS\MXD\FIGURES\20130130\_REVISIONS\TTP\_T23330-JM03\_Fig1-1.mxd\_SMH

This page intentionally left blank.

cooperation with U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD), and must reflect the mutual agreement of these agencies, whenever practical. These agencies will be provided an opportunity to discuss the INRMP. Comments received from USFWS and TPWD on the INRMP are included in Appendix A as part of the Final INRMP.

### **1.1.3 INRMP Organization**

Section 1.0 of the INRMP provides an overview of the INRMP purpose and organization, including a summary of natural resources management strategies and focuses, definitions of compliance and stewardship in terms of an INRMP, a discussion of how this INRMP is integrated with other plans, and references to relevant policies and regulations. Section 1.0 also includes information on the Installation's location, history and military mission; the INRMP goals and objectives; and responsibilities and authority associated with INRMP implementation. Section 2.0 provides details on the existing natural resources and conditions for each of the four parcels that contain airfields. No natural resources information is provided for the Peary Place Transmitter Site, as this parcel is not essential to the military mission and is not subject to direct natural resources management actions described in this INRMP. Section 3.0 provides information on the goals and objectives established for the INRMP, identifies the issues and strategies associated with natural resources management at the Installation, and discusses the natural resources management activities as they relate to each of the four natural resources focuses identified in Section 1.1.5. Section 4.0 provides maps and a brief description of the natural resources management focuses for each of the Installation parcels. Section 5.0 provides information on INRMP implementation, including information for supporting the sustainability of the military mission and the natural environment, agency consultation requirements, achieving no net loss in mission capability, National Environmental Policy Act (NEPA) requirements, INRMP project classification and funding, commitment, and use of cooperative agreements and partnerships. Section 6.0 includes the list of references cited in this document, and Section 7.0 provides a list of persons involved with preparation and review of this INRMP.

The appendices included in this INRMP includes copies of agency correspondence associated with this INRMP (Appendix A); the NASCC bird/wildlife aircraft strike hazard (BASH) instruction and Depredation Permits (Appendix B); the Wildlife Hazard Management Plan (Appendix C); a list of regulations and public laws that are relevant to this INRMP (Appendix D); flora and fauna lists for each of the Installation parcels (Appendix E); a list of native landscaping plants and local nurseries (Appendix F); a list of invasive and nuisance plants and wildlife associated with the Installation (Appendix G); information on the zoonoses of concern for the Installation (Appendix H); the installation's Soil and Water Conservation Plan (Appendix I); the 2004 NASCC Wetland Delineation Re-verification (Appendix J); the INRMP projects table and project descriptions (Appendix K); and copies of relevant and available biological survey reports and environmental assessments completed for the Installation (Appendix L).

### **1.1.4 INRMP Review and Revision Process**

In accordance 32 Code of Federal Regulations (CFR) Part 190, the Sikes Act, and 5090.1C-Ch.1, Chapter 24, installations are required to perform an informal review of their INRMP annually. Installations are not required to revise their INRMP within a specified time interval; however, a

formal review of the INRMP is required every five years in coordination with USFWS and state partners (Navy 2006a). If USFWS and state partners are in agreement, the completed annual review forms may be used in lieu of a formal review. Minor revisions to the INRMP should be completed annually to reduce the need for a more costly and time consuming revision following the formal five-year review. Annual reviews should be fully documented each year to provide each installation the option to utilize the annual review documentation to fulfill the formal review requirement whenever possible. If results of the formal review determine that the existing INRMP is effective, the INRMP need not be revised. Any revisions to the authorities and guidance documents driving plan update requirements would be implemented as appropriate during the annual review or update periods.

The formal review conducted in coordination with USFWS and state partners shall verify that all environmental compliance projects have been budgeted for and implemented on schedule; that all required natural resource positions are filled with trained staff, or are in the process of being filled; that projects and activities identified for the coming year are included in the INRMP; that all required coordination has been conducted; and that all significant changes to the installation's mission requirements or its natural resources have been identified.

Activities that may constitute an INRMP revision include, but are not limited to the following: a change in mission requirements, or intensity of land use; a significant change in natural resources baseline conditions; a determination that the current INRMP has proven to be inadequate, was not able to be implemented, or shows that projects are ineffective in meeting natural resources management goals as evidenced from monitoring results; a change in natural resources management goals or expiration of the planning horizon of the previous INRMP; or a change to put into effect base realignment and closure actions. Any of these activities should be communicated to the USFWS and state partners during the review process.

Annual reviews of the INRMP are required and will be used to assess and review updates that should be incorporated into the plan, including changes affected by environmental regulation and/or scientific advancement related to management of natural resources at the Installation. This INRMP is scheduled to be formally reviewed annually and revised as necessary, and updated and reapproved every five years at the end of the established plan period. Updates will include identification of changes in natural resources or their management, updates to INRMP projects and activities, and details on any changes to the operational mission that may impact natural resources.

The Plan Updates form, included on page *ii* of this INRMP, will be used to document changes to the INRMP that will improve natural resources management. Annual updates will provide information that will be incorporated into the five-year review, and revision, if required. Each entry in this section should reference the plan section and page number that is being updated to facilitate quick cross-referencing. INRMP modifications that are necessary are usually covered by the original EA prepared for the INRMP; however, INRMP modifications will be reviewed to compare the original action documented in the existing INRMP to the proposed modifications to determine if those modifications are significant. If INRMP modifications are deemed to be not significant, updated actions will be covered by the original NEPA documentation. Proposed

---

INRMP updates that are deemed to be significant will require additional NEPA documentation, usually at the EA level.

### **1.1.5 Management Strategies and Focuses**

Navy policy on natural resources management, as summarized in OPNAVINST 5090.1D, Ch.12, is to manage natural resources to support and be consistent with the installation mission, while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity. Land use practices and decisions must be based on scientifically sound conservation procedures and techniques, scientific methods, and use an ecosystems management approach.

DoDI 4715.03 also requires that INRMPs incorporate the guidance for ecosystems management of natural resources under the stewardship and control of DoD. The goals of this strategy are to maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and an environment that supports recreational use. The basic guidelines for ecosystems management are to:

- preserve the function and integrity of natural ecosystems;
- integrate human, social, and economic interests with environmental considerations;
- involve all interested parties (stakeholders) in identifying management goals; and
- adapt to changing conditions and requirements.

An ecosystems management approach encourages management decisions to be made on the community or ecosystem level rather than at a single species level. Maintaining or improving the quality, integrity, and connectivity of the ecosystem benefits both natural communities and individual species. Efforts to maintain, enhance, and restore natural ecosystems may be the most appropriate management strategy.

Management goals and objectives must be identified and assessed on a periodic basis to maintain the function and integrity of the Installation's ecosystems. However, as unknown factors arise and change occurs, management goals and prescriptions must be adapted. Adaptive management is an iterative cycle of planning, monitoring, evaluating, and adjusting management. Periodic reviews of management goals and practices provide the opportunity to incorporate new science and information as well as assess the performance of management actions. Prescribed actions will be considered experimental and subject to change if the expected results are not achieved.

Natural resources management practices and activities at the Installation are divided into four natural resources management focuses: land management, fish and wildlife management, outdoor recreation management and educational outreach, and integrated ecosystems management and partnering. Natural resources topics relevant to the Installation are described below for the four natural resources management focuses discussed in Section 3.0.

#### **3.2.1 Land Management**

##### **3.2.1.1 Water Resources Management**

###### **3.2.1.1.1 Watershed and Floodplains Management**

- 3.2.1.1.2 Wetlands Management
- 3.2.1.1.3 Water Quality Management
- 3.2.1.2 Coastal Zone Management
  - 3.2.1.2.1 Submerged Aquatic Vegetation
- 3.2.1.3 Vegetation and Habitat Management
  - 3.2.1.3.1 Riparian Areas Management
  - 3.2.1.3.2 Management of Vegetation to Reduce BASH Potential
  - 3.2.1.3.3 Invasive Plants and Noxious Weeds Management
  - 3.2.1.3.4 Grounds Maintenance and Landscaping Management
- 3.2.1.4 Agricultural Outleasements Management
- 3.2.1.5 Wildland Fire Management
- 3.2.1.6 Rare and Sensitive Ecosystems Management
- 3.2.1.7 Rare, Threatened, and Endangered Plant Species Management
- 3.2.2 Fish and Wildlife Management
  - 3.2.2.1 Wildlife Management and Habitat Enhancement
  - 3.2.2.2 Migratory Bird Management
  - 3.2.2.3 Fisheries and Aquatic Species Management
  - 3.2.2.4 BASH Reduction
  - 3.2.2.5 Invasive and Nuisance Wildlife Management
  - 3.2.2.6 Zoonosis Prevention
  - 3.2.2.7 Rare, Threatened, and Endangered Wildlife Species Management
- 3.2.3 Outdoor Recreation Management
  - 3.2.3.1 Public Access
  - 3.2.3.2 Educational Outreach
- 3.2.4 Integrated Ecosystems Management and Partnering
  - 3.2.4.1 Training of Natural Resources Personnel
  - 3.2.4.2 Natural Resources Law Enforcement
  - 3.2.4.3 Geographic Information System (GIS), Data Integration, Access, and Reporting
  - 3.2.4.4 Partnering with Federal and State Agencies, Universities, and Non-Governmental Organizations (NGOs)

The INRMP includes a review of potential projects to be implemented over the duration of the plan period, and has been prepared in such a way to accommodate anticipated changes in land use and habitat management. Projects and actions to achieve INRMP goals, with measurable objectives, are described in Section 3.0, and Appendix K provides a detailed summary table of

---

proposed INRMP projects and detailed description of each project's purpose, goals, objectives, baseline, and monitoring.

Establishment of a program to minimize bird strikes to aircraft is required by OPNAVINST 3750.6R and OPNAVINST 4790.2D. Due to the proximity of the Installation to wildlife habitat associated with Corpus Christi Bay, Oso Bay, Laguna Madre Estuary, Oso Creek, and the Encinal Peninsula, BASH is one of the primary issues of concern. The implementation of this INRMP will insure that efforts to enhance wildlife habitat will not increase the attractiveness of these areas to wildlife to the extent that birds or mammals may come into conflict with military aircraft operations. The BASH Program for the Installation follows the procedures established in NASCORPCINST 3750.16A (Appendix B), and receives updated migratory bird depredation permits annually from USFWS and wildlife depredation permits every five years from TPWD in support of the BASH Program. The Installation has also finalized a Wildlife Hazard Management Plan (Appendix C) for the Installation in cooperation with a U.S. Department of Agriculture (USDA) Wildlife Biologist, and the NASCC Air Operations Officer responsible for overseeing the BASH Program at the Installation. The BASH Program at the Installation is conducted in accordance with this guidance document. The current BASH Instruction for the Installation was updated in 2013 to include airfield activities conducted at NOLF Goliad.

This INRMP provides benefit of designated Critical Habitat and federally listed species known or with the potential to occur at the Installation as described in Sections 2.2.10 and 3.2.1.7 for listed plants and in Sections 2.3.6 and 3.2.2.7 for listed wildlife. The focus of rare, threatened and endangered species management on the Installation includes management of designated Critical Habitat for wintering piping plovers (*Charadrius melodus*), and management and conservation of populations of red knots (*Calidris canutus ssp. rufa*), two federally-threatened species that have been documented at the Installation (Texas A&M 2018a; Withers 2014; Woodin et al. 2010). Several other piping plover Critical Habitat areas have also been designated in the vicinity of the Main Station (see Section 2.3.6 and Figure 2-23). NOLF Goliad is located in the migratory pathway for whooping cranes (*Grus americana*) and installation managers strive for timely coordination with regulatory conservation partners should this species be observed at NOLF Goliad. The Installation also manages for conservation of maritime pocket gopher (*Geomys personatus maritimus*), a state-ranked S4 (Apparently Secure) species and a Species of Greatest Conservation Need in Texas (TPWD 2011) that occurs at the Main Station and NOLF Waldron.

Management measures identified in this INRMP that will conserve designated Critical Habitat for wintering piping plover located at the Main Station and will directly benefit other federally listed species known to occur at the Installation. Benefits to federally listed species known or with the potential to occur include updating species inventories as necessary to manage for these species and their habitats, including designated Critical Habitat; and implementing programs and activities for the protection and enhancement of all plant and wildlife habitats that occur at the Installation. Other management actions that will benefit federally listed bird species, including piping plovers and red knots, include conducting internal and agency consultation during project planning for actions as required for projects that may impact federally-listed species or designated Critical Habitat, conducting regular monitoring surveys of migratory birds, and providing public access and educational outreach. Routine monitoring of migratory birds by the

BASH Program Wildlife Biologist also will provide valuable information on the population of these species and their preferred habitat locations at the Installation. Projects and management actions that may indirectly impact federally listed bird species known or with the potential to occur are related to vegetation management and bird control measures conducted in support of the BASH Program. Proper management of these species will be afforded through implementation of the INRMP projects identified and described in Appendix K, all of which will provide direct benefit to these species.

Although most natural resources management efforts are focused on terrestrial species, managers also ensure that Navy operations, training, construction, and recreation along the installation's shorelines maintain awareness of protected marine species such as the West Indian manatee (*Trichechus manatus*), and sea turtles, especially the green sea turtle (*Chelonia mydas*). Water quality and erosion management described in this INRMP protect habitat for these species and their conservation is incorporated into programs such as outreach, education, and training for personnel and visitors.

These measures will ensure proper management of federally listed species known or with the potential to occur at the Installation, and will allow for improved management measures to be implemented, as needed. Furthering knowledge of federally listed plant and wildlife species occurring at the Installation through research projects and biological surveys will promote conservation of these species beyond the boundaries of the Installation and ensures Navy's stewardship requirements and compliance with the ESA.

An ecosystems management approach encourages management decisions to be made on the community or ecosystem level rather than at a single species level. Maintaining or improving the quality, integrity, and connectivity of the ecosystem benefits both natural communities and individual species. Efforts to maintain, enhance, and restore natural ecosystems may be the most appropriate management strategy, and would provide direct benefit to rare, threatened, and endangered plant and wildlife species known to occur at the Installation.

### **1.1.6 Stewardship and Compliance**

Compliance in terms of an INRMP refers to the actions that must be taken in order to abide by the statutes and regulations applicable to natural resources. These are actions that an installation is legally mandated or obligated to take in order to meet current or recurring natural and cultural resources conservation management requirements, and for which it *must* obtain funding. Examples of compliance actions including developing, updating, and revising INRMPS; conducting biological surveys to determine population status of rare, threatened, and endangered species; and conducting wetland surveys for planning, monitoring and/or permit applications. Compliance is essential, so these projects are of the utmost priority.

Stewardship is the responsibility to inventory, manage, conserve, protect, and enhance the natural resources entrusted to one's care in a way that respects the intrinsic value of these resources and the needs of present and future generations (OPNAVINST 5090.1D). Installations are required to recognize and balance environmental stewardship with mission readiness in retaining control and use of Navy land, sea, and air space for the purpose of maintaining the military mission. Conscious and active concern for the inherent value of natural resources must



be given in all Navy plans, actions, and programs (OPNAVINST 5090.1D). Stewardship projects and programs enhance an installation's natural resources, promote proactive conservation measures, and support investments that demonstrate Navy environmental leadership. Examples include education and public awareness projects, biological surveys or habitat protection for non-listed species, or management and execution of volunteer and partnership programs. Stewardship is an important component of the Navy's Environmental Readiness Program, and because stewardship projects can occur on an indefinite time-scale, these projects are prioritized after compliance projects.

### **1.1.7 Integration with Other Plans**

In addition to this INRMP, there are several other plans that address specific issues of natural resources management at the Installation. These plans are listed below and are described, where applicable, in this document:

- Master Plan Update (2011)
- Stormwater Pollution Prevention Plan (2012)
- Grounds Maintenance Contracts
- BASH Instruction, NASCORPCINST 3750.16A (Appendix B)
- Wildlife Hazard Management Plan (Appendix C)
- Study and Management Plan for the Maritime Pocket Gopher at Naval Air Station Corpus Christi (Cortez et al. 2007)
- Genetic Structure and Phylogenetic Relationships Among Pocket Gophers (*Geomys*) in Southern Coastal Texas (Henke et al. 2010)
- Management Plan for Controlling Invasive Exotic Plants at Naval Air Station Corpus Christi (Wiemers et al. 2007)

### **1.1.8 Policies and Regulations**

Appendix D provides a list of all regulations and policies that are applicable to development and implementation of this INRMP. Section 3.0 also lists the relevant laws, executive orders (EOs), regulations, directives, and memoranda relevant to each of the goals and objectives described for natural resources management at the Installation.

## **1.2 NAS CORPUS CHRISTI LOCATION, HISTORY, AND MILITARY MISSION**

### **1.2.1 Location**

All of the Installation parcels, with the exception of NOLF Goliad are located in Nueces County, Texas (Figure 1-1). The Main Station occupies approximately 2,629.6 ac (1,064.2 ha) (Table 1-1) within the limits of the City of Corpus Christi, in an area known as the Flour Bluff area. The Main Station lies along the southern edge of Corpus Christi Bay, and is separated from the Gulf of Mexico by Mustang Island, a barrier island that stretches 18 miles (mi) (29 kilometers [km]) from the northern tip of Padre Island north to Port Aransas. In addition to Corpus Christi Bay to

the north, the Main Station also is bordered by Oso Bay to the west and Laguna Madre Estuary to the east.

NOLF Cabaniss occupies approximately 952.9 ac (385.6 ha) and also is located within the city limits of Corpus Christi, approximately 8 mi (13 km) west of the Main Station. NOLF Waldron occupies approximately 902.7 ac (365.3 ha) of land approximately 3 mi (5 km) southwest of the Main Station, and also is located in the Flour Bluff area of the City of Corpus Christi. The Peary Place Transmitter Site is approximately 44.3 ac (17.9 ha) in size and is located on the western shore of Oso Bay, approximately 1 mi (1.6 km) west of the Main Station.

NOLF Goliad is located in Goliad County, and is approximately 1,136.0 ac (460.0 ha). NOLF Goliad is located approximately 80 mi (129 km) north-northwest of the Main Station and 13 mi (21 km) west-southwest of the Town of Goliad.

**Table 1-1. Acreage of Installation Properties.**

Installation Parcel	Area (ac)	Area (ha)
Main Station	2,629.6	1,064.2
NOLF Goliad	1,136.0	460.0
NOLF Cabaniss	952.9	385.6
NOLF Waldron	902.7	365.3
Peary Place Transmitter Site	44.3	17.9
<b>Total</b>	<b>5,665.5</b>	<b>2,293.0</b>

### 1.2.2 History

The Installation was commissioned in 1941 and has served as headquarters for the Naval Air Advance Training since 1948. In 1941, 800 instructors provided training for more than 300 cadets a month, with training nearly doubling at this site after the beginning of U.S. involvement in World War II following the bombing of Pearl Harbor in Hawaii. By the end of World War II, more than 35,000 naval aviators had received training at the Installation. Currently, the Installation produces approximately 500 newly qualified aviators each year (Navy no date [n.d.] b).

NOLF Cabaniss was built in 1941 as one of three satellite airfields, to support the Main Station, and was used for flight training of both American and foreign pilots (Freeman 2011a). The airfield was closed sometime between 1951 and 1964, and reopened after 1964 for Navy use. The airfield currently has two active runways, a control tower, and a fire department. It is primarily used by multi-engine Navy aircraft to conduct practice touch-and-go's during day and nighttime hours.

NOLF Waldron was built in 1943 as one of three satellite airfields, along with NOLF Cabaniss, supporting the Main Station, and was used for flight training of both American and foreign pilots (Freeman 2011b). The airfield was closed sometime between 1951 and 1964, and reopened sometime between 1964 and 1969 for limited use by the Navy. The airfield currently has two

---

active runways, a control tower, and a small fire department building. The airfield is used primarily by Navy T-34 aircraft to conduct practice touch-and-go's.

Naval Auxiliary Landing Field (NALF) Goliad was opened by the Navy in 1962 as a satellite airfield to support NAS Chase Field located in Beeville, Texas (Boscamp 2011 and Freeman 2011c). As part of the Base Realignment and Closure Act of 1991, NALF Goliad was closed by the Navy in 1992, and NAS Chase Field was closed in 1993. The Navy sold NALF Goliad to the County of Goliad in 2000 under the agreement that the airfield would be used as a source of economic development for the county (Boscamp 2011). The Navy reacquired the airfield as part of an eminent domain ruling by a county judge in 2011 (Collette 2011) to provide the needed 5,000-foot runway length requirements for the new T-6 aircraft that have been phased in to replace the aging T-34 fleet of turboprop aircraft stationed at the Installation. Significant improvements have been made to the airfield to support operations of the T-6 aircraft, including construction of a fire department and airfield support facilities and establishment of approximately 500 ac (202 ha) of agricultural outlease areas. Reuse of the site began in October 2012 (Collette 2012). Due to recent standardization for naming of Navy outlying airfields, the airfield descriptor for auxiliary landing fields has been changed to outlying landing fields, which changed the identifier for these airfields from NALF to NOLF.

Land associated with the Peary Place Transmitter site was purchased in 1941, and functioned as the transmitter site for the Main Station. In 1982, its function was moved to the Main Station. Beginning in March 1982 the Navy began leasing the site to local soccer clubs. As of August 2011, the Gulf Coast Soccer Club began leasing the site and currently manages the site through a lease agreement with the Navy (Legaspi 2013).

### **1.2.3 Military Mission**

The primary mission of the Installation is to *“maintain and operate facilities and provide services and material to support operations of aviation activities and units of the Naval Air Training Command and other tenant activities and units”* (Navy n.d. a). In general terms, the primary objective of the Installation is to serve as a center for training Navy jet pilots. Specifically, the mission can be correlated with the following major commands that are assigned to the Installation:

- Chief of Naval Air Training
- Training Air Wing Four
- Naval Air Station Corpus Christi
- Training Squadron 27 (VT-27)
- Training Squadron 28 (VT-28)
- Training Squadron 31 (VT-31)
- Training Squadron 35 (VT-35)
- Armed Forces Reserve Center
- U.S. Coast Guard Air Station

- Corpus Christi Army Depot (CCAD)
- Defense Logistics Agency
- U.S. Marine Aviation Training Support Group

The Main Station contains the main operation and housing facilities for personnel stationed at the Installation. On average the Main Station has a base population of 10,000 employees who originate from all parts of the country to work at the base. The CCAD is the largest tenant command at the Installation with 6,000 employees, and includes the Army's largest helicopter repair, overhaul, and maintenance center. The missions of the major units at the Installation are not expected to change in the immediate future (Torres 2013).

The effect of natural resources on the military mission at the Installation can be seen in its land use patterns and, in some cases, in the everyday operations. The development patterns at the Installation have been shaped by the shoreline and constrained by the bays surrounding the Main Station and other natural resources that limit development at the other Installation parcels (mainly wetlands and floodplain areas). Flight operations are conducted in consideration of wind patterns and the Installation location within the Central Flyway. Everyday operations at the Installation that may affect natural resources include actions that may impact wetlands, stormwater, and state or federally protected species, and protection of these resources should be considered when conducting maintenance and management activities at the Installation.

The mission and land use of the Installation are subject to change over time as the military needs of the DoD change. This INRMP will be flexible to accommodate these changes as they occur while still providing for the requirements of SAIA, and Navy environmental regulations. Yearly reviews of INRMP activities, and a complete review and update of this INRMP every five years will provide the mechanism to positively respond to changes in the military mission of the Installation, and continue to meet the requirements of environmental laws and regulations. As tenant commands change or expand, impacts to natural resources are avoided or minimized to the extent practicable, such as through the use of best management practices (BMPs) to protect water resources during construction and other development activities (AHEC 2013).

#### **1.2.4 Operations and Activities**

With the exception of NOLF Goliad, the Installation parcels are located within the city limits of Corpus Christi. The Main Station contains an active airfield and airfield support facilities, including housing, medical buildings, offices, and utilities, in addition to several athletic fields, the Gulf Winds Golf Course, docks, and a park. The Corpus Christi Army Depot, the primary aviation depot maintenance for DoD rotary wing aircraft, also is located at the Main Station.

NOLF Cabaniss contains an active airfield and several agricultural outlease areas. It is primarily used for circuit training of aircraft stationed at the Main Station. NOLF Waldron contains an active airfield and airfield support facilities in addition to several agricultural outleases.

Peary Place Transmitter Site does not currently provide any operation support for the Installation military mission. The site contains athletic fields and support facilities for public outdoor

recreation activities, and is managed and maintained by the Gulf Coast Soccer Club as an outdoor recreational area through a license agreement.

NOLF Goliad contains two 8,000-ft (2,438-m) runways and airfield support facilities, including a fire department. The primary mission of NOLF Goliad is to support training and operations of next-generation aircraft. Approximately 500 ac (202 ha) of agricultural outleases also are located at NOLF Goliad.

### 1.3 INRMP GOALS AND OBJECTIVES

The implementation of this INRMP is intended to be a dynamic, multidisciplinary process. To provide direction, recognize target management objectives, and construct the framework for measuring success of this INRMP, the following goals objectives have been established for the Installation:

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Issue:** Development and training activities have a significant potential to affect land area at the Installation; as a result, land management decisions and practices are important aspects of ecosystems management. The use and management of lands for military mission needs, and the decision-making process regarding such land use, directly affects the sustainability of the ecosystem.

Land and water management decisions will become increasingly important at the Installation as development and training activities increase. Land and water use during military training, and the decision-making progress regarding such land and water use, directly affect ecosystems sustainability. To protect and maintain natural resources while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objectives:

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.2:** Achieve no net loss of wetlands.

**Objective 1.3:** Improve and enhance water quality by reducing nonpoint source (NPS) pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

**Objective 1.5:** Maintain vegetation to reduce BASH potential.

- 
- Objective 1.6:** Maintain vegetation to reduce wildland fire hazards.
  - Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.
  - Objective 1.8:** Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.
  - Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.
  - Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, EOs, regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.

**Issue:** Human activities at the Installation and in the surrounding community have removed native vegetative communities and altered natural habitats. Environmental resources at the Installation provide vital habitat for fish and wildlife, especially in view of the considerable development and economic growth in the surrounding regions of the parcels located in Nueces County. To protect and maintain wildlife habitats while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objective:

- Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

**Issue:** Occasionally, nuisance wildlife species (e.g., feral cats, wild hog, and some bird species) become overpopulated or congregate in areas creating a threat to human health and/or the military mission. In such cases, these wildlife species must be controlled to prevent problems. To protect, maintain, and restore habitat for native plants and wildlife, while preventing nuisance wildlife from negatively impacting quality of life and the military mission, the Installation will implement programs to address the following objective:

- Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

**Issue:** Federally or state-listed plant and animal species that occur at the Installation have been identified as conservation priorities and require special protection efforts. Managing federally listed threatened and endangered species, and other rare species, is important to achieving no net loss in mission capability. To provide for protection and conservation of the state and federal rare, threatened or endangered species known or with the potential to occur at the Installation, the Installation will implement programs to address the following objective:

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.**

**Issue:** In accordance with the SAIA, an INRMP shall, to the extent appropriate and applicable, provide for public access to an installation for use of natural resources, including outdoor recreation, subject to safety, military security considerations, and the military mission. Additionally, public access for the use of the natural resources for outdoor recreation should not result in degradation of installation natural resources. In addition to traditional outdoor recreation activities such as hiking, wildlife watching, outdoor recreation activities can include educational signage and other programs that foster a sense of responsible stewardship for military personnel and the general public who are authorized access to an installation for these recreational purposes. The following objectives were developed to address Goal 2.

**Objective 2.1:** Evaluate additional opportunities for natural resources-related outdoor recreation.

**Objective 2.2:** Provide and promote outdoor recreation opportunities (e.g., wildlife observation) to DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors.

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Issue:** Plans and programs for maintaining and managing natural resources at the Installation need to fully consider the interrelationships of resources and insuring no net loss in mission capability. Often in the past, existing programs and plans have frequently focused on the management of individual resources in accordance with federal or state laws. Ecosystems management cannot be accomplished solely through the implementation of programs and plans focused on individual resources. A coordinated effort among all programs and personnel, from tenant commands to decision-making authorities, is necessary to protect the interdependent components of communities that define an ecosystem. The coordinated effort will address the consequences of actions on related resources, and will resolve conflicts between competing programs and plans for use of the natural resources at the Installation.

Ecosystems management is a holistic, adaptive management concept that transcends human-made boundaries, both internal and external to the Installation. Management intended to promote sustainable ecosystems requires awareness, education and training, and responsible participation of all individuals potentially affecting the ecosystem, as well as adjustments in management principles and practices to respond to new knowledge and dynamic conditions. To participate in adaptive ecosystems management, the Installation will implement programs to meet the following objectives:

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the Natural Resources Program (NRP) at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.4:** Establish a planning team to review and update the INRMP in accordance with OPNAVINST 5090.1D, 12-3.4.
- Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Issue:** The input and cooperation of regulatory agencies and other experts will ensure the success of the plans and programs implemented as part of this INRMP.

- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.
- Objective 4.2:** Develop partnerships with U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS), Texas Commission on Environmental Quality (TCEQ), Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD Partners in Flight (PIF), Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.
- Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

From these goals and objectives, a variety of management strategies and projects specific to the needs of the Installation have been developed and are described in Section 3.0. Maps showing the natural resources management focuses for each functional area or parcel at the Installation are provided in Section 4.0. Project details are provided in Appendix K. Annual reviews of the INRMP will be used to determine if modification of a management action may be needed to



reach the desired goal. For example, a change in management actions may become necessary because of an unforeseeable and large-scale disturbance (e.g., a hurricane or a drought) to the natural resources. This type of adaptive and integrated management approach allows for changes in short- and long-term goals due to changes in the conditions of the natural resources at NASCC.

This INRMP is a long-term planning document that guides implementation of the natural resources program to help ensure consistency with the Installation's military mission, while protecting and enhancing natural resources, to the extent practicable. In accordance with Integrated Natural Resources Management Program (32 CFR Appendix to Part 190), the SAIA, and OPNAVINST 5090.1D, this plan must provide for the following, consistent with military operations at the Installation:

- management of fish and wildlife, land, and forest resources;
- identification of fish- and wildlife-oriented recreational use activities and areas;
- enhancement or modification of fish and wildlife habitat;
- protection, enhancement, and restoration of wetlands where necessary for support of fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resources management goals and objectives, and time frames for proposed actions;
- sustainable use by the public of natural resources to the extent that such use is consistent with the needs of natural resources management and subject to Installation safety and security requirements;
- enforcement of natural resources laws and regulations;
- no net loss in the capability of military lands to support the military mission of the Installation; and
- regular review of this INRMP and its effects annually, and updated no less often than every five years.

Some of the INRMP projects covered by this plan may require some level of construction and/or ground disturbance; however, these activities are not expected to substantially affect natural resources. If impacts to sensitive natural resources are expected from implementation of management actions associated with this INRMP, the Installation will coordinate as early as possible during the construction planning process with the appropriate resource agencies that have jurisdictional oversight of the sensitive resources involved. Section 5.2 of this document describes agency consultation requirements for potential impacts to federally listed species.

Although much of the Installation has been subject to development to support the military mission, opportunities exist where the natural environment and the military mission can coexist and, in some cases mutually benefit each other. It is the goal of this INRMP to not only integrate

the conservation and enhancement of Installation natural resources, but to also identify opportunities where natural resources enhancement will promote the military mission.

## **1.4 RESPONSIBILITIES**

### **1.4.1 INRMP Funding**

In accordance with OPNAVINST 5090.1D, the Installation Commanding Officer is responsible for funding, preparation, and implementation of the INRMP. The Commanding Officer will use all available technical assistance as needed, including staff from NAVFAC Southeast, in developing and maintaining an effective, integrated program to protect, conserve, and utilize natural resources on Installation properties.

Grounds maintenance is provided by a contract administered by NASCC Public Works. Under the direction of the Installation Commanding Officer, the Public Works Officer is responsible for implementing the INRMP with the assistance of the Installation NRM. Additional assistance will be obtained, as needed, from outside federal and state agencies, including USFWS, U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA), USDA NRCS, USDA Animal and Plant Health Inspection Service (APHIS), TPWD, TCEQ, and NAVFAC Southeast. The Installation Morale, Welfare, and Recreation (MWR) Department is responsible for developing and coordinating the outdoor recreation and educational programs covered by this INRMP in coordination with the NRM.

Potential sources of funding for INRMP projects are discussed in Section 5.6.

### **1.4.2 INRMP Implementation Responsibilities**

The Installation Commanding Officer has the primary responsibility for implementing this INRMP, although various entities also are directly involved in development and implementation of the natural resources recommendations identified in this document, including the NASCC Public Works Officer and the NRM. The concept of integrated management of natural resources both justifies and requires that internal and external stakeholders contribute to the management of natural resources at the Installation.

### **1.4.3 Agency Coordination**

During the planning process for Navy actions and projects that impact sensitive natural resources, the Navy will coordinate as early as practical with appropriate federal and state natural resource agencies. When actions or projects are mission essential and/or severely time-constrained, agency coordination may not occur except as required by laws or regulations for impacts to wetlands and/or federally threatened or endangered plant and wildlife species. This INRMP has been prepared to provide guidance on avoiding or minimizing impacts to natural resources, and to limit disturbance to natural resources located in non-priority mission areas. Suitable mitigation will be sought for unavoidable natural resources impacts that result from military mission or INRMP activities. Additional details on agency consultation requirements are included in Section 5.2 of this document.

#### **1.4.4 Internal Stakeholders**

The Installation Commanding Officer, Public Works Officer, and NRM are directly involved in implementation of this INRMP, while ensuring successful implementation of the military mission. The Installation Commanding Officer is responsible for ensuring that Installation personnel comply with the laws and requirements relevant to the conservation and management of natural resources. The NRM and the Environmental Compliance Division, Public Works Department (PWD) have the responsibility of ensuring this INRMP is reviewed annually and updated as necessary to reflect current natural resources conditions, and formally reviewed and updated every five years as required by the SAIA. Other stakeholders, including the Navy's MWR Department, NASCC PWD, and the Installation commands are responsible for providing access to and oversight of natural resources for economic and recreational purposes, and/or for natural resources management and protection. Navy contractors working at the Installation assist in implementation of the INRMP but are not responsible for oversight of natural resources.

#### **1.4.5 External Stakeholders**

External stakeholders of Installation natural resources include federal and state natural resource agencies, local governments and landowners, civic and conservation groups and the Navy. For this INRMP, a stakeholder is an individual, group, or agency that has the responsibility or mandate to preserve and manage natural resources on the Installation, that has a right or privilege to make use of the natural resources, or that may be affected directly or indirectly by natural resources management actions conducted on the Installation.

State and federal agencies, such as USFWS, USDA NRCS, USDA APHIS, EPA, USACE, TPWD, and TCEQ are the primary stakeholders responsible for natural resources protection and preservation. Other stakeholders include NGOs and individuals who make use of those natural resources, such as civilian groups, including residents of the surrounding communities who have access to, or are affected by, the condition of Installation natural resources, and private conservation organizations. Table 1-2 provides a list of stakeholders currently involved with natural resources management at the Installation.

**Table 1-2. Stakeholders of Natural Resources on the Installation.**

Federal, State, and Local Agencies	
United States (U.S.) Fish and Wildlife Service	Texas Parks and Wildlife Department
NOAA National Marine Fisheries Service	U.S. Department of Agriculture (USDA), Natural Resources Conservation Service
U.S. Geological Survey	Texas Commission on Environmental Quality
U.S. Environmental Protection Agency	USDA Animal and Plant Health Inspection Service
U.S. Army Corps of Engineers	USDA Wildlife Services
Goliad County	Texas General Land Office
Nueces County	City of Corpus Christi
Department of Defense	
Naval Air Station Corpus Christi (NASCC) Public Works Department	NASCC Training Squadron 27 (VT-27)
NASCC Commanding Officer	NASCC Training Squadron 28 (VT-28)
Morale, Welfare, and Recreation Department	NASCC Training Squadron 31 (VT-31)
Corpus Christi Army Depot	NASCC Training Squadron 35 (VT-35)
Navy personnel	Training Wing 4
Non-Governmental Organizations and Individuals	
Department of Defense Partners in Flight	Military Retirees
National Audubon Society	Dependents of Navy Personnel
The Nature Conservancy of Texas	Major Navy Contractors
Native Plant Society of Texas	Texas A&M University – Corpus Christi

## 1.5 AUTHORITY

This INRMP was prepared to comply with the SAIA, DoDI 4715.03, and OPNAVINST 5090.1D. These regulations require that the Secretary of Defense implement a program to provide for the conservation and rehabilitation of natural resources on military installations. The Secretaries of each military department are authorized to carry out the program, consistent with the use of military installations, to ensure the preparedness of the U.S. Armed Forces. The Secretary of the Navy implements and maintains a balanced and integrated natural resources management program for all Navy and U.S. Marine Corps installations.

To facilitate the NRP, the Secretary of each military department is directed to prepare and implement an INRMP for each military installation under the jurisdiction of the Secretary. The INRMP must be prepared in cooperation with the Secretary of the Interior, acting through the Director of the USFWS, and the head of the appropriate fish and wildlife agencies of the state in which the military installation is located.

The Sikes Act acknowledges that the principal use of military installations is to ensure the preparedness of the U.S. Armed Forces. In accordance with the Sikes Act, the INRMP shall, to the extent appropriate and applicable, provide for the following:

- implementation of an ecosystem based program that provides for conservation and rehabilitation of natural resources consistent with the military mission;
- integration and coordination of all natural resources management activities;
- provision for sustainable multipurpose uses of natural resources;
- provision for public access for use of natural resources subject to safety and military security considerations; and
- enforcement of applicable natural resource laws (including regulations).

The Sikes Act also requires that the INRMP be submitted for public review and comment before being finalized. To fulfill this requirement an EA was prepared to satisfy NEPA requirements, which included opportunities for public review and comment on the INRMP (Navy 2001). DoDI 4715.03 and OPNAVINST 5090.1D state that INRMPs must incorporate the principles of ecosystems management as the basis for natural resources management on Navy lands. In accordance with this policy, the Navy will strive to maintain healthy, contiguous ecosystems on its own lands; where ecosystem boundaries extend onto adjoining lands, the Navy will strive to work cooperatively with neighboring landowners to manage these ecosystems.

This page is intentionally blank.

---

## **2.0 EXISTING CONDITIONS**

The Installation encompasses five parcels that are situated within Nueces and Goliad counties in southeast Texas, totaling approximately 5,665.5 ac (2,293.0 ha) (Figure 1-1). All of the parcels, with the exception of NOLF Goliad, are located within the City of Corpus Christi, in Nueces County (Figure 1-1). The Main Station is located adjacent to the southern boundary of Corpus Christi Bay and the eastern edge of Oso Bay, approximately 5 mi (8 km) inland from the Gulf of Mexico. The City of Corpus Christi, Corpus Christi Bay, and the five parcels are separated from the Gulf of Mexico by Mustang Island, a barrier island. NOLF Cabaniss is located approximately 8 mi (13 km) west of the Main Station. NOLF Waldron is located approximately 3 mi (5 km) southwest of the Main Station. The Peary Place Transmitter Site is located 2.5 mi (4 km) southwest of the Main Station. NOLF Goliad is located in Goliad County, approximately 14 mi (23 km) southwest of the City of Goliad and approximately 67 mi (108 km) northwest of the Main Station. Acreages for each of the five parcels are provided in Table 1-1.

This INRMP includes a description of the existing conditions and natural resources management of all NASCC parcels, with exception of Peary Place Transmitter Site. The Peary Place Transmitter Site, although owned by the Navy, does not provide operational support of the Installation military mission.

### **2.1 SITE CONDITIONS**

#### **2.1.1 Site Conditions**

##### **Main Station**

The Main Station contains the active airfield and airfield support facilities, including housing, medical buildings, offices, and utilities (Figure 2-1). The Main Station includes Truax Field and dozens of tenant organizations including the CCAD, the Army's largest helicopter repair, overhaul, and maintenance center. Several recreation and athletic fields are located within the eastern half of the parcel, including the Gulf Winds Golf Course, several fishing piers, and a park located along the eastern boundary. The Main Station does not contain any agricultural outlease areas.

##### **NOLF Cabaniss**

NOLF Cabaniss contains an active airfield and several agricultural outlease areas (Figure 2-2). Agricultural outlease areas are described in Section 3.2.1.4. NOLF Cabaniss is used primarily for circuit training of aircraft stationed at the Main Station. NOLF Cabaniss contains several agricultural outlease areas, a majority of which are located in the northern section of the parcel. A small agricultural outlease area is also located in the southern section of the parcel. The agricultural outleases associated with NOLF Cabaniss are not shown on Figure 2-2 as data are not currently available for these areas.

No recreational facilities are associated with NOLF Cabaniss.

## **NOLF Waldron**

NOLF Waldron contains an active airfield, airfield support facilities, and an outdoor recreational field area that is leased to a private organization for public use (Figure 2-2). NOLF Waldron also contains several agricultural outlease areas; however, these are not shown on Figure 2-2 as data are not currently available for these areas.

## **Peary Place Transmitter Site**

Peary Place Transmitter Site is currently leased to the City of Corpus Christi, and does not provide any operational support for the Installation military mission (Figure 2-2). The site contains athletic fields and support facilities for public outdoor recreation activities, and is managed and maintained by the Gulf Coast Soccer Club. This site is briefly described in this INRMP; however, no direct management of natural resources on this parcel is associated with this INRMP.



*Soccer fields at the Peary Place Transmitter Site*

Source: L. Rivard

## **NOLF Goliad**

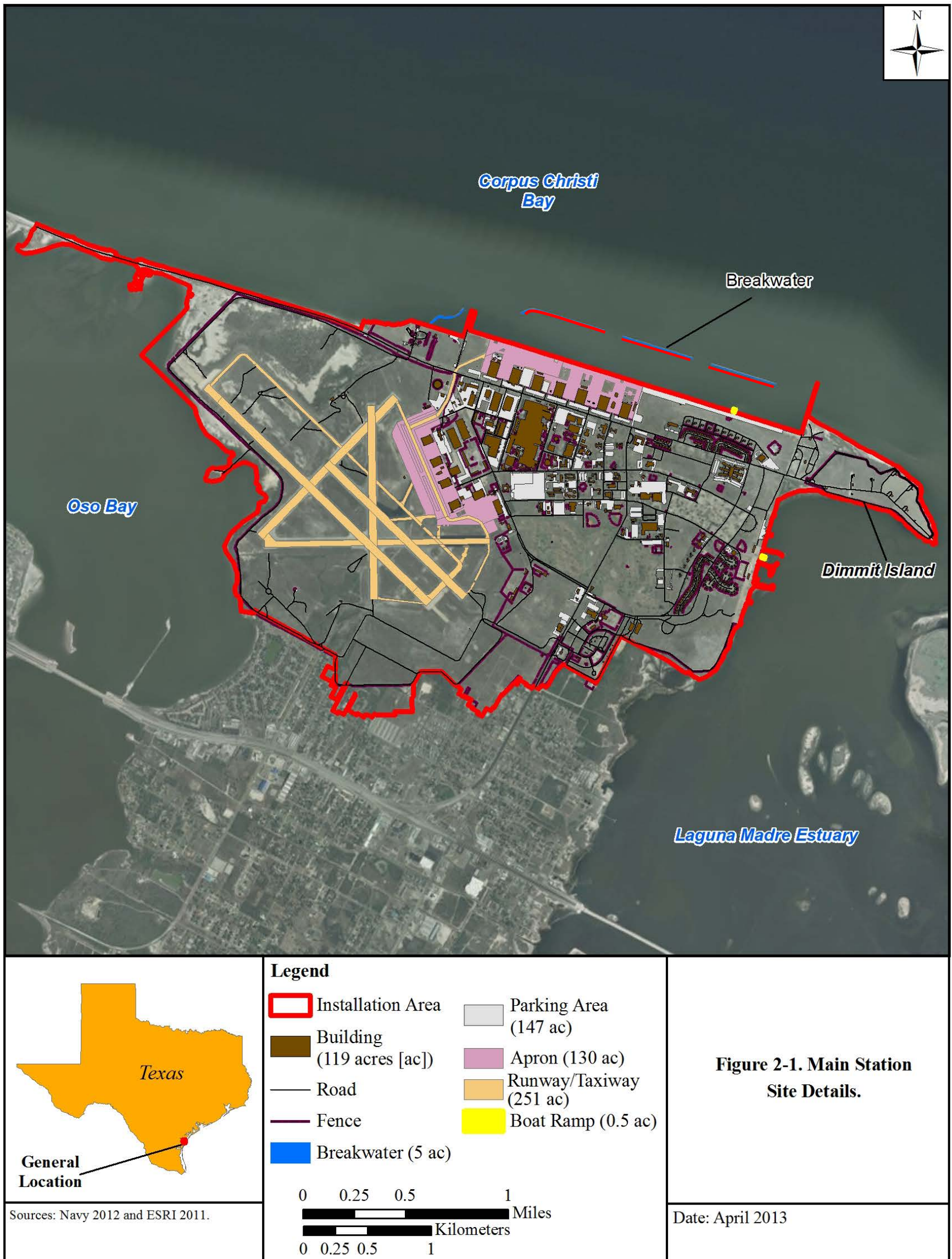
NOLF Goliad contains a runway and airfield support facilities, and agricultural outlease areas (Figure 2-3). New airfield and support facilities, including a fire department, were recently constructed at NOLF Goliad to support air operations in association with the recent transfer of this property to the Navy from Goliad County. NOLF Goliad contains two 8,000-foot (ft) (2,438-meter [m]) runways that support training and operations of next-generation training aircraft. The site contains a pond located in between the two runways; however, no formal recreational facilities are located at this site.

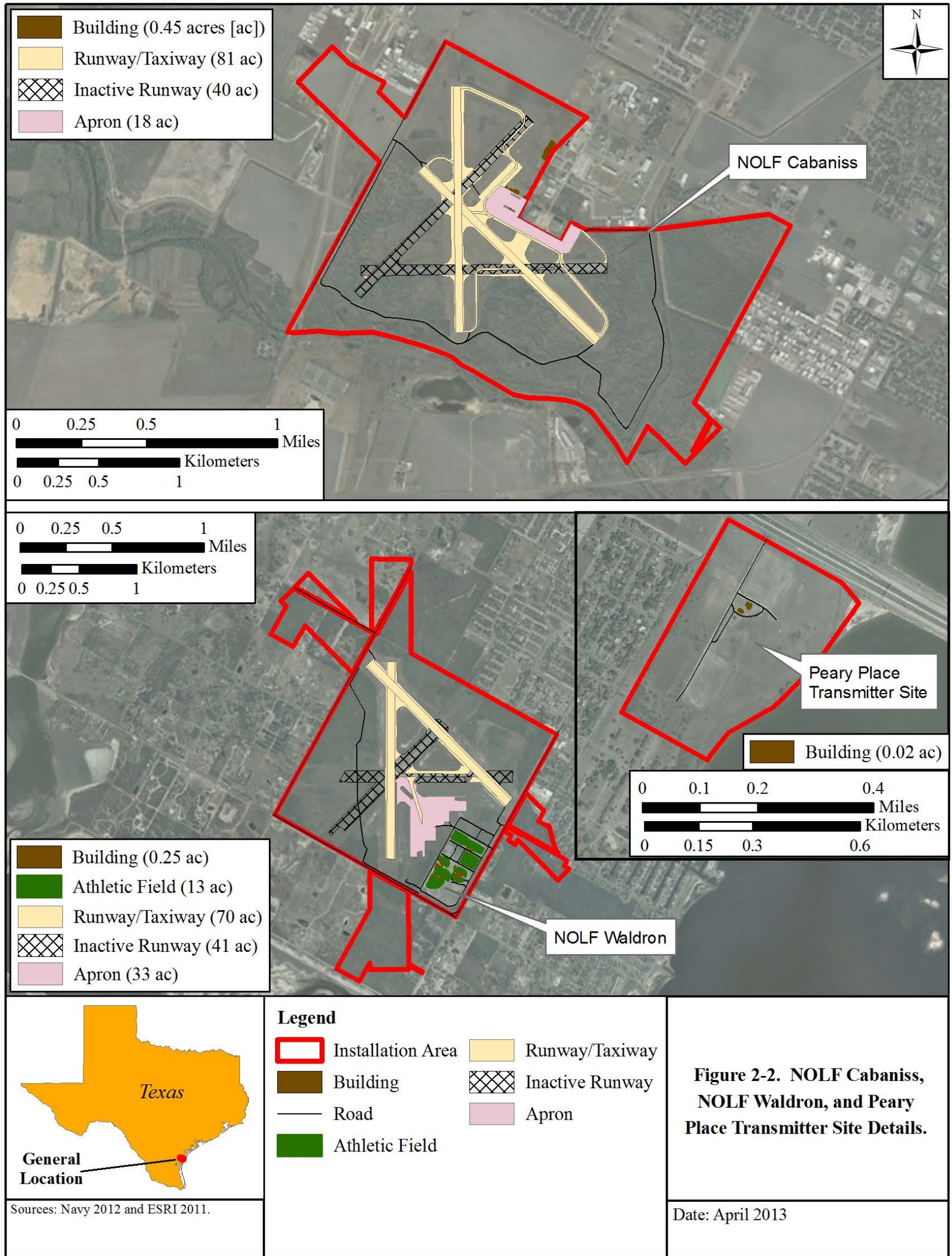
### **2.1.2 Natural Resources Constraints and Opportunities**

The natural resources constraints and opportunities for development in support of the military mission are identified for each of the Installation parcels in Figure 2-4, Figure 2-5, and Figure 2-6. Natural resources management issues and requirements pose the following constraints to the Installation's military mission and to the further development of Installation lands:

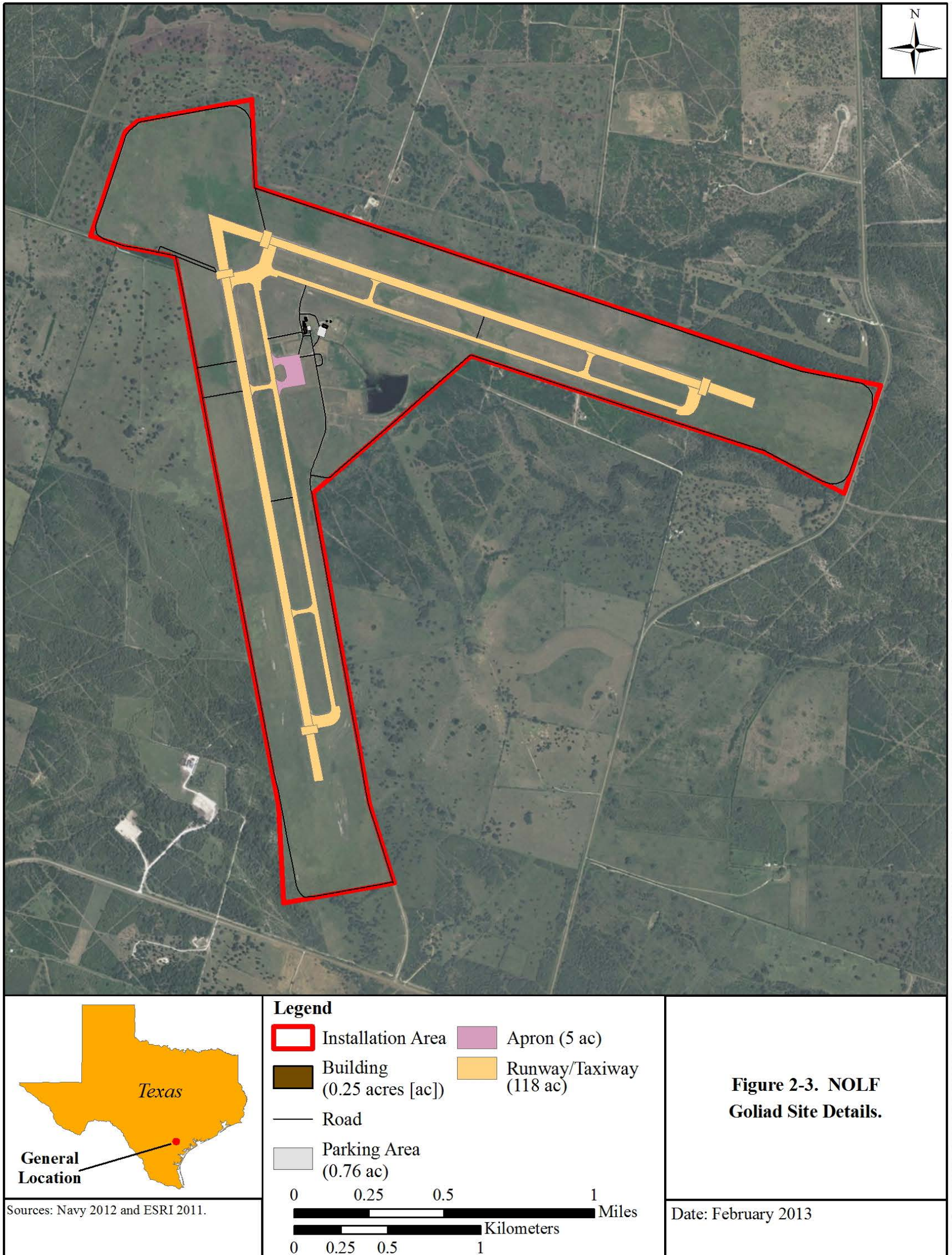
- restrictions on allowable uses of beaches and coastal zone;
- limitations on construction within 100-year and 500-year floodplain areas;
- limitations on construction within surface waters, wetlands, and riparian buffer areas;
- designated Critical Habitat for wintering populations of piping plover located adjacent to and within the Main Station boundary;
- conservation and encouragement of protected flora and fauna species and their habitats; and protection of maritime pocket gopher populations.

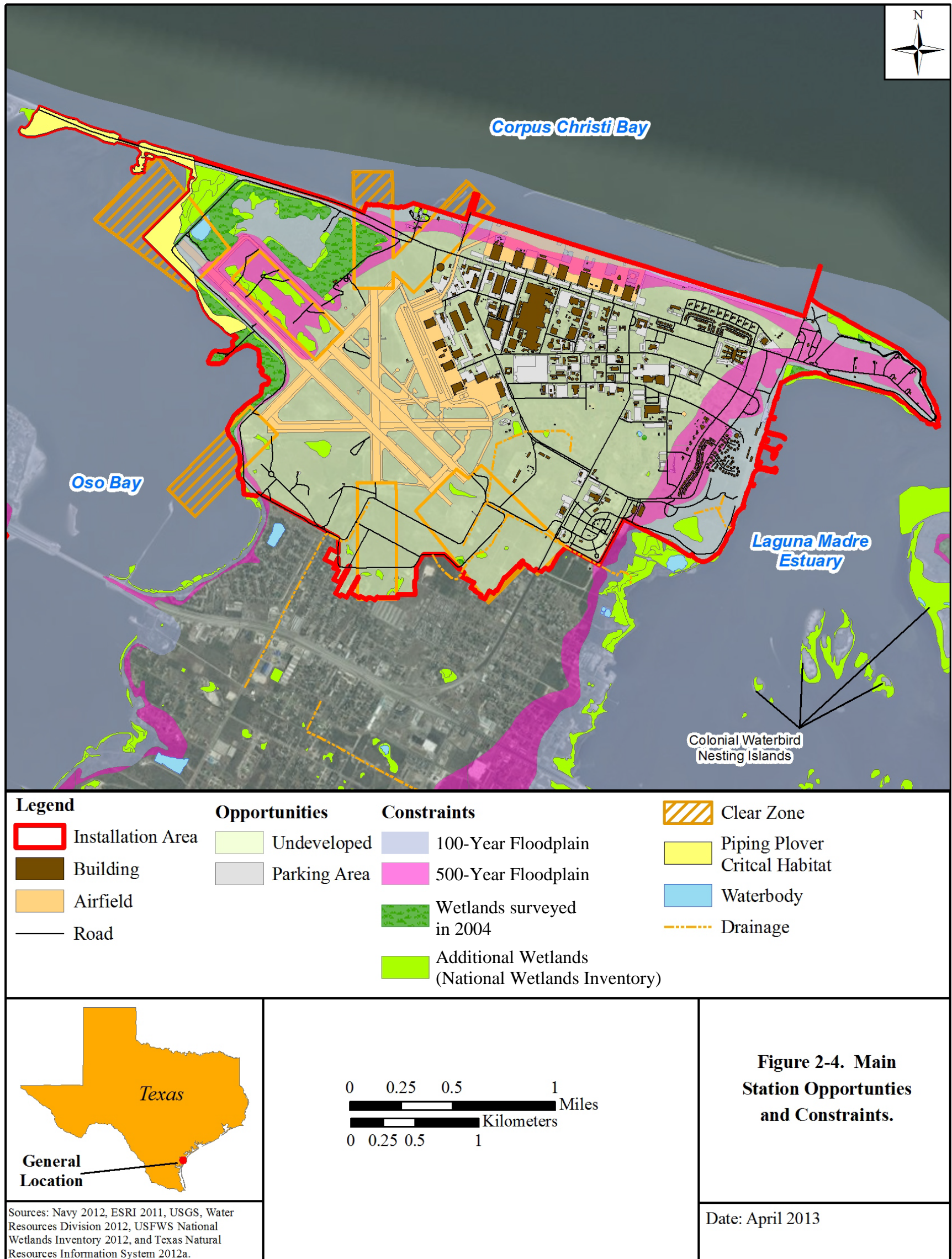




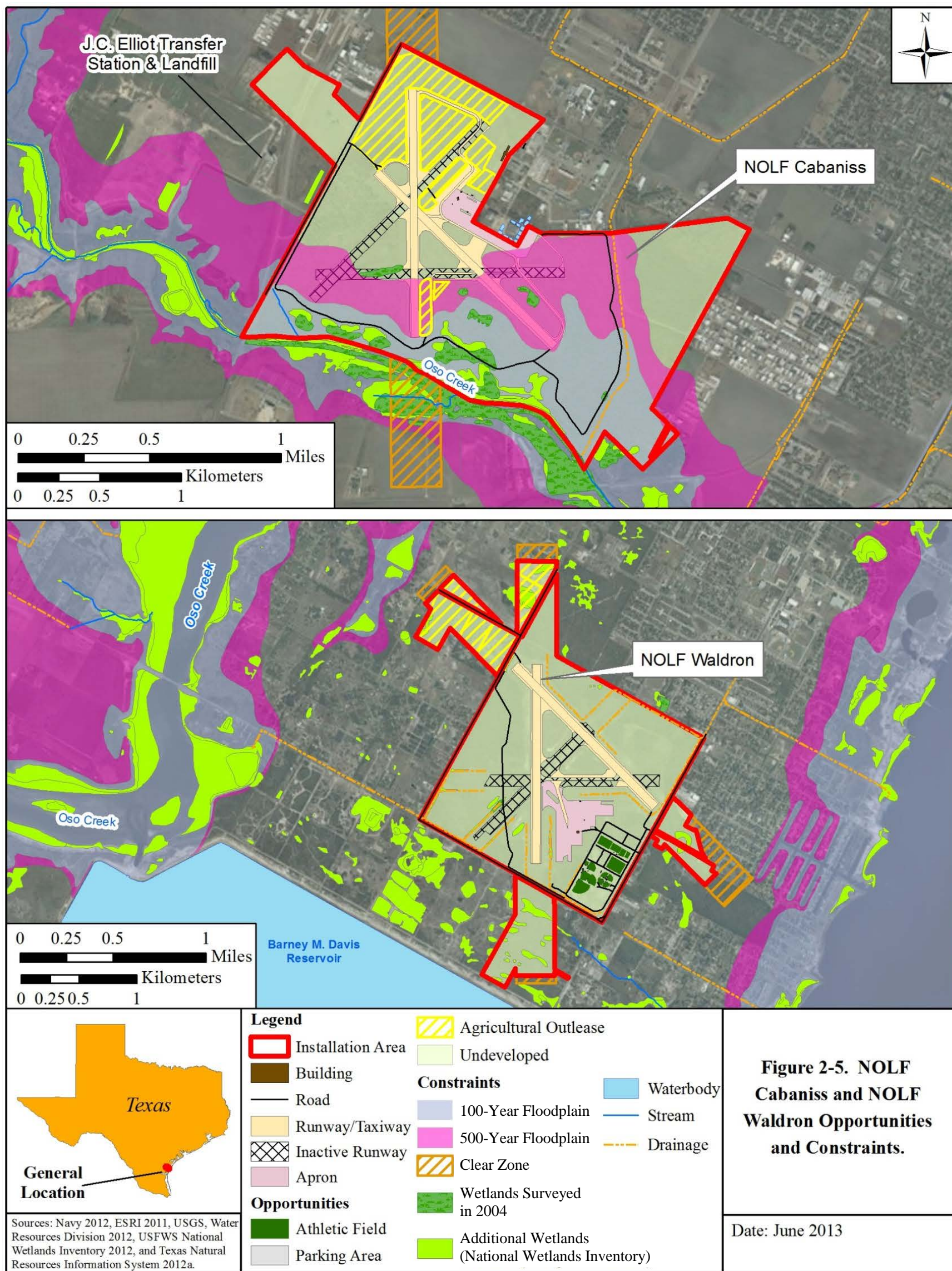


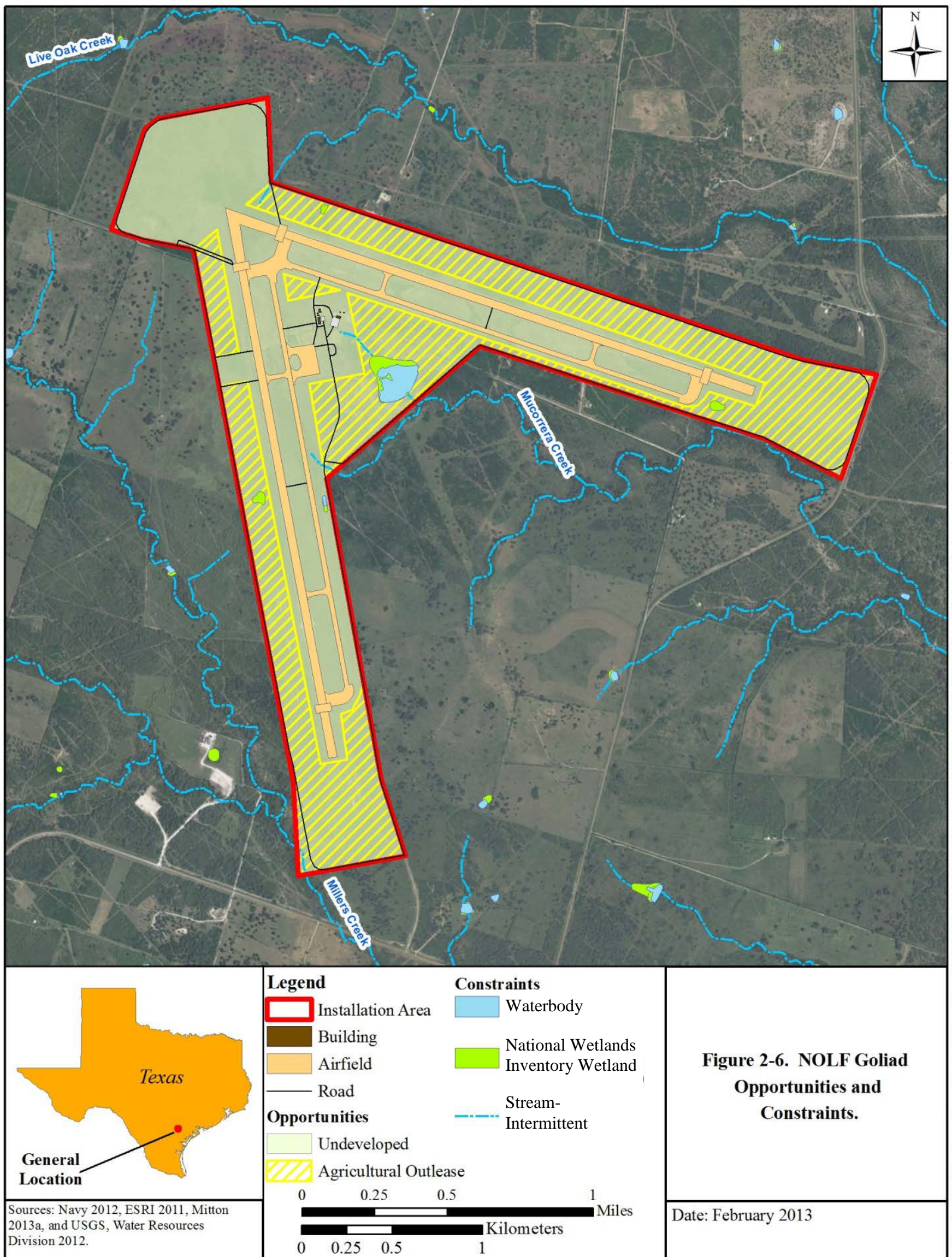
Z:\projects\NAVFAC\100 NRS T23330 JM03 CRPS CHRISTGIS\MXD\FIGURES\20130130 REVISIONS\TTP T23330-JM03 Fig2-2.mxd SMH





Z:\projects\NAVFAC\1100\_NRS\_T23330\_NRS\_T23330\_JM03\_CRPS\_CHRST\GIS\MXD\FIGURES\20130130\_REVISIONS\TTP\_T23330-JM03\_Fig2-4\_CC\_OppsCons.mxd, SMH





---

Although the Navy does not have authority over managing for constraints located outside the Installation boundary, major natural resources constraints are identified for each parcel as relevant for informational and planning purposes.

The major constraints at the Main Station are wetland and floodplain areas, designated Critical Habitat for piping plover located within and adjacent to the western boundary, and management of federally protected species known to occur and/or habitats that support these species (Figure 2-4). Currently the only federally-listed species known to at least occasionally occur at the Main Station are the federally-threatened red knot and piping plover (Texas A&M 2018a; Withers 2014; Woodin et al. 2010). Other federally listed species that have the potential to occur in Nueces County, based on the presence of suitable habitat at NASCC parcels located in Nueces County, are included in Appendix E, Table E-13. Natural resources constraints located nearby and outside the boundary of the Main Station include colonial waterbird nesting islands located to the east within Laguna Madre Estuary, and the location of the Main Station within the Central Flyway, a major migratory route for birds. Additionally, the Main Station is located within 20 mi (32 km) of two city landfills.

At NOLF Cabaniss and NOLF Waldron the major constraints are wetland and floodplain areas and maintaining the Clear Zone areas that are located outside of the Installation's boundary (Figure 2-5). No federally listed species have been documented as occurring at NOLF Cabaniss. Federally-listed species that have the potential to occur in Nueces County, based on the presence of suitable habitat at Installation parcels located in Nueces County, are included in Appendix E, Table E-13. Natural resources constraints located nearby and outside the boundary of the NOLF Cabaniss several landfills located within 10 mi (16 km), one of which is located within 0.25 mi (0.40 km) west of the airfield. Landfills are also located within 20 mi (32 km) of NOLF Waldron. NOLF Cabaniss and NOLF Waldron also are located within the Central Flyway.

At NOLF Goliad the major constraints are the surface waters and wetland areas, although these are scattered throughout and encompass a very small portion of the parcel (Figure 2-6). No federally listed species have been documented as occurring at NOLF Goliad. Other federally listed species that have the potential to occur in Goliad County, based on the presence of suitable habitat at NOLF Goliad, are included in Appendix E, Table E-14. Natural resources constraints located outside of the NOLF Goliad boundary include the Central Flyway, an important flyway for the endangered whooping crane (*Grus americana*). Whooping cranes migrate from Wood Buffalo National Park in Canada to winter at Aransas National Wildlife Refuge (USFWS 2013b), located approximately 50 mi (81 km) southeast of NOLF Goliad. Installation managers strive for timely coordination with regulatory conservation partners should this species be observed at NOLF Goliad.

Outside of these constraints the remaining areas of the Installation represent opportunity areas where mission activities would not be restricted by natural resources management issues. In addition to the opportunities (i.e., open areas) identified in Figure 2-4, Figure 2-5 and Figure 2-6, there are some possible opportunities for the Navy to leverage undeveloped habitat outside of the Installation's boundaries in support of the military mission via encroachment partnering, although these opportunities are limited at the Main Station due to the highly developed nature of the land located adjacent to this parcel. The undeveloped habitat areas that border Installation

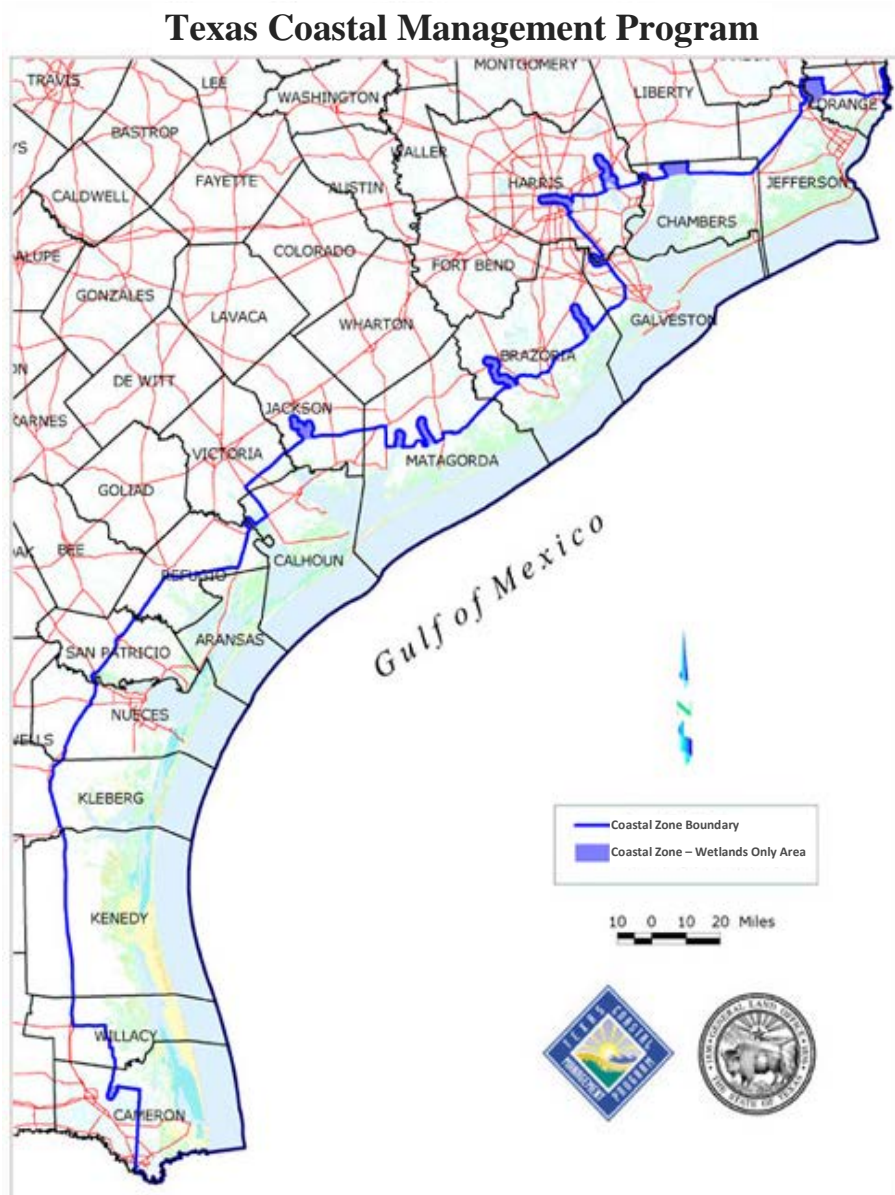
present potential opportunities for the Navy to establish buffers to separate Installation from encroaching development.

## 2.2 LAND RESOURCES

The Installation encompasses five parcels of land (Figure 1-1) totaling approximately 5,665.5 ac (2,292.8 ha) (Table 1-1).

### 2.2.1 Physiographic Location

The Installation is located within the Gulf Coastal Plains Province of Texas, which includes Coastal Prairies, Interior Coastal Prairies, and Blackland Prairies subprovinces. With the exception of NOLF Goliad, the Installation parcels are located in the Coastal Prairies Subprovince. Elevations within this subprovince range from at or near mean sea level (MSL) to 300 ft (91.4 m) above MSL (University of Texas – Austin, Bureau of Economic Geology 1996). The Coastal Prairies Subprovince extends inland from the Gulf of Mexico for 30–60 mi (48–97 km) along the coast from the Sabine River to the Lower Rio Grande Valley (Texas State Historical Association n.d. a). Texas is estimated to contain about 6.5 million ac (2.6 million ha) of Coastal Prairies habitat that



Source: Stewart 2009

extends along a band adjacent to the coastal region of the state, immediately inland from coastal marsh habitats (U.S. Geological Survey [USGS], National Wetlands Research Center 2012).



---

NOLF Goliad is located within the Interior Coastal Plains Subprovince. Elevations within this subprovince range from 300 to 800 ft (91.4 to 243.7 m) above MSL. This subprovince is comprised of alternating belts of resistant uncemented sands mixed with weaker shales that erode to form long, sandy ridges (University of Texas – Austin 2011). This region of east Texas is characterized by pine and hardwood forests, with numerous permanent streams present. The area between San Antonio and Laredo, Texas is dominated by chaparral brush and sparse grasses.

With the exception of NOLF Goliad, all of the NASCC parcels are located within the Texas Coastal Management Program Coastal Zone, which is described further in Section 3.2.1.2.

### **Main Station**

The Main Station occupies approximately 2,629.6 ac (1,064.2 ha) of land situated approximately 7 mi (11 km) inland from the Gulf of Mexico (Figure 1-1 and Figure 2-1), within the Coastal Prairies Subprovince of the Gulf Coastal Prairies Province (University of Texas – Austin, Bureau of Economic Geology 1996). The Coastal Prairies Subprovince consists of nearly flat, tallgrass prairie grasslands that include adjacent coastal wetlands and gallery forests (forests growing along a waterbody in an area otherwise devoid of trees), which is consistent with the communities at the Main Station.

### **NOLF Cabaniss**

NOLF Cabaniss occupies approximately 952.9 ac (385.6 ha) of land located in the City of Corpus Christi, approximately 8 mi (13 km) west of the Main Station (Figure 1-1 and Figure 2-2). NOLF Cabaniss is located within the Coastal Prairies Subprovince of the Gulf Coastal Plains Province (see description for Main Station).

### **NOLF Waldron**

NOLF Waldron occupies approximately 902.7 ac (385.66 ha) of land located approximately 3 mi (5 km) southwest of the Main Station and approximately 12 mi (19 km) from the City of Corpus Christi (Figure 1-1 and Figure 2-2). NOLF Waldron is located within the Coastal Prairies Subprovince of the Gulf Coastal Plains Province (see description for the Main Station).

### **NOLF Goliad**

NOLF Goliad occupies approximately 1,136.0 ac (460.0 ha) of land located 66 mi (106 km) north-northwest of the Main Station and 13 mi (21 km) west-southwest of the Town of Goliad in Goliad County (Figure 1-1 and Figure 2-3). NOLF Goliad is located within the Interior Coastal Prairie Subprovince of the Gulf Coastal Plains Province. The Interior Coastal Prairie Subprovince consists of parallel ridges and valleys with pine and hardwood forests (University of Texas – Austin, Bureau of Economic Geology 1996). NOLF Goliad is the only Installation parcel that is located outside the Texas Coastal Management Program Coastal Zone.

## **2.2.2 Climate**

Corpus Christi is located adjacent to Corpus Christi Bay, an inlet of the Gulf of Mexico. The climate of the region is subtropical, with air temperatures similar to other regions along the Gulf Coast, but with lower precipitation (Texas Climate Descriptions n.d.). This area is considered to be semi-arid, with Gulf Coast weather patterns moderating temperatures in comparison to inland areas of the region. Gulf Coast weather patterns also result in high humidity throughout the year,

---

with fog occurring on average 108 days each year. Average annual precipitation in the Corpus Christi region is about 30 inches (in) (76 centimeters [cm]), with peak rainfall occurring during May and September and winter being the driest time of year. Hurricanes may occur between June and November, but are most common during August and September. This area of Texas has been hit with numerous hurricanes since the early 1800s (Texas Historical Association 2012), with 39 storm tracks crossing within a 65-mi (105-km) radius of Corpus Christi since 1851 (National Oceanic and Atmospheric Administration [NOAA] 2012). The occurrence of one or more hurricanes or tropical storms can greatly increase the amount of annual rainfall, result in significant storm surges, and/or result in substantial beach erosion.

Typical wind patterns for Corpus Christi are associated with winds from the south or southeast, with typical speeds of 10–14 miles per hour (9–12 knots) (State Energy Conservation Office n.d.). Highest daily wind speeds tend to occur around 4:00–5:00 PM. However, severe wind events can be a concern for the Corpus Christi region of Texas. The National Weather Service defines a severe wind event as those that produce wind gusts greater than, or equal to 58 miles per hour (50 knots), create or enhance fire danger, and impact marine and aviation operations (National Weather Service Weather Forecast Office 2010). These events can occur each year, and have the potential to cause thousands of dollars of damage to residential and commercial properties.

Average air temperatures in January are 65 degrees Fahrenheit (°F) (18 degrees Celsius [°C]), with skies normally cloudy to partly cloudy during December and January (Texas Climate Descriptions n.d.). Between December and February freezing temperatures occur about 11 percent (%) of the time. Summer air temperatures can be hot with very high humidity. During the summer months average morning humidity is 93%, with an average annual humidity of 76%. High temperatures between June and August normally exceed 90°F (32°C). Wind direction is predominantly from the southeast during the warmer months and from the northwest or north in association with high pressure and cold fronts in the cooler months (Navy 2006b).

Goliad County, approximately 30 mi (48 km) inland, has climate conditions that are very similar to Corpus Christi; however, summer air temperatures average 84°F (29°C) and winters are milder, with an average temperature of 57°F (14°C). Goliad County receives approximately 39 in (99 cm) of rainfall annually, with the lowest amount of rainfall occurring in March (2.0 in, [5.1 cm]) and the highest average rainfall occurring in September (4.6 in [11.7 cm]) (Idcide 2012). This area of southeastern Texas also experiences a high frequency of hurricane and tropical storms, with about 33 storms tracking within 65 mi (105 km) of the Town of Goliad, Texas since 1851 (NOAA 2012).

### **2.2.3 Land Use**

Current land uses at Installation parcels include military/industrial, municipal, roadways, recreational, and land stewardship. Land uses on NASCC can be grouped into two general categories:

- *Operations areas* include airfields, aprons, parking areas, recreational areas, and buildings. Improved grounds are developed and maintained to obtain a pleasing appearance and include all manicured lawns, recreational fields, picnic areas, golf course

areas, and areas kept mowed for security and airfield safety reasons. Other operations areas include buildings, parking areas, roads, and other hard surfaces that prevent growth of vegetation. This includes hard structures such as runways.

- *Open areas* include semi-improved grounds that are maintained to provide erosion protection through plantings of vegetative cover, weed control, removal of dead vegetation to reduce fire hazards, and areas maintained to reduce the BASH potential around airfields. Open areas also include unimproved grounds that are not subject to maintenance or development activities, such as those areas allowed to remain in their “natural” state to support wildlife management activities, or habitat improvements not traditionally considered grounds maintenance. Open areas also include agricultural outlease areas that are designated for production of hay or row crops, or for livestock grazing.

### **Main Station**

The primary land uses at the Main Station are open areas: either untouched, mowed, or manicured (Figure 2-7). The major operations land uses include the airfield and the support facilities required to meet the military mission, as well as recreational land uses such as athletic fields and the Gulf Winds Golf Course.

### **NOLF Cabaniss**

The primary land use at NOLF Cabaniss is previously disturbed land (Figure 2-8). Other major land uses include the airfield and the support facilities required to meet the military mission, as well as several agricultural outlease areas.

### **NOLF Waldron**

The primary land use at NOLF Waldron is untouched and previously disturbed lands (Figure 2-8). Other major land uses include the airfield and the support facilities required to meet the military mission, which includes areas that are mowed in support of the BASH Program. Several agricultural outleasements are located at NOLF Waldron, as well as recreational areas that are leased from the Navy by a private organization.



*NOLF Waldron airfield*

Source: L. Rivard

### **NOLF Goliad**

The primary land use at NOLF Goliad is the airfield and several support facilities required to meet the military mission at NOLF Goliad, and agricultural outleasements (Figure 2-9). Agricultural outleasements and mowed land surround the airfield. A fire pond for use by the site fire department is located south of the intersection of the two runways.

## **2.2.4 Regional Land Use**

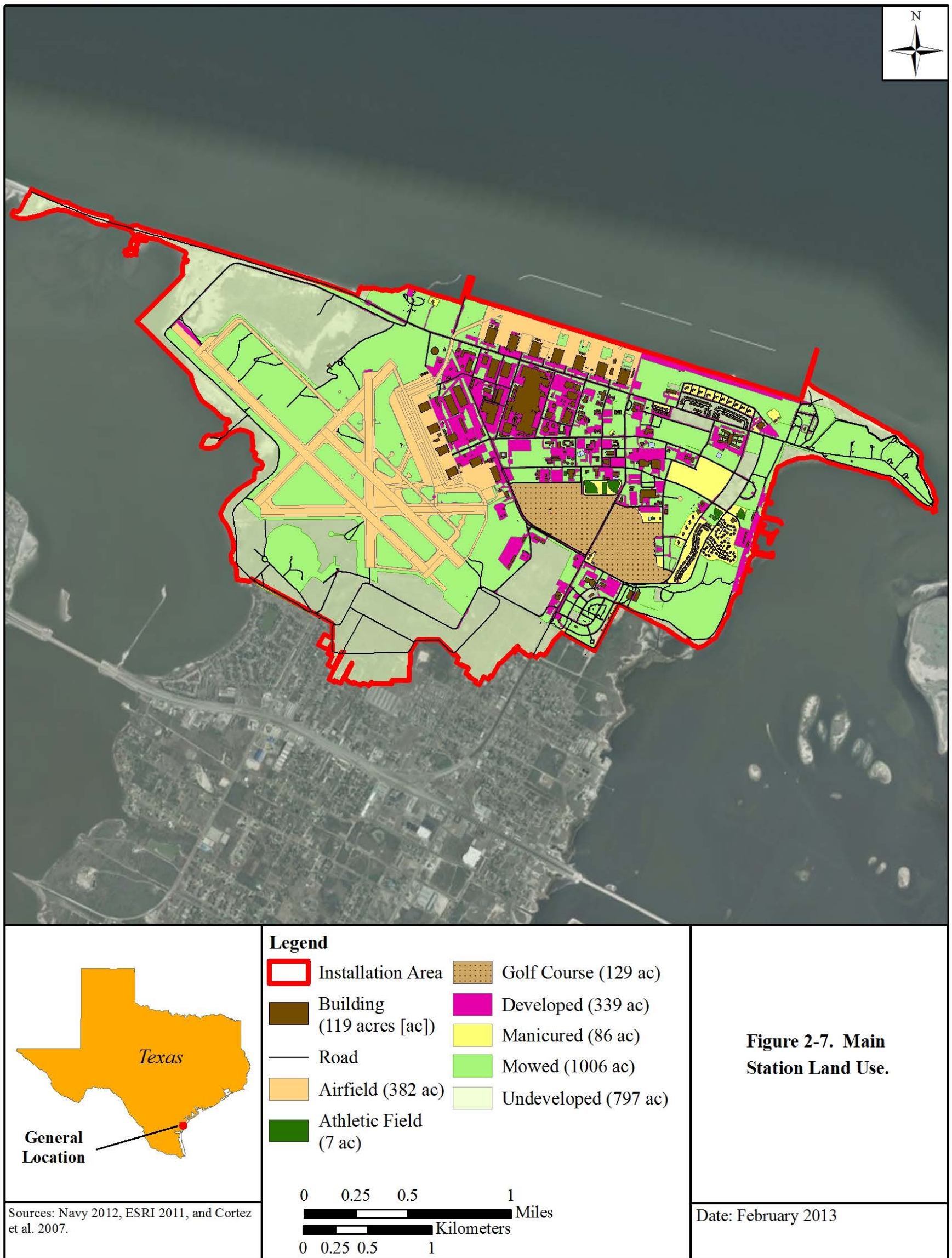
Several regional land use plans and coastal zone programs are in place that are applicable to NASCC properties. These include the 2010 Corpus Christi Future Land Use Plan (City of Corpus Christi 2010), the Corpus Christi Joint Land Use Study (JLUS; NASCC 2013), the Comprehensive Plan for Corpus Christi (City of Corpus Christi 2010), the Coastal Bend Bays Plan (Coastal Bend Bays & Estuaries Program [CBBEP] 1998), the 1972 Coastal Zone Management Act (CZMA), and the Texas Coastal Management Program (CMP). With the exception of NOLF Goliad, all of the NASCC parcels are covered by these plans and programs.

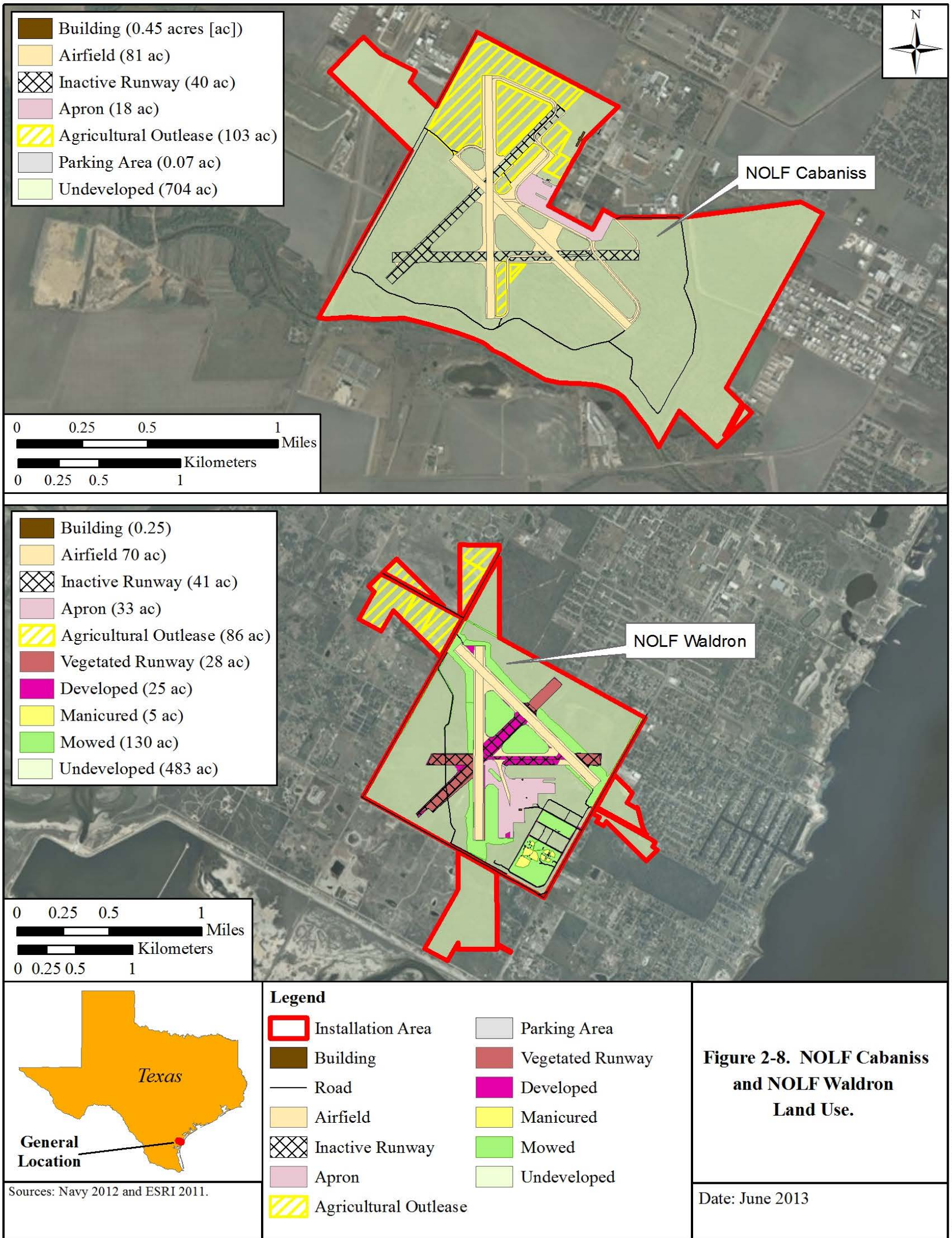
NASCC will consider these plans as they relate to natural resource issues and management of natural resources at the Installation.

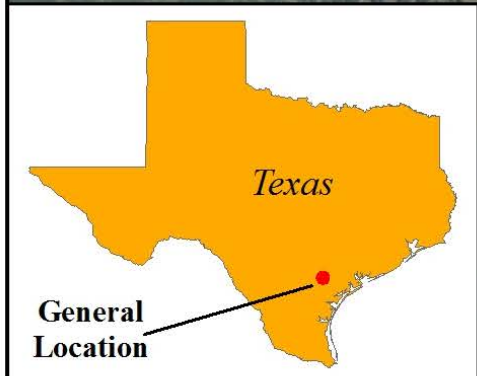
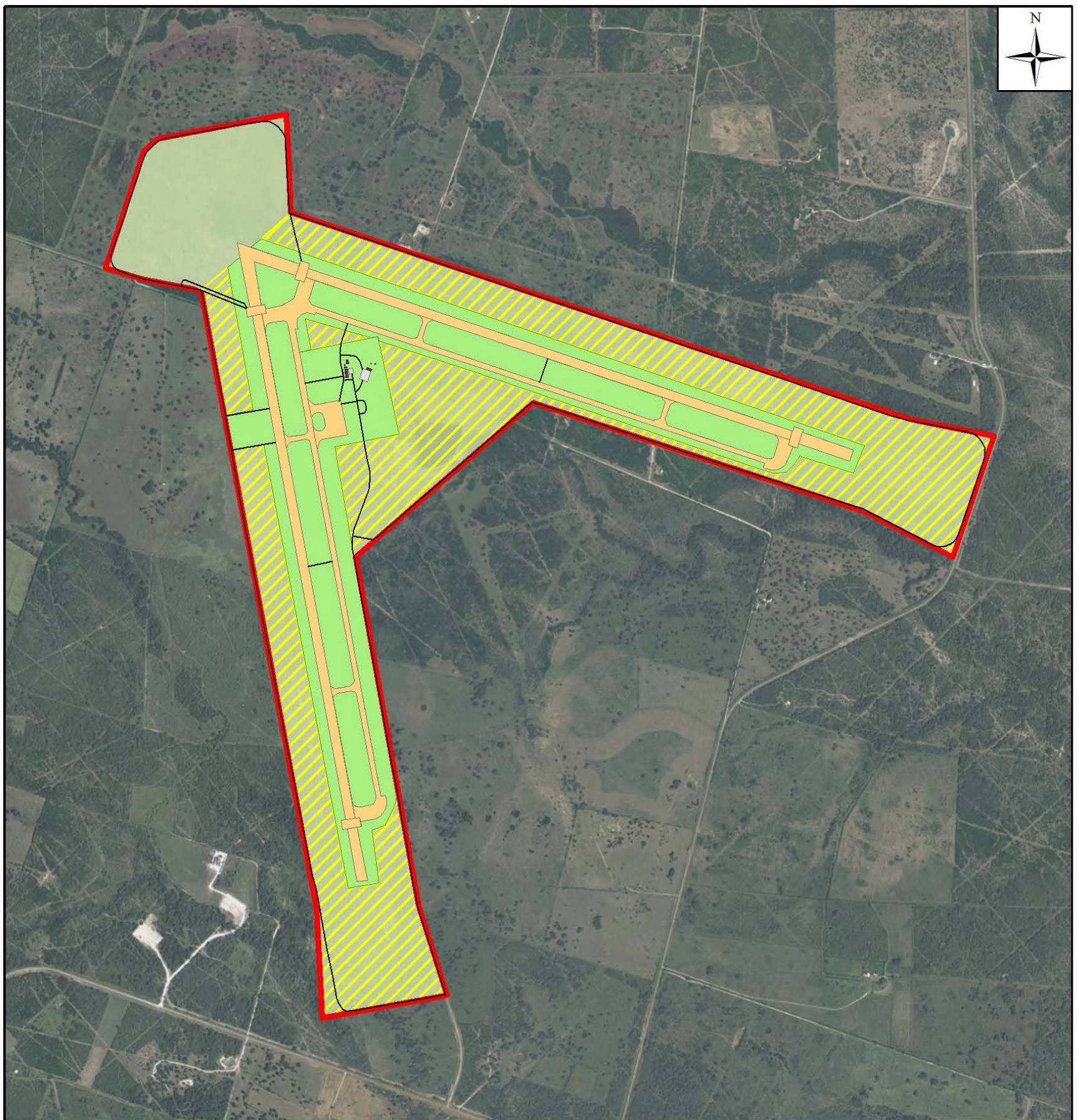
### **Main Station**

The City of Corpus Christi's population grew by approximately 8% from 2000 (population of 277,454) to 2010 (estimated population of 301,764), and is estimated to increase to 374,693 (or by an additional 20%) by 2040 (City of Corpus Christi 2010). The City of Corpus Christi operations and manages 196 parks and recreational facilities, including beaches, a cultural center, golf centers, gymnasiums, parks, pools, recreation centers, senior centers, a skate park, sports fields, tennis centers, youth and family services centers, pavilions, and a watergarden (City of Corpus Christi Parks and Recreation n.d.). Land use of the Main Station is classified as public/semi-public and is primarily surrounded by low density residential, with some areas of medium density residential, park lands, and professional office land use (City of Corpus Christi 2010). The primary conservation lands in the area are associated with Padre Island National Seashore.

Regional land uses around the Main Station are governed by the Comprehensive Plan for Corpus Christi, adopted in 1955; and the City Charter, including 1986 amendments; Corpus Christi Policy Statements; and area development plans (City of Corpus Christi 2010). The Comprehensive Plan for Corpus Christi encompasses the city and surrounding areas, and addresses future land use, transportation, public services, and annexation. The Comprehensive Plan includes specific elements, including Policy Statements, Area Development Plans, Campital Improvement Plans, and Master Utility Plans. The City Charter mandated the Comprehensive Plan for Corpus Christi and requires the City Council to "...establish comprehensive planning as a continuous governmental function to guide, regulate, and manage future development, and that all city improvements, ordinances, and regulations be consistent with the Comprehensive Plan." By definition the Comprehensive Plan is general, long range, and broad in scope, and its purpose is to guide the city in policy formulation and implementation of strategies related to population, housing, environment, land use, transportation, and public services. The Policy Statement regarding areas surrounding existing private, public, and military airports states that development within these areas should be conducted in a manner that is compatible with the operation of the airports.







**Legend**

Installation Area	Agricultural Outlease (539 ac)
Building (0.25 acres [ac])	Mowed (333 ac)
Road	Parking Area (0.76 ac)
Airfield (123 ac)	Undeveloped (125 ac)

0 0.25 0.5 1 Miles  
 0 0.25 0.5 1 Kilometers

**Figure 2-9. NOLF Goliad Land Use.**

Date: February 2013

Sources: Navy 2012, ESRI 2011, and Mitton 2013a.

Z:\projects\NAV\FACV100\_NIRS\_T23330\_JM03\_CRPS\_CHRST\GIS\MXD\FIGURES\20130130\_REVISIONS\TP\_T23330-JM03\_Fig2-9\_Goliad\_LU.mxd, SMH

This page intentionally left blank.



The City of Corpus Christi developed their Future Land Use Plan to provide the framework for orderly growth, economic development and for achieving the City's vision for the future (City of Corpus Christi 2010). This Plan provides a guide for citizens, community leaders and City staff by illustrating the City's intentions for supporting future use of public and private property. The Policy Statements, which make up the City's Future Land Use Plan, establish development and community standards for the location and interaction of residential, commercial, industrial, and public uses. In addition to addressing density of development and other issues related to zoning and expansion of commercial and/or industrial uses into residential areas, the Future Land Use Plan stipulates that special attention should be given to any development in the environmentally sensitive areas of Corpus Christi Bay, Laguna Madre Estuary, Padre Island, Mustang Island, Nueces Bay, Cayo Del Oso and Oso Creek.

The Corpus Christi JLUS was adopted by the Corpus Christi City Council in 2013 (City of Corpus Christi 2013). The primary objective of the JLUS is to reduce potential conflicts between the Installation and surrounding areas while accommodating new economic development, sustaining economic vitality, and protecting the public health and safety, without compromising the operational mission of the Installation. More specifically, the study addresses private and public land use within a 5 nautical mi (9 km) radius of each of the airfields at the Installation located in Nueces County, including an evaluation of noise, light, and safety footprints associated with the current Installation training mission, water quality, threatened and endangered species, and marine environments. The JLUS provides specific recommendations for compatible land use planning in the area, including the three Installation airfields located within the City limits and Corpus Christi International Airport (City of Corpus Christi 2013).



*Corpus Christi Bay, Main Station*

Source: L. Rivard

The Coastal Bend Bays & Estuaries Program (CBBEP) is a local non-profit 501(c)(3) organization dedicated to researching, restoring and protecting the bays and estuaries of the Texas Coastal Bend (CBBEP n.d. a). The CBBEP area of interest covers 515 square miles (mi<sup>2</sup>) (1,334 square kilometers [km<sup>2</sup>]) of water, including all bays, estuaries and bayous in the Copano, Aransas, Corpus Christi, Nueces, Baffin and upper Laguna Madre bay systems. The Program area encompasses 75 mi (121 km) of estuarine environment along the south-central Texas coastline and includes 12

counties within the region known as the Coastal Bend, extending from the land-cut in the Laguna Madre, through the Corpus Christi Bay system, and north to the Aransas National Wildlife Refuge. The CBBEP is currently developing a habitat management plan that would be used to direct habitat preservation, creation, and/or restoration activities in the Corpus Christi/Nueces Bay area. The plan will include recommendations for education, BMPs, smart growth, and

green-space planning. The mission of the CBBEP is the implementation of the Coastal Bend Bays Plan, which is to protect and restore the health and productivity of the bays and estuaries while supporting continued economic growth and public use of the bays. Current and previous CBBEP work plans can be found at <https://www.cbbep.org/work-plans/>, and identify accomplishments and planned actions that benefit the bay system and its users.

The U.S. Congress recognized the importance of meeting the challenge of continued growth in the coastal zone by passing the CZMA in 1972. The CZMA, administered by NOAA's Office of Ocean and Coastal Resource Management, provides for management of the nation's coastal resources, including the Great Lakes, and balances economic development with environmental conservation. The CZMA outlines two national programs: The National Coastal Zone Management Program and the National Estuarine Research Reserve System. A total of 34 coastal programs have been developed that aim to balance competing land and water issues in the coastal zone, while using estuarine reserves as field laboratories to provide a greater understanding of estuaries and how humans impact them. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone." Under the CZMA, the Texas CMP, funded by NOAA, helps ensure the long-term environmental and economic health of the Texas coast through management of the state's coastal natural resources areas. The Texas General Land Office, which manages the program, reviews federal actions in the Texas coastal zone to ensure consistency with the goals and policies of the CMP, supports protection of natural habitats and wildlife, and provides baseline data on the health of Gulf Coast waters. All of the Installation parcels that are located in the City of Corpus Christi are included in the boundary map for the CMP (Texas General Land Office, Coastal Management Program 2010).

### **NOLF Cabaniss**

All of the regional land use plans and coastal zone programs described for the Main Station also are applicable to NOLF Cabaniss.

### **NOLF Waldron**

All of the regional land use plans and coastal zone programs described for the Main Station also are applicable to NOLF Waldron.

### **NOLF Goliad**

A review of online resources did not identify any regional land use plans for Goliad County, or other applicable planning documents. NOLF Goliad is located outside the coastal zone area covered by the CZMA and Texas CMP.

## **2.2.5 Geology, Topography, and Soil**

### **2.2.5.1 Geological Formations**

#### **Main Station**

The Corpus Christi Bay area is part of the western gulf section of the Coastal Plains geographical region where sedimentary formations dip towards the Gulf of Mexico at low angles. The geology of the Texas Coastal Zone comprises several active environments, including fluvial-deltaic, barrier-strandplain-chenier, and bay-estuary-lagoon systems. Most of the Corpus Christi Bay area is underlain by sediments of the Beaumont formation, which is composed mostly of fresh-water sediments that were deposited by rivers during the Pleistocene epoch (Franki et al. 1965). The Main Station is located on a Pleistocene barrier-strandplain depositional environment associated with the Encinal Peninsula. The Encinal Peninsula represents the remnants of a late Pleistocene barrier island or strandplain, often referred to as the Ingleside Barrier or Ingleside Ridge, which extends discontinuously along the Texas Coastal Bend (Navy 1995). The Beaumont formation underlies the Nueces County region and is the primary geologic formation associated with the Main Station.

The Beaumont formation is made up of “barrier island and beach deposits” which consist mostly of sand, with silt, clay or mud, and gravel comprising the secondary rock types (USGS 2012a). These deposits are characterized by numerous pimple mounds and poorly defined relict beach ridges that have a total thickness of less than 60 ft (18 m) (Barnes 1974). The Beaumont formation includes older stream channels, point bars and natural levees. Recent and older lake bottoms, clay dune and sand dune deposits with concretions and massive accumulations of calcium carbonate and concretions of iron oxide are usually present. These clay and mud formations are of low permeability and have a high water holding capacity with high shrink-swell potential and low shear strength (USGS 2012a).

#### **NOLF Cabaniss**

NOLF Cabaniss is located across Oso Bay to the west of the Encinal Peninsula on a Pleistocene fluvial-deltaic depositional environment. Similar to the Main Station, this parcel is also located on the Beaumont formation (see Main Station for description); however, sediments primarily consist of mostly clay and mud of low permeability, high water-holding capacity, and high plasticity. Total thickness of this sediment is approximately 100 ft (31 m) (Barnes 1974).

#### **NOLF Waldron**

The Beaumont formation is the primary geologic formation associated with NOLF Waldron. This parcel also is located on a Pleistocene barrier-strandplain depositional environment associated with the Encinal Peninsula (see details provided for the Main Station).

#### **NOLF Goliad**

The Goliad formation underlies the Goliad County region and is the primary geologic formation associated with NOLF Goliad, covering 51% of the surface area of Goliad County. The Goliad formation is composed of mainly clay, sandstone, marl, caliche, limestone, and conglomerate. The Lissie formation covers 25% of the surface area of Goliad County and is composed of

---

mostly sand, silt, clay, and minor amounts of gravel. The surface is fairly flat and featureless except for many shallow depressions and mounds (USGS 2012b).

### **2.2.5.2 Topography**

#### **Main Station**

Elevations at the Main Station range from less than five ft (1.5 m) to 30 ft (9.1 m) above MSL; a majority of the parcel is flat with elevations ranging from 10 to 15 ft (3 to 4.6 m) above MSL. (Figure 2-10). The topography surrounding the Main Station is generally flat and homogenous. Lower elevations at the Main Station are located on the northern and eastern perimeters of the parcel, along the shorelines in association with floodplain areas of the parcel (see Figure 2-16), and the highest elevation are located in the southwestern corner of the parcel.

#### **NOLF Cabaniss**

Elevations at NOLF Cabaniss range from less than five ft (1.5 m) to approximately 40 ft (12.2 m) above MSL (Figure 2-11). The lowest elevations are located within the southern half of the parcel in association with the floodplain areas of Oso Creek. Elevations gradually rise from the southwest to the northeast, with the highest elevations located in the northern section of the parcel near the northern end of the airfield.

#### **NOLF Waldron**

Elevations at NOLF Waldron range from approximately five ft (1.5 m) to 30 ft (9.1 m) above MSL (Figure 2-11). Lower elevations at NOLF Waldron are located at the northeastern half of the parcel, with elevations gradually rising from the northeast to the southwest.

#### **NOLF Goliad**

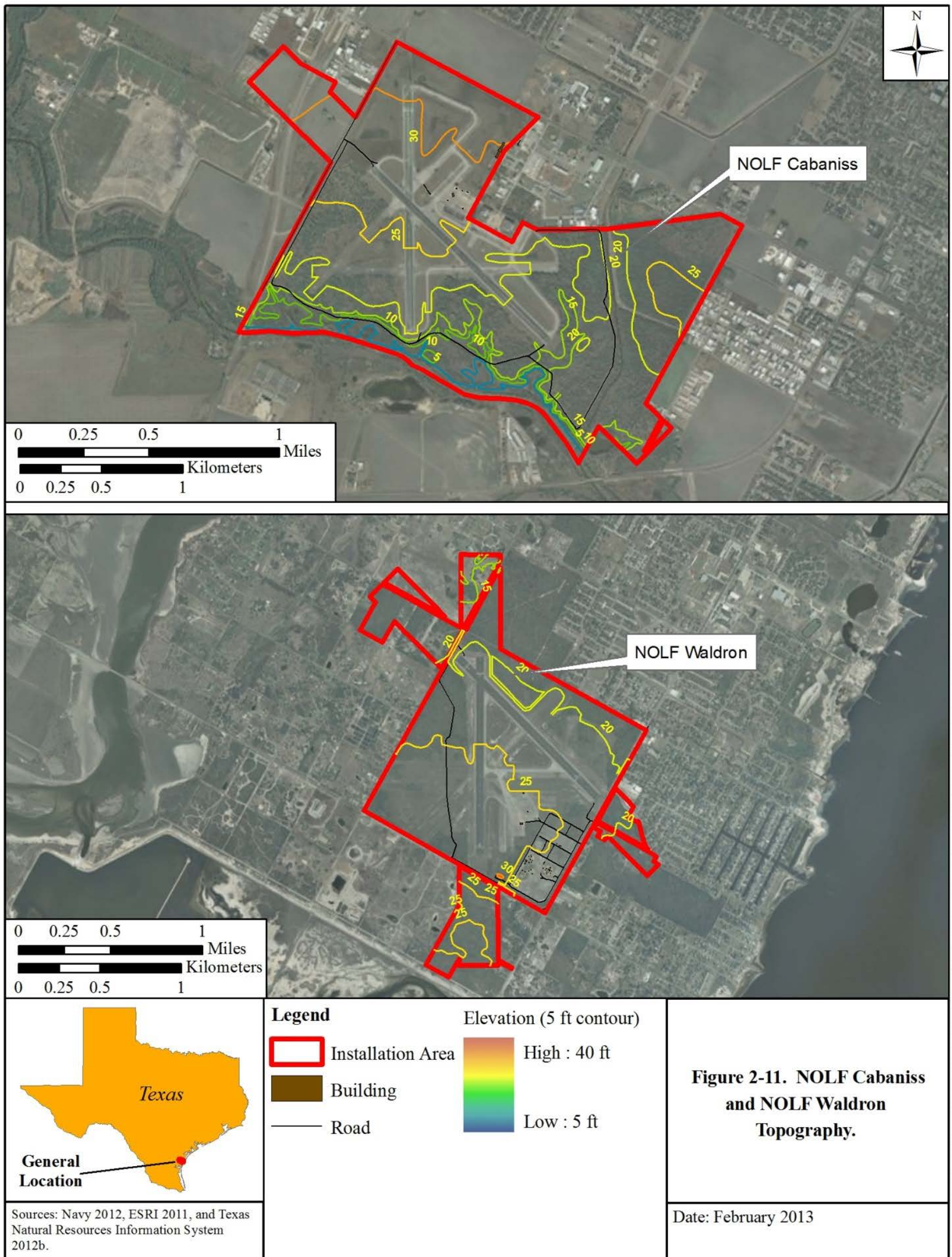
The physiography of the area surrounding NOLF Goliad is generally characterized by higher elevations and flatter topography in comparison to coastal counties (Navy 2009). Elevations at Goliad range from approximately 230 ft (70.1 m) to 330 ft (101.6 m) above MSL (Figure 2-12). Lower elevations at NOLF Goliad are located in the eastern and southern portions of the parcel, with elevations on the parcel rising from the southeast to the northwest boundary of the parcel. The actual topography of the runways and taxiways gently slopes downward in the east-southeast direction, and slopes along the edges of runways are more abrupt than what is shown on Figure 2-12.

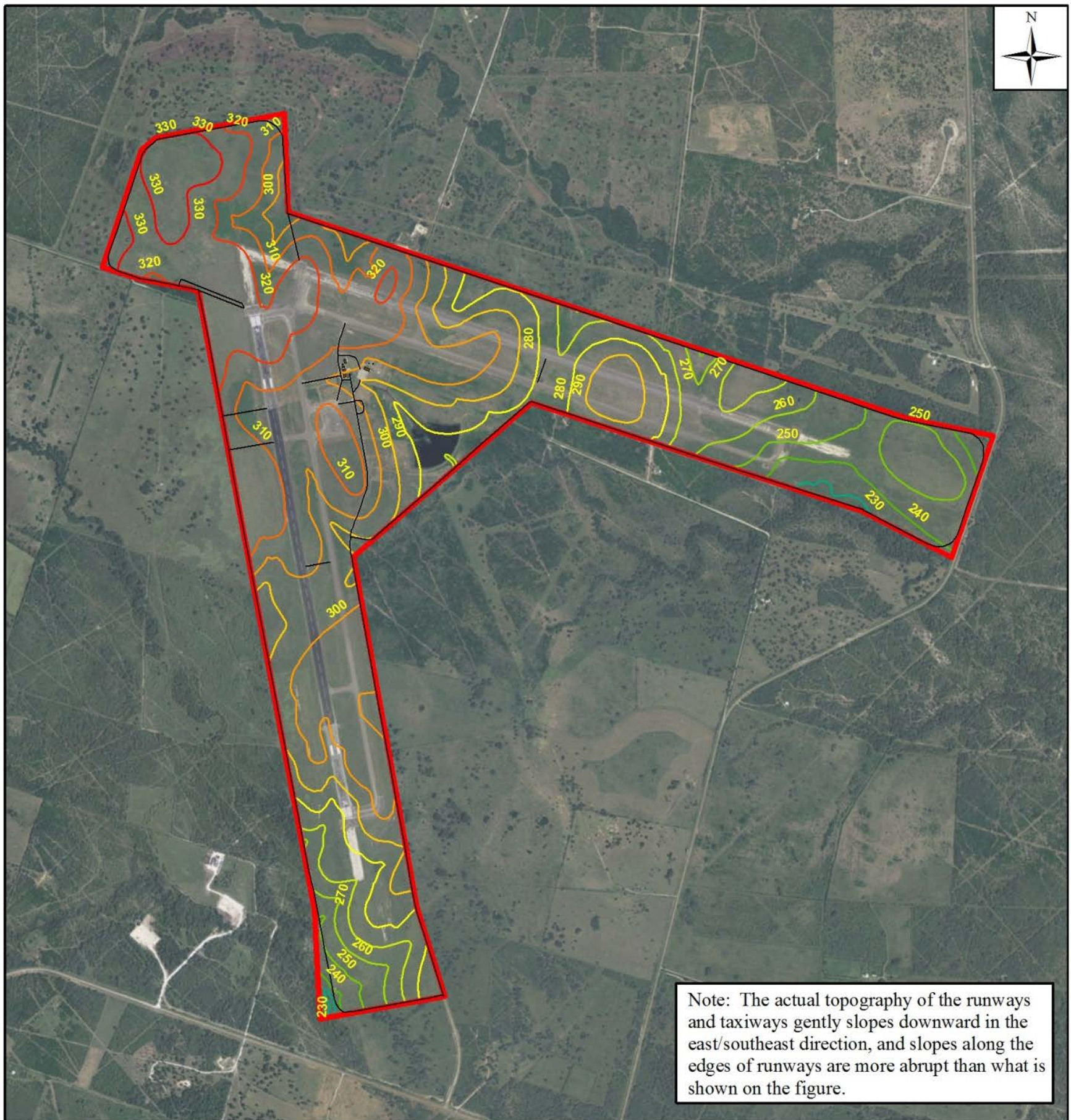
### **2.2.5.3 Soils**

#### **Main Station**

A review of USDA NRCS soils data identified three soil types at the Main Station (Figure 2-13). Galveston and mustang fine sands are the most widespread throughout the Main Station, comprising approximately 80% of the soil types present. This soil type defines the soils in the center of the parcel and soils associated with Dimmit Island. Ijam clay loam makes up approximately 19% of Main Station soils, and is located along the eastern and western boundaries of the Main Station. The remaining 1% of soils is composed of tidal flats, which are located in small areas along the eastern and western shorelines of the parcel.







**General Location**

Sources: Navy 2012, ESRI 2011, and Texas Natural Resources Information System 2012b.

**Legend**

- Installation Area
- Building
- Road

**Elevation (10 ft contour)**

High : 330 ft

Low : 230 ft

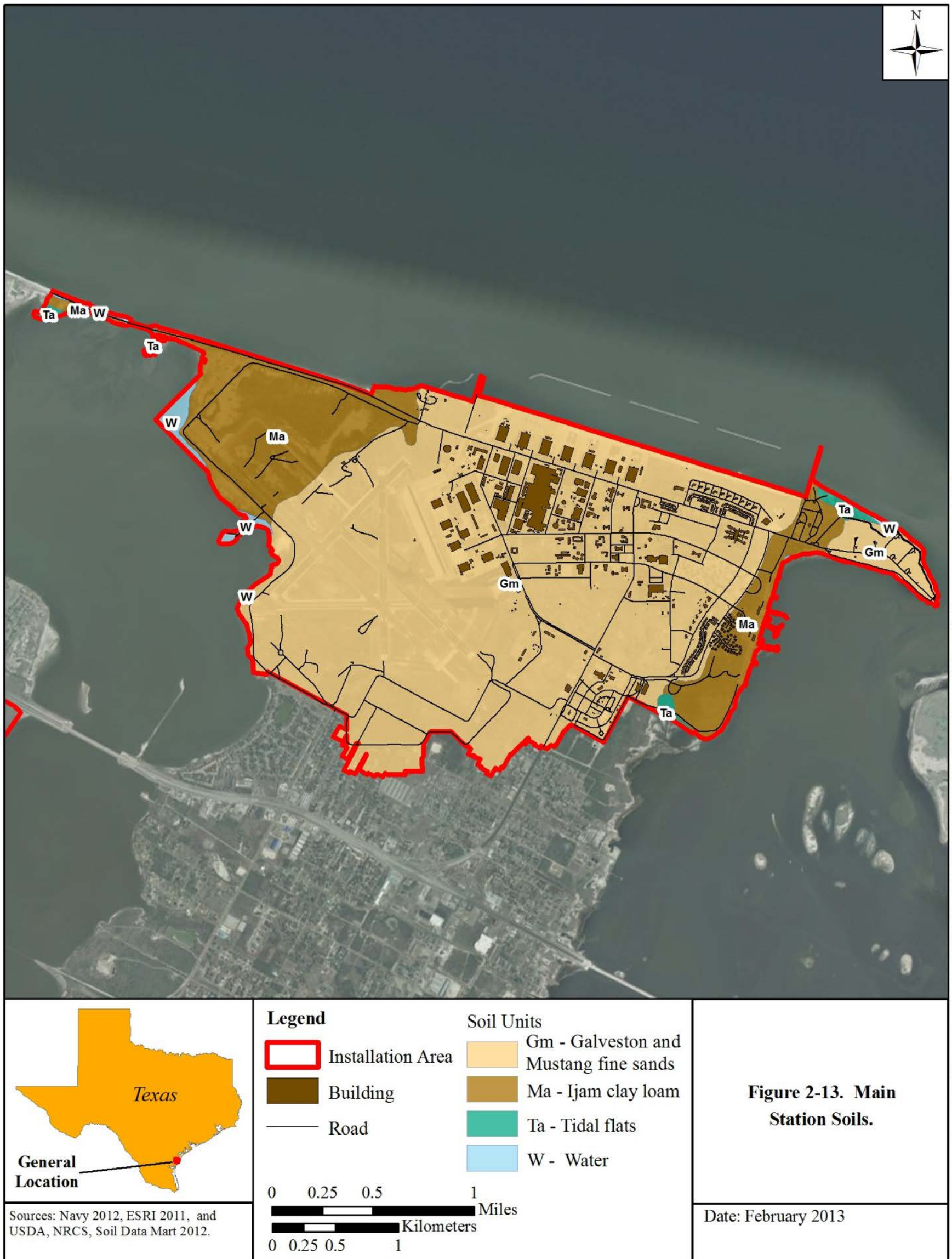
0 0.25 0.5 1 Miles

0 0.25 0.5 1 Kilometers

**Figure 2-12. NOLF Goliad Topography.**

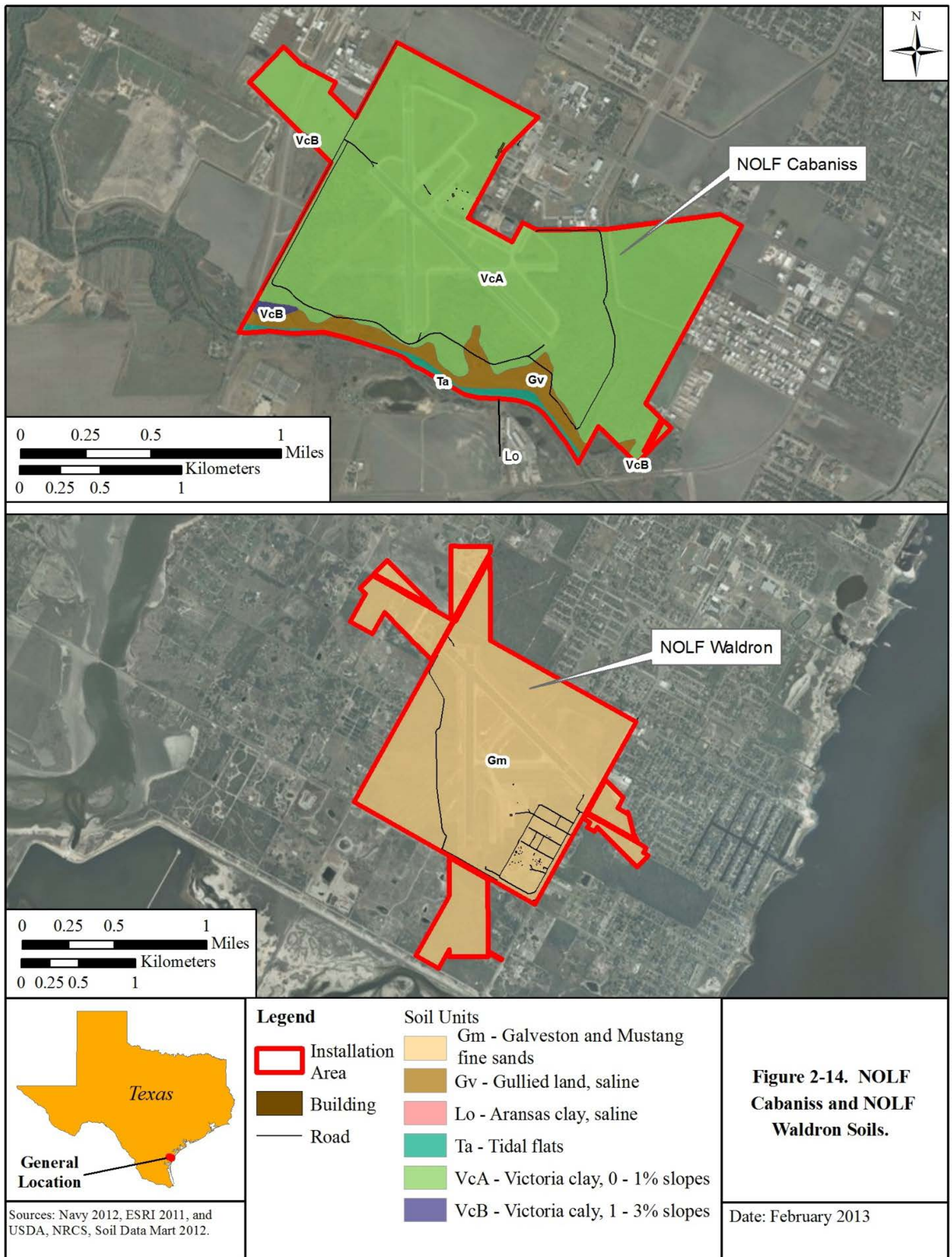
Date: February 2013

Z:\projects\NAVFAC\100\_NRS\_CRP'S\_CHRST\GIS\MXD\FIGURES\20130130\_REVISIONS\TIP\_T23330-JM03\_Fig2-12\_Goliad\_Topo.mxd, SMH

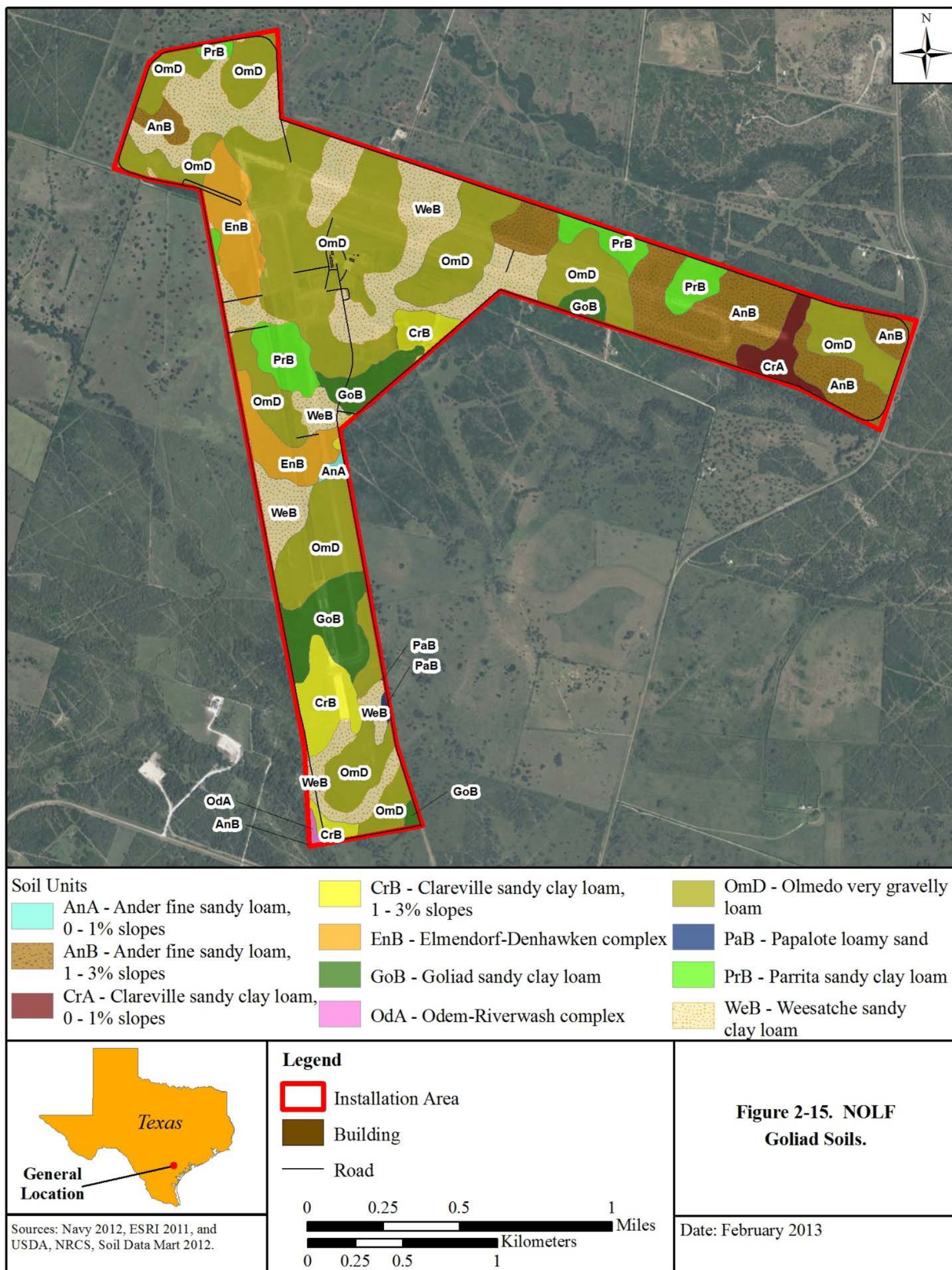


Z:\projects\NAVEAC\100\_NRS\_T23330\_JM03\_CRPS\_CHRST\GIS\MXD\FIGURES\20130130\_REVISIONS\UTP\_T23330-JM03\_Fig2-13\_CC\_Soil.mxd, SMH





Z:\projects\NAV\FAC\100\_NRS\_T23330\_JM03\_CRPS\_CHRSTGISMXD\FIGURES\20130130\_REVISIONS\TTP\_T23330-JM03\_Fig2-14\_WC\_Soil.mxd, SMH



Approximately 43 ac (17 ha) within the Main Station boundary is not classified as a soil type, but is defined as water. The Galveston fine sands portion of the Galveston and mustang fine sands soil type is the only soil type at the Main Station that is well drained. The mustang fine sands portion of the Galveston and mustang fine sands soil type and Ijam clay loam are classified as hydric (USDA NRCS 2009a).

### **NOLF Cabaniss**

USDA NRCS soils data identified four soil types at NOLF Cabaniss (Figure 2-14). Victoria clay 0–1 percent slopes is the primary soil type associated with the airfield, making up approximately 90.5% of the soils on the parcel. Minor amounts of Gullied land (7%) and tidal flats (3%) also are present at NOLF Cabaniss along the southern boundary of the parcel. Victoria clay 1–3% slopes (0.6%) and Aransas clay (less than 0.01%) each make up less than 1% of the soils types present, and these are located along the southern boundary of the parcel.

The majority of soil types associated with NOLF Cabaniss are well drained although Aransas clay is classified as poorly drained. Aransas clay is classified as hydric. The USDA NRCS soils data only generates soil descriptions for major soil components; therefore, information about hydric and natural drainage classifications is not available for Gullied land (USDA NRCS 2009a).



*Soil erosion near Oso Creek, NOLF Cabaniss*

Source: L. Rivard

### **NOLF Waldron**

A review of USDA NRCS soils data identified one soil type, Galveston and mustang fine sands (100%), at NOLF Waldron (Figure 2-14). Galveston fine sands are excessively drained, whereas mustang fine sands are poorly drained. Both are occasionally flooded. Of the soils identified for NOLF Waldron, only mustang fine sands meet hydric criteria (USDA NRCS 2009a).

### **NOLF Goliad**

A review of USDA NRCS soils data identified 11 soil types at NOLF Goliad (Figure 2-15). Olmedo very gravelly loam 1–8 percent slopes is the primary soil type on the parcel comprising approximately 41.6% of soils present, followed by Weesatche sandy clay loam 1–3 percent slopes (approximately 20%) and Ander fine sandy loam 1–3 percent slopes (approximately 13%). Minor amounts of Goliad sandy clay loam 1–3 percent slopes (approximately 7%), Elmendorf-Denhawken complex 1–3 percent slopes (approximately 6%), Parrita sandy clay loam 0–3 percent slopes (approximately 5%), Clareville sandy clay loam 1–3 percent slopes rarely flooded (approximately 5%), and Clareville sandy clay loam 0–1 percent slopes rarely flooded (approximately 2%) also comprise the soils types present at NOLF Goliad. Ander fine sandy

loam 0–1 percent slopes, Odem-Riverwash complex 0–1 percent slopes frequently flooded, and Papalote loamy sand 0–3 percent slopes are located near the southern airfield, and each of these soils types comprise less than 1% of the soil types present. With the exception of Ander fine sandy loam 0–3 percent slopes and Papalote loamy sand, soils at NOLF Goliad are classified as well drained. None of the soils present at NOLF Goliad are classified as hydric (USDA NRCS 2009b).

## 2.2.6 Water Resources

All of the NASCC parcels, with the exception of NOLF Goliad, are located within the Coastal Bend Regional Water Planning Area (Region N). NOLF Goliad is covered by the South Central Texas Planning Area (Region L). The Coastal Bend Region depends mostly on surface water sources for its municipal and industrial supply use, which accounted for 85% of the region’s total water use in 2000 (Texas Water Development Board [TWDB] 2010a). The South Central Texas Region depends mostly on groundwater for its municipal and industrial supply use, which accounted for approximately 47% of the region’s total water use in 2000 (TWDB 2010b).

Complete information on the water supply for the NASCC area is available at the Texas Water Development Board, Region N Planning Group:  
<http://www.twdb.texas.gov/waterplanning/rwp/regions/n/index.asp>

### 2.2.6.1 Watersheds

#### Main Station

The Main Station is located in the Nueces-Rio Grande Coastal Basin, which is located on the Texas Coast between the Nueces and Guadalupe-San Antonio river basins. The drainage area of the basin is approximately 10,442 mi<sup>2</sup> (27,045 km<sup>2</sup>). The basin drains eastward toward the coast, eventually emptying to the Laguna Madre Estuary system. There are no perennial streams within the drainage area (TWDB 2010a).

The Main Station lies on a peninsula bordered by Oso Bay, Corpus Christi Bay and the Laguna Madre Estuary. Within the Nueces-Rio Coastal Basin the Main Station is located within the Coastal Bend Bay System. The Coastal Bend Bay System, including Corpus Christi Bay, Oso Bay, Nueces Bay, the Laguna Madre Estuary, and other bays are part of the Estuary of National Significance program that was established in by the U.S. Congress through the Water Quality Act of 1987. More information on this program and the Coastal Bay Bend System are provided in Section 3.2.1.2.

The City of Corpus Christi is the largest provider of water supply contracts in the Coastal Bend Region, and based on recent water use records, the City of Corpus Christi provided about 67% of the municipal and industrial water demand in the region. The City of Corpus Christi and their customers receive surface water supplies from Lake Texana, through a contract agreement with Lavaca Navidad River Authority (TWDB 2010a).

---

### **NOLF Cabaniss**

NOLF Cabaniss is located in the Nueces-Rio Grande Coastal Basin (see description provided for the Main Station). Drainage from NOLF Cabaniss flows into Segment 2485 of the Nueces-Rio Grande Coastal Basin.

### **NOLF Waldron**

NOLF Waldron is located in the Nueces-Rio Grande Coastal Basin (see description for Main Station). The drainage from NOLF Waldron flows into either Segment 2485 or 2491 of the Nueces-Rio Grande Coastal Basin.

### **NOLF Goliad**

NOLF Goliad is part of the South Central Texas Region, which includes parts of the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca river basins, and part of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces coastal basins. NOLF Goliad lies on the border of the San Antonio-Nueces Coastal Basin and the San Antonio River Basin. The San Antonio River Basin drains a total area of 4,180 mi<sup>2</sup> (10,826 km<sup>2</sup>) that drains towards the Gulf of Mexico. Water quality in the San Antonio Basin can vary from very good in the upper basin to relatively poor in the lower basin (particularly during periods of low flow) depending on water flows. The coastal basins, including the San-Antonio-Nueces Coastal Basin, receive surface water flows from adjoining river basins, as limited surface water is received from local runoff (TWDB 2010b).



*Sunflower species near freshwater pond, NOLF Goliad*

Source: L. Rivard

#### **2.2.6.2 Floodplain**

Floodplains are defined as low and relatively flat areas adjoining inland and coastal waters, and include flood-prone areas of offshore islands. The Federal Emergency Management Agency defines these areas as being subject to a 1% or greater chance of flooding in any given year.

#### **Main Station**

Portions of the Corpus Christi Bay 100-year and 500-year floodplain areas extend within the northern, eastern, and western boundaries of the Main Station (Figure 2-16). A portion of the northwestern-most section of the active airfield is within the 500-year floodplain at the Main Station.

### **NOLF Cabaniss**

Portions of the 100-year and 500-year floodplain areas of Oso Creek extend onto approximately half of the NOLF Cabaniss parcel from the southwest (Figure 2-17). The southern-most portion of the active airfield is located within the 500-year floodplain of Oso Creek.

### **NOLF Waldron**

No floodplain areas are located within the boundaries of NOLF Waldron (Figure 2-17). The 100-year and 500-year floodplain areas of Oso Creek to the west and Laguna Madre Estuary to the east are located within 0.5 mi (0.8 km) of the parcel boundaries.

### **NOLF Goliad**

There are no floodplain areas located within the boundaries or proximity of NOLF Goliad (Figure 2-18).

#### **2.2.6.3 Surface Water**

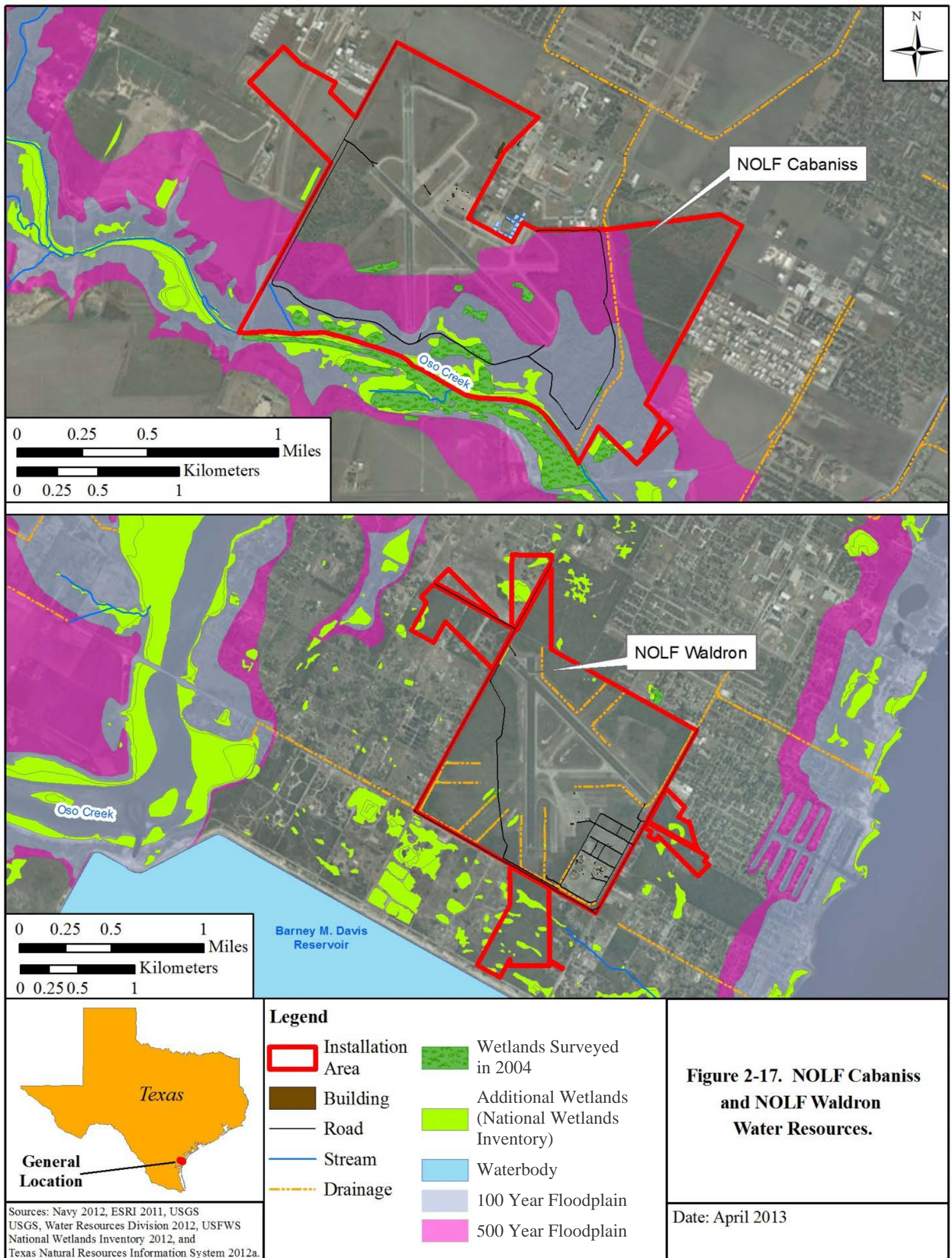
With the exception of NOLF Goliad, the Installation properties are located in the Coastal Bend Region. The two major surface water resources in the Coastal Bend Region are the Choke Canyon Reservoir/Lake Corpus Christi System within the Nueces River Basin, and Lake Texana located on the Navidad River in Jackson County (TWDB 2010a). NOLF Goliad is located in the South Central Texas Region where limited surface water resources are available, especially in the lower part of the region where NOLF Goliad is located.

Surface waters associated with the Installation are shown on Figures 2-16, 2-17 and 2-18. Some surface waters, such as small streams and wetlands may be present that are not depicted on these figures. Wetland data is provided for both National Wetlands Inventory data available from USFWS and old wetlands survey data where available.

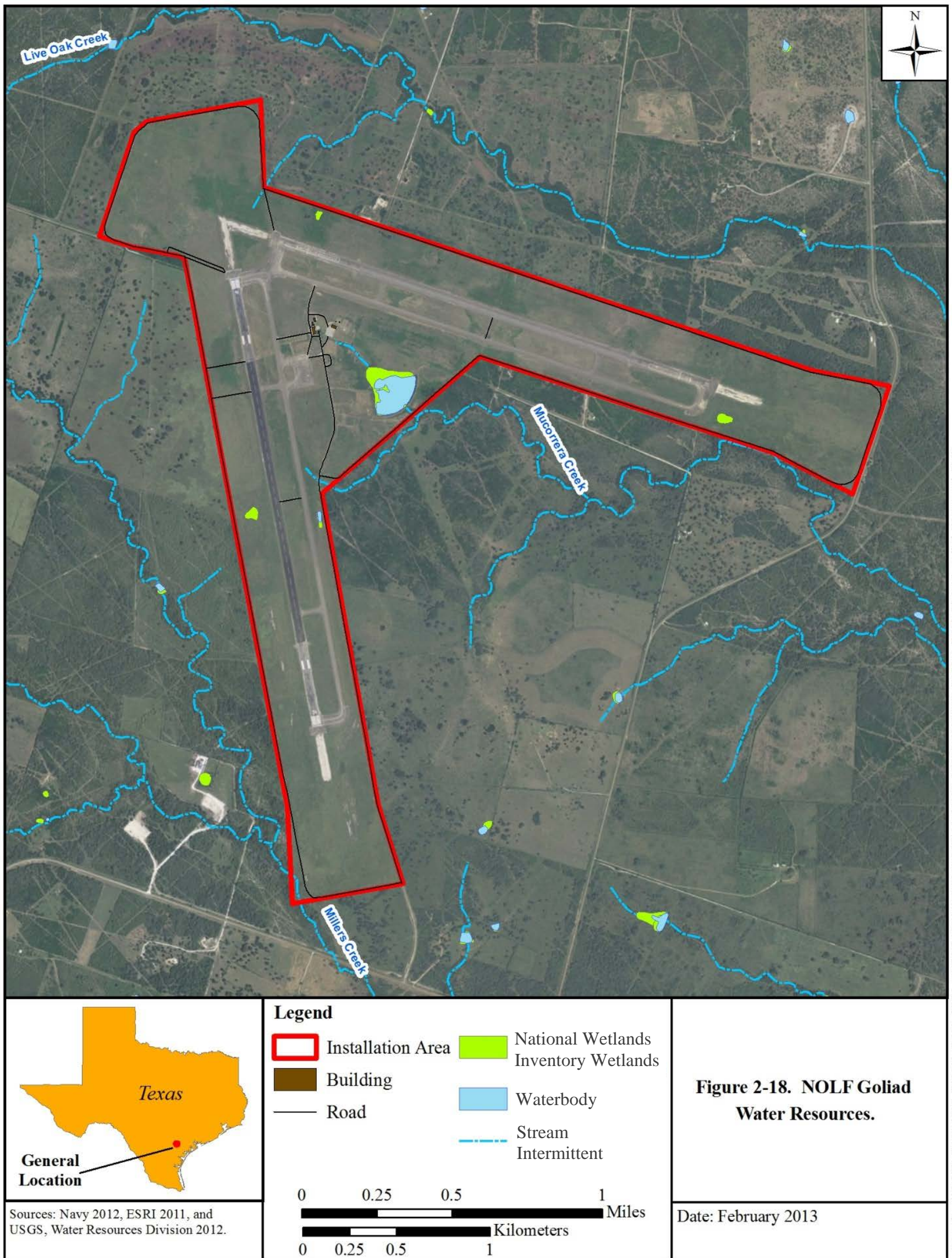
### **Main Station**

Minor freshwater systems are present at the Main Station, including ponds associated with the Gulf Winds Golf Course, and a freshwater system located northwest of the runway area (Figure 2-16). No major or minor freshwater systems (streams, permanent ponds, or lakes) are located in the immediate vicinity of the Main Station. The major surface waters that surround the Main Station are estuarine, and include Corpus Christi Bay, Oso Bay, and the Laguna Madre Estuary. The saltwater systems associated with the Gulf of Mexico and the Atlantic Ocean are located within 5 mi (8 km) east of the Main Station. A retention pond located adjacent to CCAD Building #1700 and other small wetland areas that retain water during wet periods are present at the Main Station; however, these are not reflected in Figure 2-16 based on their size and availability of data. Several other similar wetland areas that retain water during wet periods also are located in the surrounding area outside the Main Station boundary.









This page intentionally left blank.

### **NOLF Cabaniss**

Oso Creek is located along the southern boundary of NOLF Cabaniss, and a small pond is located just outside the southeastern boundary of the parcel (Figure 2-17). No other major or minor freshwater systems (streams, permanent ponds, or lakes) are located in the immediate vicinity of NOLF Cabaniss.

### **NOLF Waldron**

No major or minor freshwater systems (streams, permanent ponds, or lakes) are located at NOLF Waldron (Figure 2-17). The Barney M. Davis Reservoir is located immediately south of the parcel, Oso Creek is located approximately 1 mi (1.6 km) west of the parcel, and Laguna Madre Estuary is located approximately 0.5 mi (0.8 km) east of the parcel.

### **NOLF Goliad**

NOLF Goliad contains three minor sections of intermittent streams, and several named and unnamed intermittent streams are located within the vicinity of the parcel (Figure 2-18). A small section of a tributary to Live Oak Creek located to the north is located in the northern section of the parcel, and a freshwater pond and tributary to Mucorrera Creek is located on the parcel southeast of the intersection of the two runways. A small section of Millers Creek traverses the southwestern-most corner of the parcel.



*Freshwater pond, NOLF Goliad*

Source: L. Rivard

#### **2.2.6.4 Groundwater**

The major aquifer that underlies the Installation region is the Gulf Coast Aquifer. The Gulf Coast Aquifer, which is located beneath the Installation properties, yields moderate to large amounts of both fresh and slightly saline water; however, the City of Corpus Christi relies primarily on surface water for its municipal and industrial water use. Subsidence has been reported within the Gulf Coast Aquifer within the Coastal Bend Region. Water quality within the Gulf Coast Aquifer is generally good, although there is a risk of saltwater intrusion in the southeast portion of the aquifer along the coastline (TWDB 2010a).

The portion of the Gulf Coast Aquifer in Nueces County is located within the Coastal Bend Regional Water Planning Area (Region N) and the portion of the Gulf Coast Aquifer in Goliad County is located within the South Central Texas Regional Water Planning Area (Region L). Nueces and Goliad counties also have established Groundwater Conservation Districts (GCDs) to provide for conservation, preservation, protection, and recharge; to prevent waste; and to

control land surface subsidence (TWDB 2010b). The Installation has a spill prevention plan in place that provides for management and protection of groundwater resources.

### **Main Station**

The Main Station lies on the Gulf Coast Aquifer within the Nueces-Rio Grande Coastal Basin. The Gulf Coast Aquifer extends from northern Mexico to Florida and is comprised of five aquifer formations: Catahoula, Jasper, Burkeville, Evangeline, and Chicot. The Evangeline and Chicot aquifers are the uppermost water formations within the Gulf Coast Aquifer System, and consequently are the formations utilized most commonly for groundwater supply. The Corpus Christi Aquifer Storage and Recovery Conservation District was created in 2005 and covers Aransas, Kleberg, Nueces, and San Patricio counties. The district is currently pursuing a five-year management plan, which was adopted in 2008 (TWDB 2010a).

### **NOLF Cabaniss**

NOLF Cabaniss lies above the Gulf Coast Aquifer and is located within the Corpus Christi Aquifer Storage and Recovery Conservation District as described above for the Main Station.

### **NOLF Waldron**

NOLF Waldron lies above the Gulf Coast Aquifer and is located within the Corpus Christi Aquifer Storage and Recovery Conservation District as described above for the Main Station.

### **NOLF Goliad**

There are five major and minor aquifers that supply water to the South Central Texas Region, including the area of NOLF Goliad. The five major aquifers are the Edwards, Carrizo, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) aquifers. The three minor aquifers are the Sparta, Queen City, and Yegua-Jackson aquifers. NOLF Goliad lies above the Gulf Coast Aquifer, which is described for the Main Station. Currently groundwater withdrawals from the Gulf Coast Aquifer are substantially less than groundwater recharge (TWDB 2010b). Approximately 90% of the groundwater withdrawals from the Gulf Coast Aquifer are used for municipal and agricultural uses within the South Central Texas Regional Water Planning Area.

More information on water resources for Goliad County is available at the Texas Water Development Board, Region L Planning Group:  
<http://www.twdb.texas.gov/waterplanning/rwp/regions/l/index.asp>

#### **2.2.6.5 Wetlands**

Wetlands are identified as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. In general terms, wetlands are semi-terrestrial areas where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil or on its surface.

Table 2-1 provides a summary of wetland data provided by the USFWS National Wetland Inventory and Navy wetland data obtained from wetland delineations previously conducted at the

Installation (Appendix J). Descriptions of wetlands associated with each the Installation parcels are provided below.

**Table 2-1. Installation Wetland Acreages.**

Parcel	Previously-surveyed Wetlands Acreage (Out-of-Date)	National Wetlands Inventory Wetlands Acreage	Total Wetland Acreage
Main Station	106.1 acres (42.9 hectares)	122.9 acres (49.7 hectares)	229.0 acres (92.7 hectares)
NOLF Cabaniss	28.2 acres (11.4 hectares)	30.3 acres (12.3 hectares)	58.5 acres (23.7 hectares)
NOLF Waldron	0.0 acres (0.0 hectares)	27.3 acres (11.0 hectares)	27.3 acres (11.0 hectares)
NOLF Goliad	0.0 acres (0.0 hectares) <sup>1</sup>	14.5 acres (5.9 hectares)	14.5 acres (5.9 hectares)

Sources: Navy 2012, USFWS National Wetlands Inventory 2012, and Turner Collie & Braden Inc. 2004

<sup>1</sup> No previously-surveyed wetlands data are associated with NOLF Goliad since a formal wetland delineation has never been conducted on this parcel.



*Wetland, NOLF Cabaniss*

Source: L. Rivard

### Main Station

The most recent wetland delineation for the Main Station was completed in 2004 (Turner Collie & Braden Inc. 2004 and Appendix J). That delineation is now out-of-date and a new survey should be performed as part of any pending project that might impact wetlands. Approximately 106.1 ac (42.9 ha) of palustrine and estuarine wetlands were present at the Main Station. The USFWS National Wetlands Inventory database has identified approximately 122.9 ac (49.7 ha) of additional

wetlands at the Main Station. Typical wetland types present include salt marsh, vegetated tidal flats, and freshwater marsh. Wetlands at the Main Station occur primarily along the littoral zone of Oso Bay and just inland from coastal areas as isolated depressions (Figure 2-16).

### NOLF Cabaniss

The most recent wetland delineation for NOLF Waldron was completed in 2004 (Turner Collie & Braden Inc. 2004 and Appendix J). That delineation is now out-of-date and a new survey should be performed as part of any pending project that might impact wetlands. Approximately 28.2 ac (11.4 ha) of wetlands were present at NOLF Cabaniss. The USFWS National Wetlands Inventory database has identified approximately 30.3 ac (12.3 ha) of additional wetlands at NOLF Cabaniss. All of the wetlands at NOLF Cabaniss are associated with the floodplain areas along Oso Creek (Figure 2-17). Due to the brackish water conditions and the mixture of

vegetation associated with Oso Creek, including woodland communities, a variety of wetland types occur at NOLF Cabaniss.

### **NOLF Waldron**

The most recent wetland delineation for NOLF Waldron was completed in 2004 and identified no jurisdictional wetlands at NOLF Waldron (Turner Collie & Braden Inc. 2004 and Appendix J). That delineation is now out-of-date and a new survey should be performed as part of any pending project that might impact wetlands. The USFWS National Wetlands Inventory database has identified approximately 27.3 ac (11.0 ha) of wetlands at NOLF Waldron (Figure 2-17). Wetlands at NOLF Waldron are located primarily outside of the airfield area and occur within the Clear Zone areas located off the ends of the runways.

### **NOLF Goliad**

A wetland delineation has not been conducted at NOLF Goliad. The USFWS National Wetlands Inventory database has identified approximately 14.5 ac (5.9 ha) of wetlands at NOLF Goliad. A majority of the wetland acreage at NOLF Goliad is associated with the freshwater pond located between the two runways, although a few small pockets of wetlands are located near the runways, outside the active areas of the airfield (Figure 2-18).

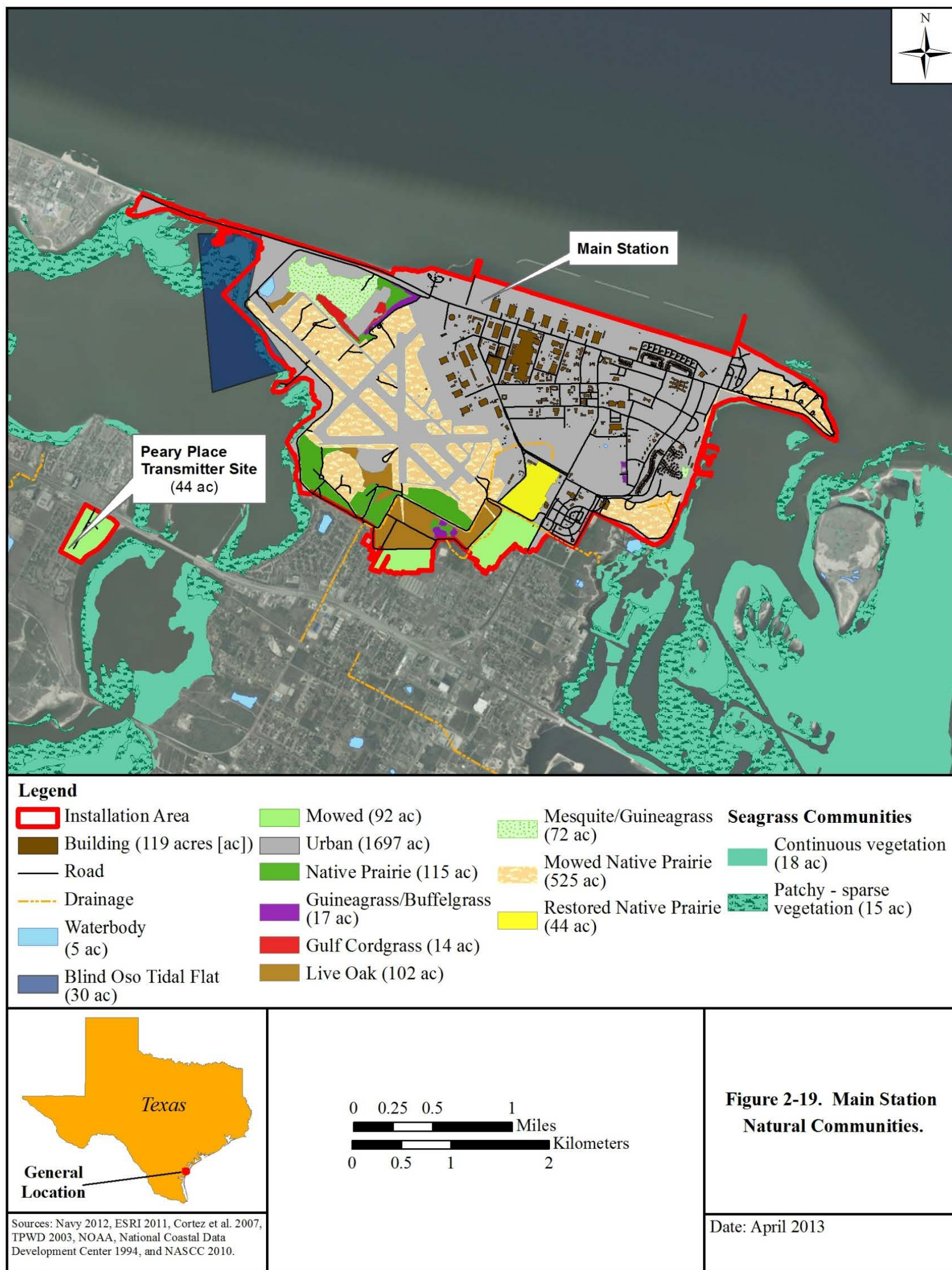
## **2.2.7 Natural Communities and Vegetation**

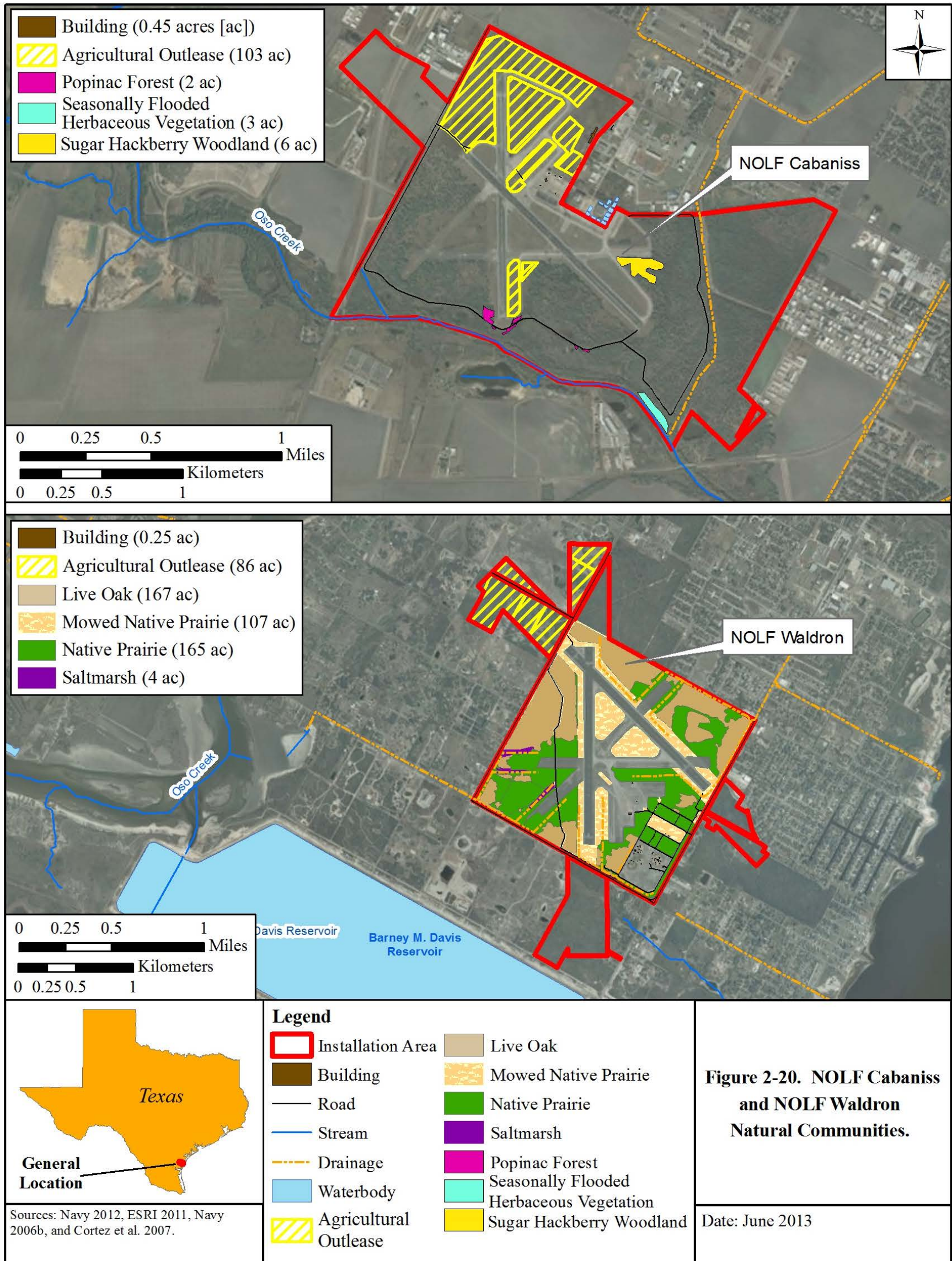
Several surveys have been completed to identify natural communities and vegetation types at the Installation. Table 2-2 provides information on surveys conducted for Installation properties that included collection of natural community and vegetation data, including wetland surveys that collected wetland plant species data.

### **Main Station**

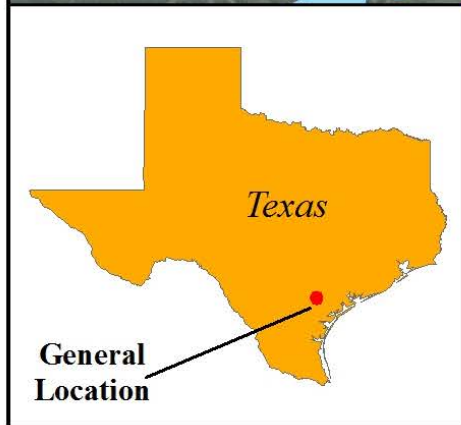
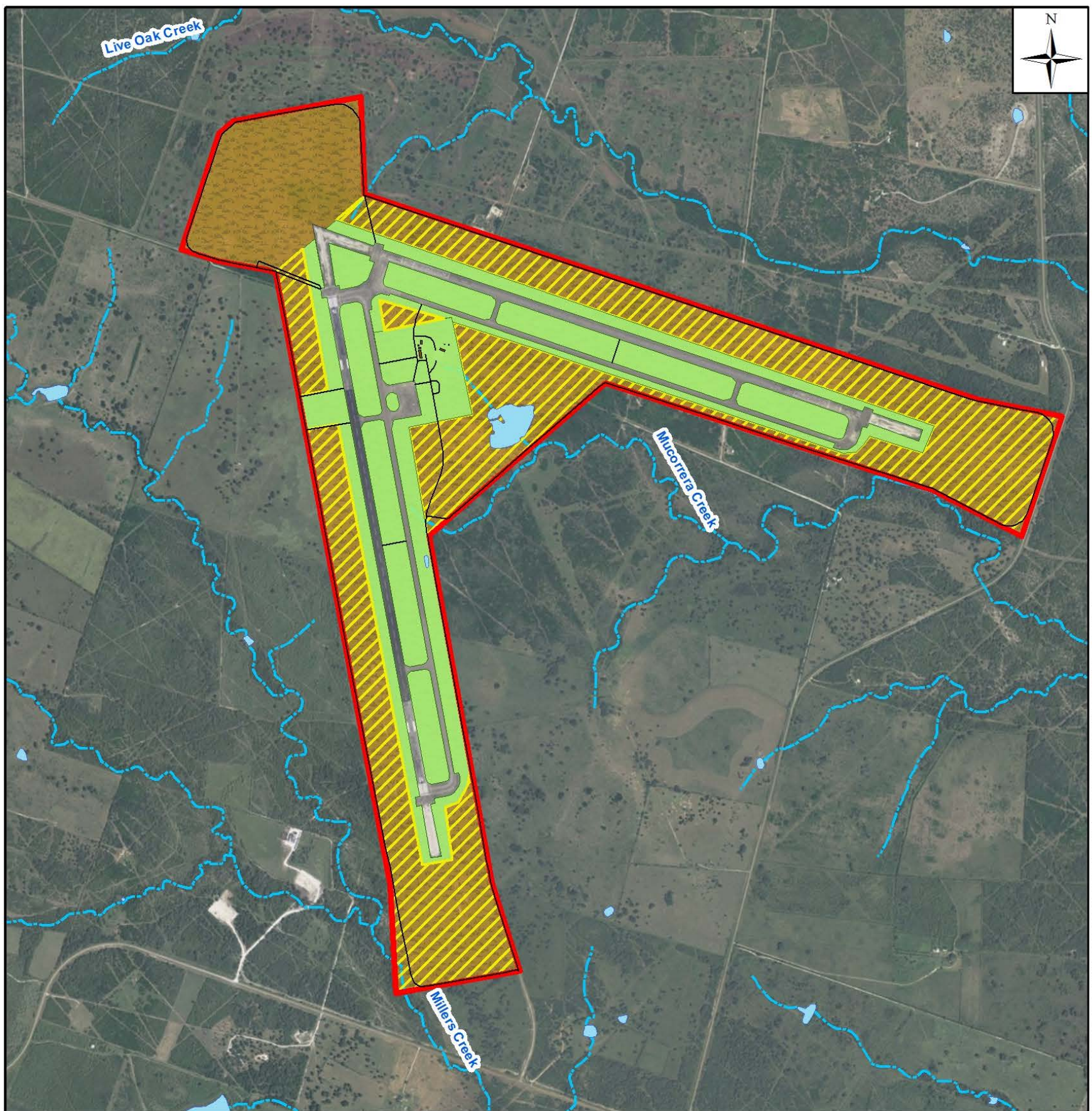
The Main Station and surrounding parcels lie within the Gulf Prairies and Marshes vegetation region of Texas (Hatch et al. 1990 and Gould 1975). The original vegetation of the Main Station was probably a mix of scrub-oak-redbay woodlands and mid- to tall-grass openings, although vegetation associated with the tidally influenced saline flats have probably changed marginally, consisting of scattered clumps of salt tolerant grasses and low growing forbs (TPWD 1992).

Much of the Main Station is urban in nature; however, several natural community types are present. The natural community located around the airfield, at Dimmit Island, and in an area located in the southeast corner of the parcel is mowed native prairie (Figure 2-19), which defines areas of native prairie where 95% or more of the area is mowed on a monthly basis. Live oak (*Quercus fusiformis*), native prairie, guineagrass (*Urochloa maxima*)/buffelgrass (*Pennisetum ciliare*), gulf cordgrass (*Spartina spartinae*), mesquite/guineagrass, and restored native prairie grass communities are primarily located along the periphery of the airfield. The Blind Oso tidal flat community is located along the northwestern parcel boundary (Cortez et al. 2007).









Sources: Navy 2012, ESRI 2011, TPWD 2003, and Mitton 2013a.

**Legend**

Installation Area	Waterbody (8 ac)
Building (0.25 acres [ac])	Post Oak Forest and Grassland Mosaic (118 acres)
Road	Agricultural Outlease (539 ac)
Stream - Intermittent	Mowed (333 ac)

0 0.25 0.5 1 Miles  
 0 0.25 0.5 1 Kilometers

**Figure 2-21. NOLF Goliad Natural Communities.**

Date: February 2013

Z:\projects\NAVFAC\100\_NRS\_T23330\_JM03\_CRPS\_CHRSTYGIS\MXD\FIGURES\20130130\_REVISIONS\TTP\_T23330-JM03\_Fig2-21.mxd, SMH

This page intentionally left blank.

Vegetation of the Main Station consists mostly of frequently mown lawns with introduced grasses such as Bermuda grass and St. Augustine (*Stenotaphrum secundatum*). Other areas that are subject to less frequent mowing consist of a few, mostly non-native species such as Kleberg bluestem (*Dicanthium annulatum*), silky bluestem (*D. sericeum*), and King Ranch bluestem (*Bothriochloa ischaemum* var. *songarica*) (Wolfe et al. 1998 and TPWD 1992). There are some small areas that consist of native vegetation along the perimeter of the Main Station.

**Table 2-2. Summary of Installation Surveys that Collected Natural Community and Vegetation Data.**

Survey Title	Year	Installation Parcel			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
Wetlands Delineation	1996	X	X	X	
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station	1998	X	X	X	
NAS Corpus Christi Wetland Delineation Re-verification	2004	X	X	X	
Management Plan for Controlling Invasive Exotic Plants at NASCC	2007	X	X	X	
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Study and Management Plan for the Maritime Pocket Gopher at NASCC	2007	X		X	
Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas	2010	X		X	
Survey for the Black-spotted Newt on NAS Kingsville, NAS Corpus Christi and NALF Orange Grove.	2011	X			
Biological Survey of Naval Outlying Facility Goliad, Goliad, Texas	2012				X

Sources: Texas A&M University – Corpus Christi 2012, Woodin et al. 2010, Cortez et al. 2007, Hickman et al. 2007, Wiemers et al. 2007, Navy 2006b, Turner Collie & Braden Inc. 2004, and Wolfe et al. 1998

Vegetation associated with the wetland areas of the Main Station include gulf cordgrass, sea oxeye (*Borrchia frutescens*), saltgrass (*Distichlis spicata*), saltwort (*Batis maritima*), saltmarsh cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*S. patens*), bulrush (*Scirpus* spp.), and marsh elder (*Iva* spp.). A list of plants that have been identified at the Main Station is included in Appendix E, Table E-1.

---

Following TNC's National Vegetation Classification System (Weakley et al. 1997), a total of seven natural, semi-natural, and select non-native communities were delineated and described for the Main Station (Wolfe et al. 1998).

Live Oak – Redbay Woodland (*Quercus virginiana* – *Persea borbonia*). This mostly evergreen woodland is the principal vegetation type of well-drained sands located on the Ingleside barrier-strandplain along the Texas Coastal Bend. This community is globally rare and restricted to the Coastal Bend of Texas (Wolfe et al. 1998). Development of the Main Station has replaced much of this community, but a few examples can be found along the southern and western perimeters (Figure 2-19). Coastal live oak (*Quercus agrifolia*) is probably the dominant species, but it is the mix of laurel oak (*Q. hemisphaerica*) and redbay (*Persea borbonia*) that defines this community. This natural community is classified as rare by TPWD (see Section 2.2.10).

Little Bluestem – Brownseed Paspalum Herbaceous Vegetation (*Schizachyrium scoparium* – *Paspalum plicatulum*). The natural openings and clearings within the Live Oak–Redbay

Woodland areas support a diverse, mid- to tall-grass grassland of considerable diversity. Common species include little bluestem (*Schizachyrium scoparium*), brownseed paspalum (*Paspalum plicatulum*), thin paspalum (*P. setaceum*), gulfdune paspalum (*P. monostachyum*), big bluestem (*Andropogon gerardii*), and switchgrass (*Panicum virgatum*) (Wolfe et al. 1998).

Mesquite Woodland (*Prosopis glandulosa*). The northwestern area of the Main Station was converted from tidal flat to upland as a result of the addition of fill material to facilitate the extension of the northwest-southeast runway into Oso Bay to accommodate modern (post-war) aircraft. Honey mesquite (*Prosopis glandulosa*) clearly dominates the woodland in such areas. In some areas, mesquite trees are 8.0–10.0 ft (2.4–3.0 m) tall with a 50–60% canopy cover, while other areas are characterized by trees of 4.0 ft (1.2 m) height (Wolfe et al. 1998 and TPWD 1992). There are very few other woody plants present, whereas the ground layer in open areas is covered with dense stands of non-native grasses.

Popinac – Honey Mesquite – Retama Woodland (*Leucaena leucocephala* – *Prosopis glandulosa* – *Parkinsonia aculeata*). This deciduous woodland community occupies fill areas along the fenceline in the southwestern corner of the station. Popinac (*Leucaena pulverulenta*) is a 6.5–26.0 ft (2.0–8.0 m) tall legume native to tropical America that escaped cultivation and can be found scattered throughout south Texas on shell deposits and waste areas (Wolfe et al. 1998 and Everitt and Drawe 1993).

Gulf Cordgrass – Key Grass – Southern Sea-blite Herbaceous Vegetation (*Spartina spartinae* – *Monanthochloe littoralis* – *Suada linearis*). This midgrass grassland community occupies the same area of the Main Station as the mesquite woodland. It occurs downslope from the woodlands a few inches above the level of tidal flats, on a band of deep loamy saline soil (Wolfe et al. 1998). This community is dominated by a few coarse bunchgrasses and sedges such as gulf cordgrass and chestnut fimbry (*Fimbristylis castanea*), and the ubiquitous halophytic sub-shrub sea oxeye.

Saltgrass – Cordgrass Tidal Herbaceous Vegetation (*Distichlis spicata* – *Spartina spp.*). Poorly drained, low-lying, tidally-influenced areas along Oso Bay, Corpus Christi Bay, Laguna Madre

Estuary, and on partially filled areas in the northwest corner of the Main Station support this variable wetland community (Wolfe et al. 1998). Bands or zones providing a particular microhabitat (as defined by substrate, depth to water level, frequency of inundation, etc.) are typically composed of single-species colonies. Areas of standing salt or brackish water often support colonies of saltmarsh bulrush. Normally immersed but occasionally submersed flats often support a mosaic of seashore dropseed (*Sporobolus virginicus*), shoregrass (*Monanthochloe littoralis*), saltgrass, saltmeadow cordgrass, and a few low shrubs or semi-woody perennials.

Spikerush – Rush – Umbrella-sedge Seasonally Flooded Herbaceous Vegetation (*Eleocharis spp.* – *Juncus spp.* – *Fuirena spp.*). In addition to the live oak-redbay woodlands, the natural vegetation of the Ingleside barrier-strandplain along the Texas Coastal Bend includes some unusual freshwater wetlands, most notably small permanent or ephemeral ponds known locally as potholes (Wolfe et al. 1998). These freshwater wetlands are home to a small suite of species that are widely removed from the rest of their respective (largely Caribbean/Floridian) ranges. Wide shallow ditches seem to provide alternately wet and dry microhabitats suitable for most of these unusual species. Deep narrow ditches tend to provide suitable habitat only for weedier species (e.g., cattails) tolerant of standing stagnant water.

### **NOLF Cabaniss**

Prior to being developed the vegetation of NOLF Cabaniss probably consisted of a mid- to tall-grass prairie grassland. Trees and other woody plants were most likely kept in check by periodic wildfires, although a few trees likely persisted along Oso Creek. The site was originally used for agricultural purposes, and the subsequent development of the parcel for use as an airfield has essentially eliminated the original vegetation (Navy 2006b). With the exception of the Oso Creek corridor, the site contains no native grasslands and practically no natural vegetation. The majority of the site is now covered by disturbance-associated species, including some of the most noxious weeds that occur within the Coastal Bend area (Wolfe et al. 1998).

Six vegetation communities, including the two previously described, were identified at NOLF Cabaniss in a 1998 survey conducted by TNC (Wolfe et al. 1998) using TNC's National Vegetation Classification System (Weakley et al. 1997). These include bluestem–Johnsongrass herbaceous vegetation, sugar hackberry woodland, honey mesquite-sugar hackberry-Roosevelt weed woodland, blackbrush shrubland, gulf cordgrass seasonally flooded herbaceous vegetation, key grass herbaceous vegetation, and popinac forest. Three small parcels of popinac forest occur along a road located near the southwestern perimeter of NOLF Cabaniss and sugar hackberry woodland occurs east of the center of NOFLF Cabaniss (Navy 2006b) (Figure 2-20). A list of plants that have been identified at NOLF Cabaniss is included in Appendix E, Table E-2.

Bluestem – Johnsongrass Herbaceous Vegetation (*Dichanthium spp.* – *Sorghum halepense*). Most of the level ground grasslands near the airfield runways are mowed regularly or maintained as hay meadows. Important grasses of this community include several non-native species such as Kleberg bluestem, silky bluestem, Angleton bluestem (*Dichanthium aristatum*), Johnsongrass (*Sorghum halepense*), and rhodegrass (*Chloris gayana*) (Wolfe et al. 1998). Many weedy forbs also are present. Poorly drained swales are dominated by spikesedges (*Eleocharis macrostachya* and *E. montividentis*) and native golden tickseed (*Coreopsis tinctoria*).

---

Sugar Hackberry Woodland (*Celtis laevigata*). This deciduous woodland is dominated by mesquite (*Prosopis* sp.) and sugar hackberry, and is located in a level upland area near the east end of the east-west runway. This woodland forms a broken canopy between 15 ft and 20 ft (five m and six m) in height, and includes some heavy masses of vines including Texas snoutbean (*Rhynchosia texana*), common morning-glory (*Ipomoea trichocarpa*), twinevine (*Sarcostemma cynanchoides*), and ivy treebine (*Cissus incisa*). A few weedy shrub species are present such as Roosevelt weed (*Baccharis neglecta*) and retama (*Parkinsonia aculeata*), along with a considerable amount of prickly pear cactus (*Opuntia lindheimeri*). The ditch bank located along the eastern edge of the parcel contains scattered Mexican ash (*Fraxinus berlandieriana*) trees, numerous retama, and a dense cover of non-native grasses (Wolfe et al. 1998).

Honey Mesquite – Sugar Hackberry – Roosevelt Weed Woodland (*Prosopis glandulosa* – *Celtis laevigata* – *Baccharis neglecta*). This deciduous woodland occurs on the gently sloping soils near Oso Creek in the southwestern corner of the parcel. Mesquite is more common than sugar hackberry in some portions, and large woody plants are more scattered, providing less cover than in the Sugar Hackberry Woodland. Weedy grassy openings support an abundant prickly pear cactus population, along with shrubs such as narrowleaf elbowbush (*Forestiera angustifolia*), Don Quixote's lace (*Yucca treculeana*), granjeno (*Celtis pallida*), popinac, Roosevelt weed, and retama. The aggressive exotics Chinaberrytree (*Melia azedarach*) and Chinese tallow (*Sapium sebiferum*) also are present (Wolfe et al. 1998).

Blackbrush Shrubland (*Acacia rigidula*). This mostly evergreen shrubland comprises species more commonly associated with Tamaulipan thornscrub, and occupies the steep slopes along Oso Creek in the southeastern corner of the parcel (Wolfe et al. 1998). An impenetrable thicket is formed by shrubs such as blackbrush (*Acacia rigidula*), narrowleaf elbowbush, coyotillo (*Karwinskia humboldtiana*), coma (*Bumelia celastrina*), agarito (*Berberis trifoliolata*), Berlandier wolfberry (*Lycium berlandieri*), mesquite, and prickly pear cactus. Native shortgrasses such as purple threeawn (*Aristida purpurea*), Texas grama (*Bouteloua rigidisetata*), and buffalograss (*Buchloe dactyloides*) dominate the few openings.

Gulf Cordgrass Seasonally Flooded Herbaceous Vegetation and Key Grass Herbaceous Vegetation (*Spartina spartinae* – *Monanthochloe littoralis*). A variety of halophytic communities are supported by the slightly saline soils located along Oso Creek, some of which can be classified as wetlands (Wolfe et al. 1998). Colonies of saltmarsh bulrush (*Scirpus robustus*) occupy the broad shallow valley between the southern ends of the runways, and are replaced on very slightly higher sites by nearly solid stands of gulf cordgrass. Scattered salt cedars (*Tamarix aphylla*) are located along the banks of Oso Creek in the southeastern corner of NOLF Cabaniss (Wolfe et al. 1998).

Popinac Forest (*Leucana leucocephala*). Popinac was introduced from tropical America and has since become naturalized (Wolfe et al. 1998 and Everitt and Drawe 1993). Several closed canopy stands of this medium-sized tree can be found along the southern perimeter road of the parcel.

Riparian habitat is characterized as the land and vegetated zone that forms the interface between terrestrial and aquatic ecosystems (Montgomery 1996). Typically, these areas are associated with the banks and margins of streams and rivers; however, this term has expanded in recent years to

include areas located adjacent to all waterbodies, including lakes, ponds and wetlands. Riparian areas provide important wildlife habitat and help to stabilize soils along river, stream, and creek banks. NOLF Cabaniss is the only Installation parcel that contains substantial riparian areas in association with Oso Creek.

### **NOLF Waldron**

Four natural community types have been mapped at NOLF Waldron including live oak, native prairie, mowed native prairie, and saltmarsh (Figure 2-20). Mowed native prairie defines the natural community located adjacent to the runways, with live oak and native prairie communities dispersed throughout most of the remainder of the area around the airfield. A small amount of saltmarsh community is located at the western ends of the runways near the west corner of the parcel. The agricultural outlease areas located within the Clear Zone area of NOLF Waldron are not classified as a natural community due to their disturbed nature.

TNC identified four vegetation communities at NOLF Waldron in a 1998 survey (Wolfe et al. 1998) using TNC's National Vegetation Classification System (Weakley et al. 1997). These include live oak-redbay woodland; spikerush-rush-umbrella sedge seasonally flooded herbaceous vegetation; tallow tree seasonally flooded forest; and honey mesquite-granjeno woodland. A list of plants that have been identified at NOLF Waldron is included in Appendix E, Table E-3.



*Indian blanket (Gaillardia pulchella), NOLF Waldron*

Source: L. Rivard

*Live Oak – Redbay Woodland (Quercus virginiana – Persea borbonia).* NOLF Waldron

contains the typical non-native mowed grasslands found around other landing strips; but much of the parcel consists of a single native community – Live Oak/Redbay Woodland. This globally rare community (see Section 2.2.10) is the principal vegetation at NOLF Waldron, with various phases represented virtually throughout the parcel (Wolfe et al. 1998). Post oak (*Quercus stellata*) is present but rare. Associated shrubs and woody vines include yaupon (*Ilex vomitoria*), American beautyberry (*Callicarpa americana*), greenbriar (*Smilax bona-nox*) and, in moister spots, wax-myrtle (*Myrica cerifera*). This community varies in structure at NOLF Waldron with some areas occupied by small stands of tall trees with a closed canopy; however, most areas appear as shrub thickets 4–8 ft (1–2 m) in height. One such thicket located on the south side of Yorktown Boulevard burned during a wildfire in the summer of 1996. A few herbaceous species were encountered during a site survey conducted in April 1997. Most of the woody plants were only top-killed, which produced 2–3 ft (0.6–0.9 m) tall stump sprouts.

Various openings occur throughout this woodland community, some naturally occurring and some artificially created (e.g., fire lanes, trails). Drier openings support big bluestem, which was reported to reach a height of 8 ft (2.4 m) in the fall of 1991, overtopping adjacent shrubby oak stands (Wolfe et al. 1998). Most of the grasses on this site are midgrasses (e.g., little bluestem, brownseed paspalum, gulfdune paspalum, and switchgrass). Quite a few forbs also are present, many of which are areniphiles or sand-loving species.

Spikerush – Rush – Umbrella-sedge Seasonally Flooded Herbaceous Vegetation (*Eleocharis spp.* – *Juncus spp.* – *Fuirena spp.*). The status of freshwater ponds or wetlands at NOLF Waldron prior to construction is unknown, but it is likely they were poorly defined and few in number (Wolfe et al. 1998). NOLF Waldron’s drainage ditches presently support a moderately diverse sedge-dominated community that includes a number of rare wetland species, including one-head porcupine-sedge (*Fuirena scirpoidea*), spreading beakrush (*Rhynchospora divergens*) and smallseed beakrush (*R. microcarpa*).

Tallow-tree Seasonally Flooded Forest (*Sapium sebiferum*). A fairly large freshwater pond exists in the northwest corner of Flour Bluff Drive and Caribbean Drive, within the Clear Zone located beyond the north end of the north-south runway (Wolfe et al. 1998). This depression supports a closed-canopy swamp forest composed of the exotic Chinese tallow and the native black willow (*Salix nigra*). Other species present include a thin veneer of duckweed (*Lemna* sp.), cattails (*Typha* sp.) and patches of mixed hydrophytic species, but no plant species of interest were encountered in this wetland.

Honey Mesquite – Granjeno Woodland (*Prosopis glandulosa* – *Celtis pallida*). This mostly deciduous community is restricted to a small area of heavy clay soils along the south side of a large pond in a former horse pasture located at the northwest corner of Flour Bluff Drive and Caribbean Drive (Wolfe et al. 1998). This clay may be from spoil dredged from the adjacent wetland. The vegetation here differs radically from elsewhere on the parcel. Important woody species include mesquite, granjeno (*Celtis pallida*), and colima (*Zanthoxylum fagara*), the last of which seldom occurs on deep sand sites. The herbaceous layer includes several species that are rare or entirely absent from oak-redbay woodlands and associated openings.

## **NOLF Goliad**

NOLF Goliad is located in the East Central Texas Plains ecoregion (TPWD 2012a). The original vegetation was mainly perennial warm-season bunchgrasses in savannahs of post oak, live oak, and mesquite. Since the Southern Texas coastal region was settled, major vegetation changes have taken place. The original grasslands that existed throughout southern Texas have been replaced by developed land, ranches, and crops. The natural community associated with NOLF Goliad is Post Oak Forest and Grassland Mosaic (Figure 2-21).





*American star-thistle* (*Centaurea americana*),  
*NOLF Goliad*

Source: L. Rivard

A list of flowering plants that have been identified at NOLF Goliad is included in Appendix E, Table E-4).

*Post Oak Forest and Grassland Mosaic (Quercus stellata and various grass species)*. With the exception of the paved runway areas and the waterbody located southeast of the intersection of the two runways, the entire parcel is comprised of this natural community type. Plant species commonly associated with the Post Oak Forest Grassland Mosaic community includes blackjack oak, eastern red cedar (*Juniperus virginiana*), mesquite (*Prosopis glandulosa*), black hickory

(*Carya texana*), live oak, sandjack oak (*Quercus incana*), cedar elm (*Ulmus crassifolia*), hackberry (*Celtis* sp.), yaupon, poison ivy (*Toxicodendron radicans*), American beautyberry, hawthorn (*Crataegus* sp.), supplejack (*Berchemia scandens*), trumpet creeper (*Campsis radicans*), dewberry (*Rubus* sp.), coral-berry (*Symphoricarpos orbiculatus*), little bluestem, silver bluestem (*Bothriochloa saccharoides*), beaked panicum (*Panicum anceps*), Wright's threeawn (*Aristida wrightii*), sprangletop grass (*Leptochloa* sp.), and tick clover (*Desmodium* sp.). Dominant grasses on the sandy loam soils are shore little bluestem (*Schizachyrium littorale*), bristlegrass (*Setaria* sp.), paspalum (*Paspalum hieronymi*), windmill grass (*Chloris* sp.), silver bluestem, big sandbur (*Cenchrus myosuroides*), and tanglehead (*Heteropogon contortus*) (Texas State Historical Association n.d. b). The post oak forest and grassland mosaic community at NOLF Goliad includes blackjack oak, eastern red cedar, mesquite, live oak, Rio Grande dewberry (*Rubus riograndis*), marsh bristlegrass (*Setaria paryiflora*), barbed bristlegrass (*S. viridis*), fringed windmill grass (*Chloris ciliata*), hooded windmill grass (*C. cucullata*). The land surrounding NOLF Goliad is dominated by shrubs, some trees, and ranches (Navy 2009).

### 2.2.8 Nuisance and Invasive Plant Species

Several nuisance and invasive plants are located at the Installation (Appendix G, Table G-1). The NASCC 2007 Exotic Species Management Plan describes the geographic location of infestations of Brazilian peppertree (*Schinus terebinthifolius*), Chinaberrytree, Chinese tallow, and guineagrass at the Main Station, NOLF Cabaniss, and NOLF Waldron. Brazilian peppertree, Chinaberrytree, and Chinese tallow are the primary nuisance and invasive plant species located at the Main Station and NOLF Waldron, and Chinaberrytree and Chinese tallow are the primary nuisance and invasive plant species located at NOLF Cabaniss. Guineagrass also is present at the Main Station and NOLF Cabaniss (Wiemers et al. 2007). In addition to these species, additional invasive or nuisance plant species have been identified, including 19 species at the Main Station, 20 species at NOLF Cabaniss, nine species at NOLF Waldron, and 11 species at NOLF Goliad (Appendix E, Table E-1, Table E-2, Table E-3, and Table E-4). A 2016 survey of NASCC shoreline habitat recorded invasive species including Brazilian peppertree, Chinaberrytree, tamarisk (*Tamarix* spp.), white lead tree (*Leucaena leucocephala*), buffelgrass (*Cenchrus*

*ciliaris*), giant reed (*Arundo donax*), and guineagrass (*Urochloa maxima*). Invasive species were not detected where tidal waters occurred, inundating the areas for significant time (Texas A&M 2017). Approximately 19 acres of shoreline were subsequently treated to remove woody exotics and restore the habitat (Texas A&M 2018b).

A survey targeting invasive species located at NOLF Goliad has not been conducted; however, a recent biological survey of this parcel identified 11 nuisance and invasive flowering plants (Appendix E, Table E-4).

## 2.2.9 Sensitive Wildlife Habitat and Rare Ecosystems

### Main Station

Flora surveys of the Main Station identified a number of species of interest (species of remarkably restricted or otherwise unusual distribution) including the presence of nine Texas endemic species (Appendix E, Table E-1). Texas endemic plant species identified at the Main Station in 1998 include Park's croton (*Croton parksii*), pussyfoot (*Dalea obovata*), Texas crabgrass (*Digitaria texana*), San Saba pinweed (*Lechea san-sabeana*), sand phacelia (*Phacelia patuliflora* ssp. *austrotexana*), large clammyweed (*Polanisia erosa* ssp. *breviglandulosa*), woolly globemallow (*Sphaeralcea lindheimeri*), Rio Grande greenthread (*Thelesperma muecense*), and Texasgrass (*Vaseyochloa multinervosa*) (Wolfe et al. 1998). The terrestrial natural communities identified for the Main Station are described in Section 2.2.7 and includes the oak-redbay natural community, which is a rare community (TPWD 2012b). The oak-redbay community is considered globally rare (G2) and rare within Texas (S2), and is imperiled due to rarity (generally 6–20 occurrences) or due to other factors that make it vulnerable to extinction.

Seagrass beds are considered “special aquatic sites” under the Clean Water Act (CWA) Section 404(b)1 guidelines, and are considered essential fish habitat by the NOAA National Marine Fisheries Service (NMFS). Seagrasses are highly specialized marine flowering plants rooted and submersed in the higher salinity waters of most Texas bays and estuaries, with five genera occurring in Texas coastal waters (*Halodule* spp., *Thalassia* spp., *Syringodium* spp., *Halophila* spp., and *Ruppia* spp.). Taxonomically not true grasses, the seagrasses of Texas belong to the families Cymodoceaceae, Ruppiceae, and Hydrocharitaceae. Seagrasses occur in shallow saline waters, usually in protected lagoon or bay environments. Seagrasses require sunlight, water, nutrients, and a soft muddy substrate. Vast expanses of seagrass meadows provide a unique habitat for many estuarine dependent plants and animals, and it plays a major role in the reproductive cycles of many recreationally and commercially important species in the Coastal Bend area of Texas. Fish and shellfish utilize seagrass habitats in the early stages of their life cycles, feeding on organic matter produced by decomposing seagrasses and hiding from larger predators among the seagrass blades (CBBEP n.d. b).

Seagrass habitat is located at the Main Station along the shorelines of Oso Bay and Laguna Madre Estuary (Figure 2-19). At the Main Station, these beds consist predominantly of shoalgrass (*Halodule wrightii*).

### NOLF Cabaniss

Flora surveys of NOLF Cabaniss identified the presence of one Texas endemic species, coastal phacelia (*Phacelia laxa*) (Appendix E, Table E-2). None of the terrestrial communities described for NOLF Cabaniss in Section 2.2.7 are considered rare or sensitive.

### NOLF Waldron

Flora surveys of NOLF Waldron identified the presence of six Texas endemic species (Appendix E, Table E-3), including Texas crabgrass, San Saba pinweed, Texasgrass, coastal phacelia, large clammyweed, and Rio Grande greenthread (Wolfe et al. 1998). The terrestrial natural communities identified for the NOLF Waldron are described in Section 2.2.7 and includes the oak-redbay natural community, a rare community as described for the Main Station.

### NOLF Goliad

Surveys of flowering plants of NOLF Goliad identified *Liatris* sp., possibly bracted blazing star (*Liatris bracteata*) (also commonly known as coastal gay-feather), a rare plant that is considered state and globally vulnerable to imperiled (Texas A&M University – Corpus Christi 2012). Based on the common rootstock of all *Liatris* individuals found on NOLF Goliad and the hybridization behavior exhibited by this genus, the authors of the report recommended all individuals occurring on NOLF Goliad be treated as a potential threatened species. A comprehensive natural community survey of this parcel has not been conducted.

#### 2.2.10 Rare, Threatened, and Endangered Plants Species

Surveys for rare plants and areas of botanical interest were conducted by TPWD at the Main Station, NOLF Cabaniss, and NOLF Waldron in September 1991 and April 1992 (TPWD 1992) and 1998 (Wolfe et al. 1998). During these surveys, no federally listed threatened or endangered species were encountered; however, one plant species considered rare in Texas was identified at NOLF Cabaniss (see discussion below). A total of nine rare, threatened, or endangered plant species have the potential to occur at the Nueces County parcels (TPWD 2013). Table 2-3 provides information on surveys conducted for Installation properties that included collection of rare, threatened, and endangered plant data.

**Table 2-3. Summary of Installation Surveys that Collected Rare, Threatened, and Endangered Plants Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
Survey of Rare, Threatened, and Endangered Plants on U.S. Navy Property in South Texas	1992	X	X	X	
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station	1998	X	X	X	
Study and Management Plan for the Maritime Pocket Gopher at NASCC	2007	X		X	
Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas	2010	X		X	

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
Biological Survey of Naval Outlying Facility Goliad, Goliad, Texas	2012				X

Sources: Texas A&M University – Corpus Christi 2012, Woodin et al. 2010, Cortez et al. 2007, and Wolfe et al. 1998

**Main Station**

No rare plants have been identified at the Main Station. The TNC survey of the Main Station concluded that the deep, sandy soils of the Encinal Peninsula (and the Nueces County parcels) are unlikely to support any plant species of federal concern (Wolfe et al. 1998). However, TNC has identified a number of species at the Main Station that are endemic to sandy areas of Texas or of special interest because of their rarity in Texas (Appendix E, Table E-1).

**NOLF Cabaniss**

Buckley’s spiderwort (*Tradescantia buckleyi*) has been documented at NOLF Cabaniss. Buckley’s spiderwort is considered a Texas rare plant species, and currently has a global rank of G3 (vulnerable) and a state ranking of S3 (vulnerable) (TPWD 2012c) (Appendix E, Table E-13). Edaphic and geographic factors present at NOLF Cabaniss indicated a strong possibility for the occurrence of other rare plant species (Wolfe et al. 1998). Victoria clay soils (0–1 percent slopes and 1–3 percent slopes) are present at NOLF Cabaniss, which provide the potential for slender rushpea (*Hoffmannseggia tenella*) and South Texas ambrosia (*Ambrosia cheiranthifolia*) to occur, as these species are known to occur on Victoria series soils at a site in western Nueces County. Chandler’s craglilly (*Echeandia chandleri*), plains gumweed (*Grindelia oolepis*), and yellow-show (*Amoreuxia wrightii*) also are known from the general area and may occur on Victoria series soils.

**NOLF Waldron**

No rare plants have been identified at NOLF Waldron. The TNC survey of the NOLF Waldron concluded that the deep, sandy soils of the Encinal Peninsula (and the Nueces County parcels) are unlikely to support any plant species of federal concern (Wolfe et al. 1998). However, TNC has identified a number of species at the NOLF Waldron that are endemic to sandy areas of Texas or of special interest because of their rarity in Texas (Appendix E, Table E-2).

**NOLF Goliad**

A focused rare plant survey has not been conducted at NOLF Goliad. A biological survey of flowering plants conducted at NOLF Goliad in 2012 did not identify any rare, threatened, or endangered plant species (Texas A&M University – Corpus Christi 2012). A total of six plant species that are considered rare in the state of Texas have the potential to occur at NOLF Goliad (TPWD 2013) (Appendix E, Table E-14).

**2.2.11 Regional Conservation Lands**

Regional conservation lands include state or federally protected conservation lands, such as state and national parks, wildlife refuges, and wildlife management areas (WMAs). The TPWD operates 51 WMAs in Texas (TPWD 2005), which are established to represent habitats and

wildlife populations typical of each ecological region of Texas. The objective of the WMA program is to perform research on wildlife populations and habitats, conduct education on sound resource management, and to provide public hunting, hiking, bird watching and other outdoor recreational opportunities that are compatible with conservation goals. One WMA, three state parks, and a national wildlife refuge are located within 50 mi (80 km) of the Main Station, NOLF Cabaniss, and NOLF Waldron.

Redhead Pond (42 ac [17 ha]) is a WMA within 5 mi (8 km) of the Installation parcels located in Nueces County. The Redhead Pond WMA was purchased to protect freshwater wetland habitat for wintering waterfowl and other birds. Bird viewing is the sole outdoor recreational opportunity at this WMA (TPWD n.d. a).

Mustang Island State Park (4,000 ac [1,619 ha]) is within 10 mi (16 km) of the Installation parcels located in Nueces County. Mustang Island is a coastal barrier island with a unique and complicated ecosystem consisting of sand dunes, which provides important habitat for migratory birds as well as provides land protection from hurricane-driven waves. The state park encompasses 4,000 ac (1,619 ha) and almost 5 mi (8 km) of beach (TPWD n.d. b).

The Padre Island National Seashore is a 130,434-ac (52,785-ha) national park located within 25 mi (40 km) of the Installation parcels in Nueces County. Padre Island National Seashore separates the Gulf of Mexico from the Laguna Madre Estuary. Padre Island is an important nesting ground for Kemp's Ridley sea turtle (*Lepidochelys kempii*) and provides habitat for 380 bird species. Recreational opportunities include camping, fishing, birding, hunting, and swimming at the beach (National Park Service 2013).



*Padre Island National Seashore*

Source: L. Rivard

Goose Island State Park (321 ac [130 ha]) is within 40 mi (64 km) of the Installation parcels located in Nueces County. Goose Island State Park is a 321-ac (130-ha) park surrounded by the St. Charles and Aransas bays on the coast of the Gulf of Mexico (TPWD n.d. c).

Lake Corpus Christi State Park is an 11,000-ac (4,452-ha) park located on the southeastern corner of Lake Corpus Christi, within 50 mi (80 km) of the Installation parcels located in Nueces County. The park represents one of the few remaining strands of brushland in the area, and the riparian woodlands along the Nueces River provide a diverse ecological area for a variety of animals (TPWD n.d. d).

The Aransas National Wildlife Refuge is within 54 mi (87 km) of the Installation parcels located in Aransas, Calhoun, and Refugio counties. The Aransas National Wildlife Refuge is a 114,657-ac (46,400-ha) protected area located on the southwest side of San Antonio Bay along the Gulf of Mexico, and provides important habitat for whooping cranes (*Grus americana*) and other animals and migratory birds (Great Outdoors Recreation Pages n.d.).

---

## **NOLF Goliad**

There are two WMAs that are located within 50 mi (80 km) of NOLF Goliad: James E. Daughtrey WMA and Guadalupe Delta WMA.

The James E. Daughtrey WMA is a 4,400-ac (1,781-ha) multiple use recreational area located approximately 48 mi (km) west of NOLF Goliad. The WMA is a multi-use area that surrounds Choke Canyon Reservoir, which provides valuable habitat for migratory species including waterfowl. Fishing, hiking, wildlife viewing, and hunting are permitted on the James E. Daughtrey WMA (TPWD n.d. e).

The Guadalupe Delta WMA is a 6,594-ac (2,669-ha) WMA located approximately 50 mi (80 km) southeast of NOLF Goliad. In the late 1970s the USFWS and TPWD identified the Guadalupe River delta as a wetland area that needed to be preserved to protect the wildlife habitat. Biking, fishing, hiking, hunting, and wildlife viewing are all permitted on the Guadalupe Delta WMA (TPWD n.d. f).

Several conservation easements that have been posted as wildlife conservation areas by the Goliad Wildlife Association, a non-profit association served by the Texas Cooperative Extension, are associated with lands adjacent to NOLF Goliad. Goals of the Goliad Wildlife Association include improving and/or maintaining wildlife populations and developing wildlife awareness and management practices throughout Goliad County. The Association was established in 1993 and currently has 160 members and oversight of 102,606 ac (41,523 ha) (Navy 2009).

The Refugio-Goliad Prairie is located approximately 10 mi (16 km) due west of NOLF Goliad. The Refugio-Goliad Prairie contains over 100,000 ac (40,469 ha) of private land that is conserved and managed as one of the largest and highest-quality expanses of coastal tallgrass prairies remaining in Texas. Coastal tallgrass prairie is a globally imperiled community and has experienced substantial habitat loss. Rare species such as the federally endangered Attwater's prairie chicken (*Tympanuchus cupido* ssp. *attwateri*), northern aplomado falcon (*Falco femoralis* ssp. *septentrionalis*), white-tailed hawk (*Buteo albicaudatus*), and Texas prairie dawn (*Hymenoxys texana*) are dependent on these native prairies and can be found in the Refugio-Goliad Prairie. Along with local landowners, the TPWD, USFWS, and TNC, among others, have identified these grasslands as high priority areas for conservation and have initiated partnerships designed to help landowners maintain and enhance them (Navy 2009).

## **2.3 FISH AND WILDLIFE RESOURCES**

Several wildlife surveys have been conducted on Installation properties including amphibian and reptile, bird, and mammal surveys. A summary of the results of these surveys are described in the following sections, where relevant, and a complete list of fauna known or with the potential to occur at Installation properties is provided in Appendix E, Tables E-5 through E-12. Rare, threatened or endangered wildlife species that are known or have the potential to occur at NASCC are described in Section 2.3.6 and listed in Appendix E, Tables E-13 and E-14.

### 2.3.1 Fish

No focused fish surveys have been conducted at the Installation; however, three biological surveys have been conducted that included the documentation of fish species (Table 2-4).

#### Main Station

Surveys have identified eight fish species at the Main Station (LaBella 2011 and Hickman et al. 2007). Based on county records an additional two fish species have the potential to occur on the Main Station (Appendix E, Table E-9).

**Table 2-4. Summary of Installation Surveys that Collected Fish Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Survey for the Black-spotted Newt on NAS Kingsville, NAS Corpus Christi and NALF Orange Grove.	2011	X			
USFWS Fish Survey of Goliad County Industrial Park	2012				X

Sources: USFWS 2012a, LaBella 2011, and Hickman et al. 2007

#### NOLF Cabaniss

A survey conducted in 2005–2006 confirmed the occurrence of two fish species in freshwater at NOLF Cabaniss, including Alligator gar (*Atractosteus spatula*) and common carp (*Cyprinus carpio*) (Appendix E, Table E-9) (Hickman et al. 2007).

#### NOLF Waldron

There are no permanent water bodies at NOLF Waldron that would support fish.

#### NOLF Goliad

A fish survey was conducted at NOLF Goliad in 2012 (USFWS 2012a). Results of this survey identified three species: black bullhead (*Ameiurus melas*), green sunfish (*Lepomis cyanellus*), and golden shiner (*Notemigonus crysoleucas*) (Appendix E, Table E-10).

### 2.3.2 Amphibians and Reptiles

Based on county records 73 amphibians and reptiles have the potential to occur in Nueces County and 108 amphibians and reptiles have the potential to occur at NOLF Goliad; however, because their natural history is generally not well known, the distribution and relative abundance of these herptiles within Nueces County are not well known. Several surveys have been

conducted at the Installation that included the collection of amphibian and reptile data (Table 2-5).

### Main Station

Surveys conducted at the Main Station have identified seven amphibians and 12 reptiles (LaBella 2011, Hickman et al. 2007, and Wolfe et al. 1998). An additional 11 amphibians and 43 reptiles also have the potential to occur based on Nueces County records (Appendix E, Table E-9).

**Table 2-5. Summary of Installation Surveys that Collected Amphibian and Reptile Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station	1998	X	X	X	
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Survey for the Black-spotted Newt on NAS Kingsville, NAS Corpus Christi and NALF Orange Grove.	2011	X			
USFWS Herpetofauna Survey of Goliad County Industrial Park	2012				X

Sources: USFWS 2012b, LaBella 2011, Hickman et al. 2007, and Wolfe et al. 1998

### NOLF Cabaniss

Surveys conducted at NOLF Cabaniss have identified 9 reptile species (Hickman et al. 2007 and Wolfe et al. 1998) (Appendix E, Table E-9). No amphibians have been documented at NOLF Cabaniss. Based on county occurrence data, 18 amphibian species and 46 reptile species also have the potential to occur at NOLF Cabaniss (TPWD 2013 and Navy 2006b).

### NOLF Waldron

Surveys conducted at NOLF Waldron have identified 7 reptiles at NOLF Waldron (Hickman et al. 2007 and Wolfe et al. 1998) (Appendix E, Table E-9). No amphibians have been documented at NOLF Waldron. Based on county occurrence data, 18 amphibian species and 48 reptile species also have the potential to occur at NOLF Waldron (TPWD 2013 and Navy 2006b).

### NOLF Goliad

A herpetofauna survey was conducted at NOLF Goliad in 2012 (USFWS 2012b). Results of this survey identified seven amphibians and eight reptiles (Appendix E, Table E-10) (USFWS 2012b). Based on county occurrence data, 15 amphibians and 77 reptiles also have the potential to occur at NOLF Goliad (Mitton 2013b).



### 2.3.3 Birds

Texas, especially South Texas, is world-renowned for the variety of bird species that reside or migrate through the state to over-wintering habitats in Central and South America, or overwinter here. Coastal forests, grasslands, and marshes are valuable feeding, nesting, and resting areas for passerines, waterfowl, wading birds, and shorebirds. The Installation region is located within the Central Flyway of North America, a specific migratory route which covers the states of Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota; and the Canadian provinces of Alberta, Saskatchewan and the Northwest Territories (USFWS n.d. b).

Based on county occurrence data and species checklists for the area approximately 340 bird species have the potential to occur in Nueces County. The list of birds with the potential to occur is based on data provided in the 2006 INRMP, which did not include information for Goliad County. Several surveys have been conducted that identified bird species at Installation parcels, including a survey focused on grassland bird species conducted in 2010 (Table 2-6).

**Table 2-6. Summary of Installation Surveys that Collected Bird Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station.	1998	X	X	X	
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas	2010	X		X	
Biological Survey of Naval Outlying Facility Goliad, Goliad, Texas	2012				X

Sources: Texas A&M University – Corpus Christi 2012, Woodin et al. 2010, Hickman et al. 2007, and Wolfe et al. 1998

As part of the 1988 amendment to the Fish and Wildlife Conservation Act (Public Law 100-653), the USFWS is required to identify species, subspecies, and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the 1973 ESA. According to the USFWS Birds of Conservation Concern 2008 (USFWS 2008), Installation parcels located in Nueces County are within the U.S. portion of the Gulf Coastal Prairie region, also known as Bird Conservation Region (BCR) 37 (Figure 2-22). NOLF Goliad is located in the Oaks and Prairies region, or BCR 21 (Weaver 2013). The goal envisioned by the USFWS in identifying Birds of Conservation Concern (BCC) species is to stimulate the implementation of coordinated, proactive management and conservation actions among federal, state, tribal, and private partners to prevent these species from being listed under

---

the ESA. Additionally, the BCR lists are intended to assist federal land-managing agencies and their partners in their efforts to abide by the bird conservation principles embodied in the Migratory Bird Treaty Act (MBTA) and EO 13186 titled “*Responsibilities of Federal Agencies to Protect Migratory Birds*” (USFWS 2008). Of the 44 bird species listed by USFWS for BCR 37, 18 of these species have been documented at Installation parcels located in Nueces County (Appendix E, Tables E-5, E-6, and E-7). Of the 21 bird species listed by USFWS for BCR 21, three species have been documented at NOLF Goliad (Appendix E, Table E-8). Birds listed by USFWS as BCC species are covered in more detail in Section 2.3.6.

In accordance with the MBTA, active nests may not be removed, even from man-made structures, without a permit issued by USFWS. Nests may only be removed after they are vacated by the resident birds and their fledglings. Efforts should therefore be made to prevent nesting on buildings and structures that are scheduled for demolition, improvement, or other construction activities. Similarly, nesting should be discouraged on structures essential to the military mission, such as antennas and radars, so that their functionality is not compromised by the presence of a nest. Otherwise, in most cases, such nests would have to remain in place until the hatchlings fledge.

### **Main Station**

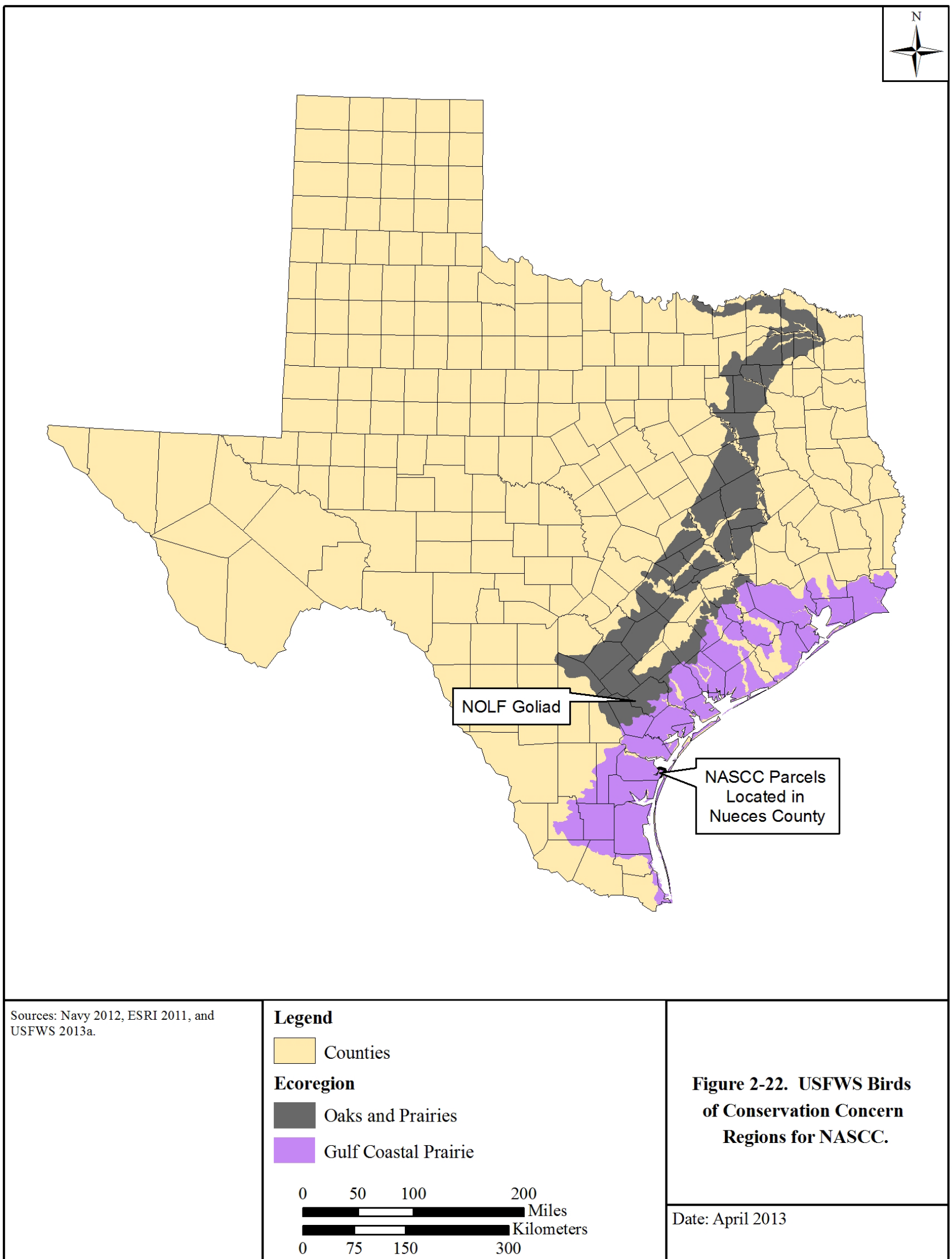
Surveys conducted at the Main Station have identified 103 bird species within the parcel boundaries, with approximately 235 additional bird species having the potential to occur (Appendix E, Table E-5) (Woodin et al. 2010, Hickman et al. 2007, and Wolfe et al. 1998). The species identified as having the potential to occur are based on a survey of the Main Station, NOLF Cabaniss, and NOLF Waldron, which did not differentiate the occurrence of birds observed for each parcel. A species inventory update in 2007 identified the federally-delisted brown pelican (*Pelecanus occidentalis*) and peregrine falcon (*Falco peregrinus*) (Hickman et al. 2007).

### **NOLF Cabaniss**

Surveys conducted NOLF Cabaniss have identified 42 bird species within the parcel boundaries, with approximately 300 additional bird species having the potential to occur (Appendix E, Table E-6) (Hickman et al. 2007 and Wolfe et al. 1998). The species identified as having the potential to occur are based on a survey of the Main Station, NOLF Cabaniss, and NOLF Waldron, which did not differentiate the occurrence of birds observed for each parcel.

### **NOLF Waldron**

Bird surveys conducted at NOLF Waldron have identified 48 bird species within the parcel boundaries, with approximately 290 additional bird species having the potential to occur (Appendix E, Table E-7) (Woodin et al. 2010, Hickman et al. 2007, and Wolfe et al. 1998). Species with the potential to occur are based on a survey of the Main Station, NOLF Cabaniss, and NOLF Waldron, which did not differentiate the occurrence of birds observed for each parcel.



Sources: Navy 2012, ESRI 2011, and USFWS 2013a.

**Legend**

- Counties
- Ecoregion**
- Oaks and Prairies
- Gulf Coastal Prairie

0 50 100 200 Miles  
 0 75 150 300 Kilometers

**Figure 2-22. USFWS Birds of Conservation Concern Regions for NASCC.**

Date: April 2013

This page intentionally left blank.



*Scissor-tailed flycatcher*  
(*Tyrannus forficatus*), *NOLF Goliad*

*Crested caracara* (*Caracara cheriway*),  
*NOLF Waldron*

Source L. Rivard

### NOLF Goliad

A biological survey was conducted at NOLF Goliad in 2012 that included the collection of bird data (Texas A&M University – Corpus Christi 2012). Results of this survey identified 48 bird species at NOLF Goliad (Appendix E, Table E-8).

### 2.3.4 Mammals

Based on county occurrence data, 55 terrestrial mammal species have the potential to occur in Nueces County (Appendix E, Table E-11). Data on the mammals with the potential to occur at NOLF Goliad are not available. Several surveys have been conducted that identified mammal species at Installation parcels (Table 2-7).

**Table 2-7. Summary of Installation Surveys that Collected Mammal Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station	1998	X	X	X	
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Study and Management Plan for the Maritime Pocket Gopher at NASCC	2007	X		X	
Biological Survey of Naval Outlying Facility Goliad, Goliad, Texas	2012				X

Sources: Texas A&M University – Corpus Christi 2012, Cortez et al. 2007, Hickman et al. 2007, and Wolfe et al. 1998

---

## **Main Station**

Surveys conducted at the Main Station have identified 18 mammal species (Hickman et al. 2007 and Wolfe et al. 1998) (Appendix E, Table E-11). Based on county occurrence data, 38 additional mammal species have the potential to occur at the Main Station (TPWD 2013 and Navy 2006b). Mammalian species known or with the potential to occur at the Main Station include species commensal with humans and some more reclusive species. Mammals commonly associated with the urban or suburban environment include opportunistic scavengers such as the common raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginiana*), Norway rat (*Rattus norvegicus*), roof rat (*R. rattus*), and house mouse (*Mus musculus*). The eastern cottontail rabbit (*Sylvilagus floridanus*) and fox squirrel (*Sciurus niger*) are common residents of open areas but are never far from the protective cover of shrubbery or forests. More reclusive small mammals, such as hispid cotton rats (*Sigmodon hispidus*) and pocket mice (*Perognatus* spp. and *Chaetodipus* spp.), as well as large mammals, including coyote (*Canis latrans*), bobcat (*Lynx rufus*), javelina (*Tayassu tajacu*), gray fox (*Urocyon cinereoargenteus*), white-tailed deer (*Odocoileus virginianus*), and wild hog (*Sus scrofa*) have the potential to occur in the undeveloped areas on and around the Main Station. Of these species, white-tailed deer, wild hogs, javelinas, coyotes, and gray foxes, as well as feral cats (*Felis catus*) and feral dogs (*Canis lupus*), have been documented to occur at multiple Installation parcels including the Main Station.

A resident population of gray foxes is known to occur at the Main Station (Wolfe et al. 1998), and likely dens beneath buildings. Gray foxes are common throughout most of the United States and Mexico, and in Texas they are classified as fur-bearers with their harvest regulated by the TPWD.

## **NOLF Cabaniss**

Surveys conducted at NOLF Cabaniss have identified 10 mammal species (Hickman et al. 2007 and Wolfe et al. 1998) (Appendix E, Table E-11). Based on county occurrence data, 46 additional mammal species have the potential to occur at the NOLF Cabaniss (Appendix E, Table E-11) (TPWD 2013 and Navy 2006b).

## **NOLF Waldron**

Surveys conducted at NOLF Waldron have identified nine mammal species (Hickman et al. 2007 and Wolfe et al. 1998) (Appendix E, Table E-11). Based on county occurrence data, 47 additional mammal species have the potential to occur at NOLF Waldron (Appendix E, Table E-11) (TPWD 2013 and Navy 2006b). A sizeable population of white-tailed deer has been known to occupy the dense woody habitat on NOLF Waldron; however, removal of large mammals including deer occurs as needed to support the BASH Program as authorized by a wildlife depredation permit received from TPWD.

## **NOLF Goliad**

A biological survey was conducted at NOLF Goliad in 2012 that included the collection of mammal data (Texas A&M University – Corpus Christi 2012). Results of this survey identified 13 mammal species at NOLF Goliad (Appendix E, Table E-12). A list of other mammals that could potentially occur in Goliad County is not available.

### 2.3.5 Nuisance and Invasive Wildlife Species

Several introduced as well as native species may be considered nuisance wildlife in an urban setting such as the Main Station, including feral cats, red imported fire ants (*Solenopsis invicta*), Norway rat, house mouse, striped skunk, raccoon, and Virginia opossum. A list of wildlife considered by the USFWS to be nuisance or invasive species and which reside in or traverse properties managed by the Installation is provided in Appendix G, Table G-1.

The list of invasive species present or potentially occurring at the Installation will continue to increase as more plants and animals migrate into new areas under normal biological migratory patterns (e.g., Africanized honeybee [*Apis mellifera* ssp. *scutellata*]) and as more exotic plants and animals are purposely or accidentally introduced into the environment. Red imported fire ants, house sparrow (*Passer domesticus*), and rock pigeons (*Columba livia*), all of which occur at the Installation, are examples of common invasive species that can present both aesthetic and health problems. Expanded information on the invasive species listed by USFWS is presented in Appendix G. Two surveys have been conducted that identified nuisance and invasive species at Installation parcels (Table 2-8).

**Table 2-8. Summary of Installation Surveys that Collected Nuisance and Invasive Wildlife Data.**

Survey Title	Year	NASCC Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas	2010	X		X	

Sources: Woodin et al. 2010 and Hickman et al. 2007

### 2.3.6 Rare, Threatened, and Endangered Wildlife Species

The following is a brief discussion of the rare, threatened and endangered fauna known historically from Nueces and Goliad counties that have the potential to be found on Installation properties (Appendix E, Tables E-13 and E-14). In addition to state and federal listing status for all species known or with the potential to occur at the Installation, Tables E-

TPWD maintains a list of Rare, Threatened, and Endangered Species of Texas by county with a map for “potential or known presence” for Nueces and Goliad counties. The county lists are available here:  
<https://tpwd.texas.gov/gis/rtest/>

13 and E-14 in Appendix E also include global and state ranking information as applicable. Based on county records for wildlife species, 85 species that are considered rare in the state of Texas, listed as threatened or endangered by the federal ESA or by the state of Texas, listed as USFWS Birds of Conservation Concern (BCC) species by USFWS, or marine mammals protected by the Marine Mammal Protection Act, have the potential to occur in Nueces County

(Appendix E, Table E-13). Based on county records for wildlife species, 58 species that are considered rare in the state of Texas, listed as threatened or endangered by the federal ESA or by the state of Texas, or listed as BCC species by USFWS, have the potential to occur in Goliad County (Appendix E, Table E-14).

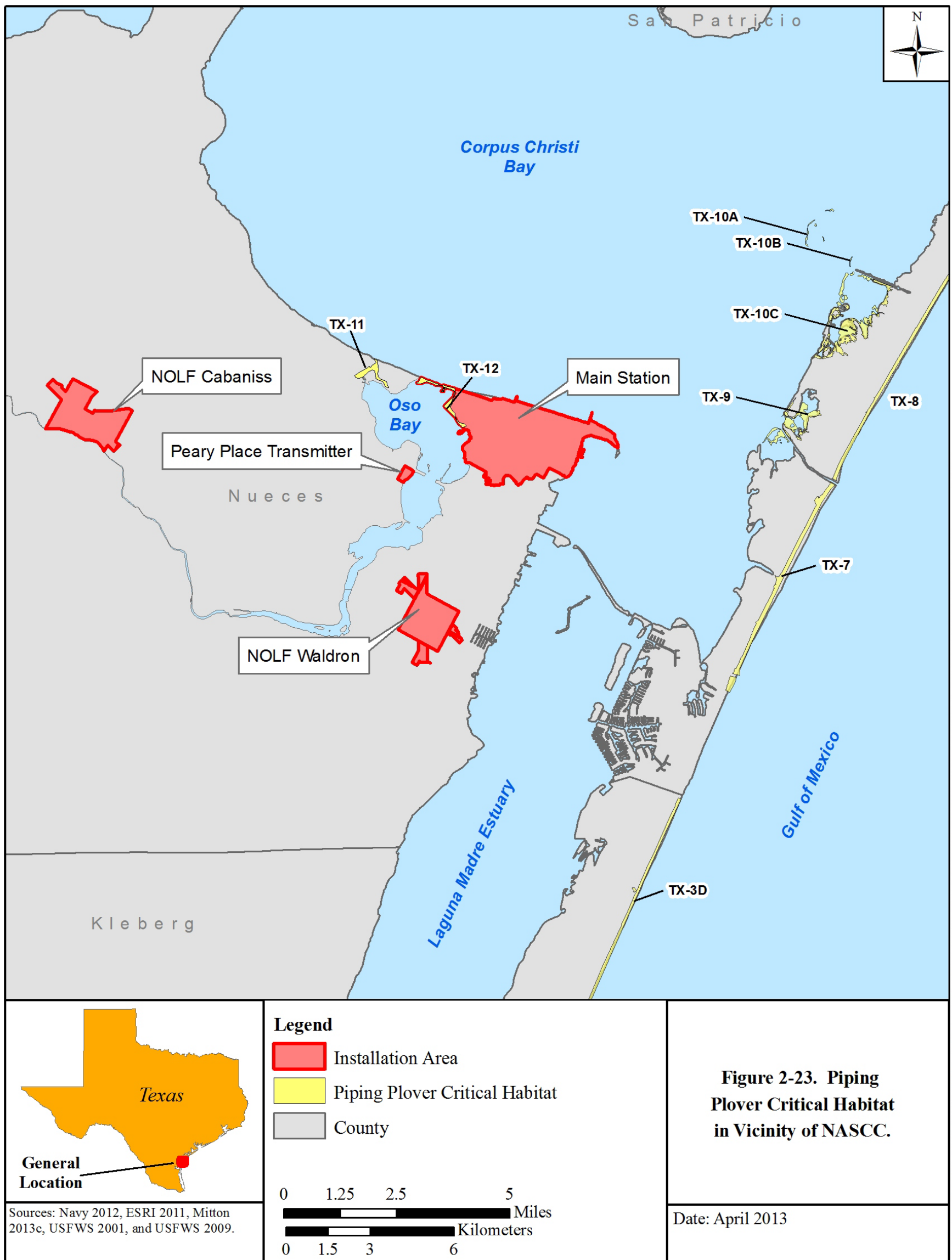
Several wildlife surveys have been conducted at the Installation that included the collection of rare, threatened and endangered wildlife data, including surveys focused on rare, threatened, and endangered species that have the potential to occur (Table 2-9). Results of these surveys have identified two bird species that occur at the Installation that are federal candidate species for listing (see discussion below for the Main Station and NOLF Waldron). In addition to these species, several other species that are listed as rare, threatened or endangered in the state of Texas also are known to occur at the Installation as described below. Several bird species that are listed as USFWS BCC species are present at the Installation, and nearly all of the bird species that occur at the Installation are protected under the MBTA, as amended (16 USC 703-712).

**Table 2-9. Summary of Installation Surveys that Collected Rare, Threatened, and Endangered Wildlife Data.**

Survey Title	Year	Installation Parcels			
		Main Station	NOLF Cabaniss	NOLF Waldron	NOLF Goliad
The Nature Conservancy Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station.	1998	X	X	X	
Species Inventory Update at NAS Corpus Christi, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site	2007	X	X	X	
Study and Management Plan for the Maritime Pocket Gopher at NASCC	2007	X		X	
Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas	2010	X		X	
Survey for the Black-spotted Newt on NAS Kingsville, NAS Corpus Christi and NALF Orange Grove.	2011	X			
Biological Survey of Naval Outlying Facility Goliad, Goliad, Texas	2012				X
USFWS Fish Survey of Goliad County Industrial Park	2012				X
USFWS Herpetofauna Survey of Goliad County Industrial Park	2012				X

Sources: Texas A&M University – Corpus Christi 2012, USFWS 2012a, USFWS 2012b, LaBella 2011, Woodin et al. 2010, Cortez et al. 2007, Hickman et al. 2007, and Wolfe et al. 1998





This page intentionally left blank.

---

## Main Station

Piping plover is a federally-threatened bird species that inhabit sandy beaches in San Patricio and Nueces counties, Texas. This species is threatened throughout much of their range primarily due to the loss of their preferred nesting sites as a result of human activities. These birds have been observed overwintering at the Main Station (Texas A&M 2018a; Withers 2014) and along the western side of Oso Bay, adjacent to the eastern boundary of the Main Station (Navy 2006b). In July 2001 the USFWS designated 142 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas as critical habitat for wintering populations of the piping plover (66 FR 36038-36086). Two of these areas are located in Oso Bay adjacent the Main Station. Critical Habitat Texas Unit 12 (TX-12) encompasses 6 ac (2 ha) along the eastern side of Oso Bay, with portions of this Critical Habitat area extending within the boundaries of the Main Station (Figure 2-23). This Critical Habitat Unit is adjacent to Texas Spur 3 extending to a point 1.5 mi (2.5 km) south of the bridge that connects Ward Island and the Main Station. Critical Habitat Texas Unit 11 (TX-11) is located along the western edge of Oso Bay, adjacent to Ward Island near the Texas A&M University – Corpus Christi campus. The landward boundary of these Critical Habitat areas is designated as the line where dense vegetation begins, and the boundary within Oso Bay is the mean lowest low water line. These Critical Habitat Units include lands known as wind tidal flats that are infrequently inundated by seasonal winds. Due to the dynamic nature of coastal habitat (i.e., hurricanes, storm surges, erosion), the definitive determination of piping plover Critical Habitat boundaries is the USFWS’s textual description of each unit, rather than a static mapped boundary. In May 2009 the USFWS issued a Revised Designation of Critical Habitat for the Wintering Population of the Piping Plover in Texas (74 FR 23476-23600). The revisions impacted 18 specific Critical Habitat units in Texas but did not alter the two Critical Habitat units located in Oso Bay.

Based on survey information available for the Main Station two bird species that are federally-threatened are known to occur: piping plovers and red knots. Based on data available for Nueces County, an additional 14 threatened and endangered federally listed wildlife species have the potential to occur, including one fish, five marine reptile, four bird, three terrestrial mammal, and one marine mammal species (NOAA Fisheries 2012 and TPWD 2012c and Appendix E, Table E-13). There are several other species that are known or have the potential to occur that are protected by the Marine Mammal Protection Act; identified as USFWS BCC species, or are listed as rare, threatened, or endangered by the state of Texas (Appendix E, Table E-13).

TNC conducted surveys at the Main Station in 1997 for all federal candidate, threatened, or endangered species with the potential to occur in San Patricio, Nueces, and Aransas counties (Wolfe et al. 1998). No federally listed threatened or endangered species were identified during this survey; however, subsequent surveys conducted at the Main Station have identified the presence of piping plovers and red knots (Texas A&M 2018a; Withers 2014; Woodin et al. 2010).

Information on state and federally listed threatened and endangered species found in Texas is available here: [https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/nongame/listed-species/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/listed-species/)

In addition to the piping plover and red knot, five other bird species are known to occur at the Main Station that are listed as threatened or endangered in the state of Texas. These include the white-tailed hawk, peregrine falcon, reddish egret (*Egretta rufescens*), and white-faced ibis (*Plegadis chihi*), which are listed as threatened in the state of Texas;

and the brown pelican, which is listed as endangered in the state of Texas. The white-tailed hawk, peregrine falcon (non-breeding population), and reddish egret also are USFWS BCC species for the region (USFWS 2008). Two peregrine falcons were observed perching on the perimeter fence in the northwest corner of the peninsula at the Main Station overlooking Oso Bay in October 1998. The peregrine falcon was removed from the federal ESA list in 1999, but remains threatened in the state of Texas. The brown pelican was removed from the federal ESA list in 2009, but remains listed as endangered in the state of Texas. In addition to these species, an additional 32 bird species that are rare or listed as threatened or endangered in the state of Texas, or USFWS BCC bird species for the region, are known or have the potential to occur at the Main Station (Appendix E, Table E-13). Of these are three bird species that are federally-listed that have the potential to occur, including piping plover, northern aplomado falcon, and whooping crane. Several bird species that are listed as threatened or endangered in Texas are known to use habitats in the immediate vicinity of the Main Station. These habitats are used mainly for feeding and resting, as the Main Station does not provide large quantities of habitat suitable for nesting by most of these species.

Nesting structures for the northern aplomado falcon are present within 10 miles of NASCC on northern Padre Island, as well as on Mustang Island. The Peregrine Fund leads efforts related to re-establishing and expanding the presence of this species in South Texas coastal areas and may be contacted for coordination with the Navy.

USFWS Critical Habitat for Threatened and Endangered Species has a Critical Habitat mapper, which identifies piping plover critical habitat adjacent to NASCC. The Critical Habitat mapper is available here: <https://ecos.fws.gov/ecp/>

The black-spotted newt (*Notophthalmus meridionalis*) is listed as threatened by the state of Texas and is federal candidate species for listing. Potential habitat that would support this species, including semi-permanent wetlands and wet or semi-wet ditches, canals, or shallow depressions (TPWD 1999a and Burst 1994) is present at the

Main Station. A survey was conducted for black-spotted newt at the Main Station in 2011, with negative survey results (species was not observed [LaBella 2011]). Two other amphibians that are listed as threatened in the state of Texas, sheep frog (*Hypopachus variolosus*) and Rio Grande lesser siren (*Siren intermedia* ssp. *texana*), have the potential to occur on the Main Station. Sheep frog is found predominantly in grasslands and savannahs or moist sites in arid areas. The Rio Grande lesser siren is found in similar habitat types as the black-spotted newt. Although focused surveys for these two amphibian species has not been conducted, surveys that included the collection of amphibian data have not identified sheep frog or Rio Grande lesser siren as occurring at the Main Station (LaBella 2011, Hickman et al. 2007, and Wolfe et al. 1998).

Two reptile species known to occur at the Main Station, Texas tortoise (*Gopherus berlandieri*) and Texas horned lizard (*Phrynosoma cornutum*), are listed as threatened by the state of Texas (Hickman et al. 2007). Several species of sea turtle have the potential to occur within waters located adjacent to the Main Station during foraging; however, these species are not expected to use the Main Station for nesting. The green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's Ridley sea turtle, and leatherback sea turtle (*Dermochelys coriacea*) are federally endangered species that have the potential to occur, as well as the loggerhead sea turtle (*Caretta caretta*), a federally threatened species. Kemp's Ridley, green, hawksbill, and loggerhead sea turtles have been documented in the Corpus Christi – Nueces Bay system (Raymond 1989). Suitable foraging habitat for these sea turtle species may exist within the seagrass beds located adjacent to the Main Station, including the expanse of seagrass beds associated with the shallow waters of Corpus Christi Bay and the Laguna Madre Estuary along the northern and eastern shores of the Main Station (Wolfe et al. 1998). Strandings of sea turtles have the potential to occur at the Main Station; however, the majority of strandings occur on the seaward side of Mustang Island away from the Main Station (Navy 2006b and Raymond 1989). The most recent sea turtle stranding at the Main Station occurred in April 2013 when a dead green sea turtle was discovered washed up on the north side of Dimmit Island (Mitton 2013d). The previous sea turtle stranding also occurred at Dimmit Island, when a dead turtle washed ashore in February 2012.

Of the marine mammals that have the potential to occur offshore in the marine and estuarine waters adjacent to the Main Station, only the West Indian manatee (*Trichechus manatus*) and Atlantic bottlenose dolphin (*Tursiops truncatus*) have the potential to occur (Appendix E, Table E-13). In addition to being protected by the Marine Mammal Protection Act, the West Indian manatee is a federally-threatened species. West Indian manatee includes two distinct subspecies, Florida manatee (*Trichechus manatus latirostris*) and Antillean manatee (*Trichechus manatus manatus*); however, the two subspecies share similar physical characteristics, and are distinguished based on their range (USFWS 2010a). Range of Florida manatees is primarily restricted to the southeastern U.S., although they are occasionally observed as far north as Massachusetts, and as far west as Texas. Antillean manatees are found in coastal and riverine systems of South and Central America (from Brazil to Mexico), and in the Greater and Lesser Antilles throughout the Caribbean Basin. West Indian manatee inhabits both marine and freshwater habitats, with a preference for warm water. They are herbivores, feeding on a variety of marine, estuarine, and freshwater plants, including submerged, floating and emergent vegetation. Juvenile calves may begin feeding on plant material as early as a few months of age. Weaning of juveniles is generally complete by one year of age, and the calf may remain with their mother until about 2 years old. Stock of Florida manatees is thought to number approximately 3,800, and it is believed that the population is stable and perhaps increasing (USFWS 2010a).

Atlantic bottlenose dolphin is also protected by the Marine Mammal Protect Act. Atlantic bottlenose dolphin prefers shallow bays and lagoons along the Gulf Coast, and is common on the continental shelf and near shore waters. Atlantic bottlenose dolphins frequent estuaries of large river systems, such as Corpus Christi Bay, in search of fish (Navy 2006b). All other marine mammals that may occur offshore in the Gulf of Mexico are covered for Navy impact assessment under the Atlantic Fleet Active Sonar Training Environmental Impact

Statement/Overseas Environmental Impact Statement and are not addressed in this INRMP. A total of 29 species of marine mammals have ranges that include the Gulf of Mexico and have the potential to occur in the waters adjacent to the Main Station. Of the 29 species of marine mammals that have the potential to occur offshore, including dolphin, whales, and the West Indian manatee, six species are federally-endangered, one is federally-threatened, and all 29 species are protected by the Marine Mammal Protection Act.

Historically, the dense, thornscrub habitats that provide optimal habitats for several federally protected species have been found extensively in Nueces County. Two federal and state of Texas endangered species of big cats that are associated with thornscrub habitats, the ocelot (*Leopardus pardalis*) and Gulf Coast jaguarundi (*Puma yagouaroundi* ssp. *cacomitli*), occurred historically in Nueces County. Ocelots inhabit dense thornscrub habitat, and have home ranges averaging 3,700 ac (1,500 ha) (Navy 2006b). The minimum patch-size needed to support a single animal is thought to be 99 ac (40 ha). The jaguarundi is a small, slender-bodied, brown to salt and pepper gray short-legged cat that also inhabits dense thornscrub. The loss of this brushland habitat is the principal threat to the jaguarundi in Texas and Mexico. The 1997 TNC survey did not identify any habitat areas that would support these two listed species of big cats at the Main Station or surrounding areas (Wolfe et al. 1998).

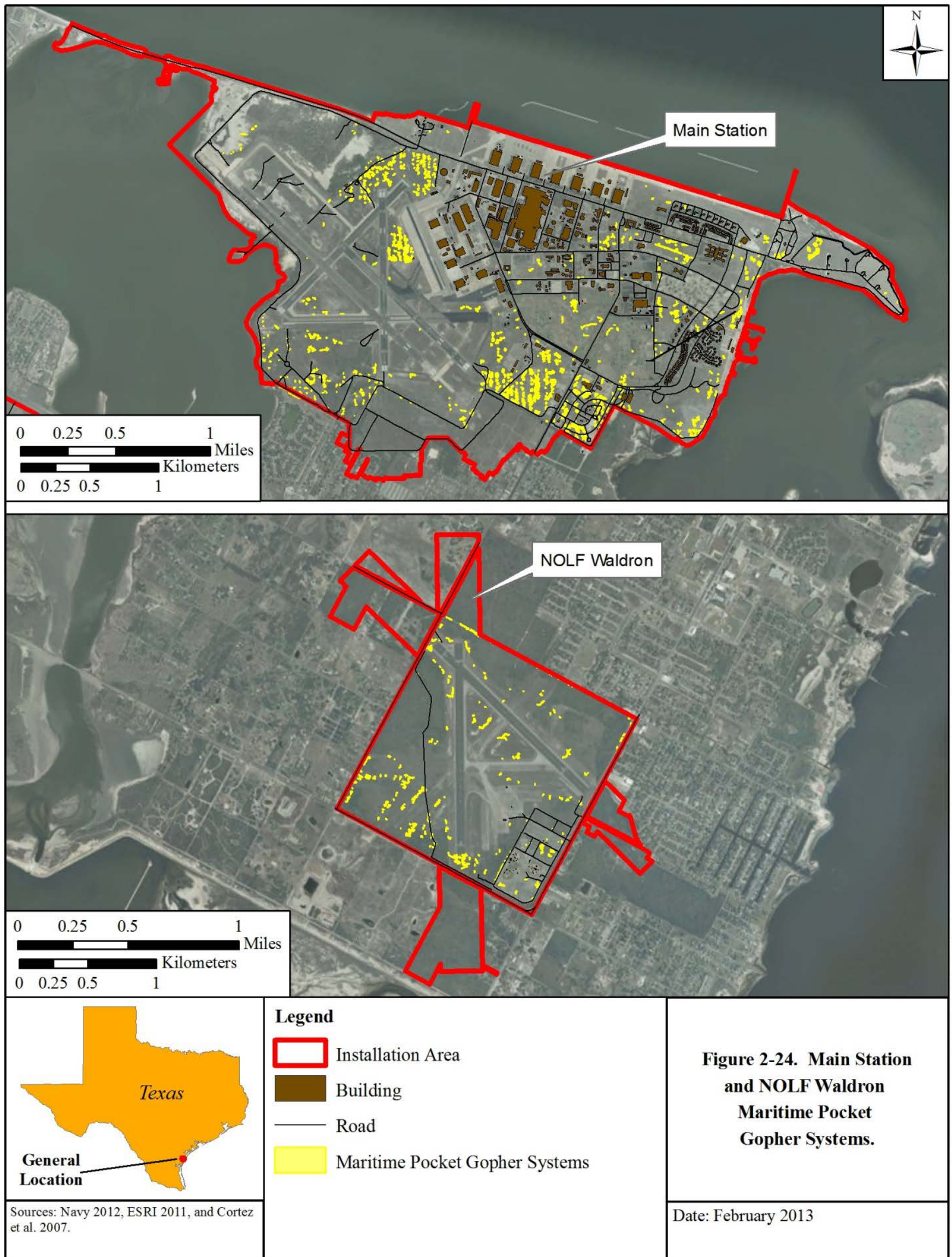
The only mammal listed by the state of Texas that is known to occur at the Main Station is southern yellow bat (*Lasiurus ega*). Southern yellow bat is a threatened species in the state of Texas, and is known to roost and raise young in palm trees on the Main Station.

Maritime pocket gopher is a state-ranked S4 (Apparently Secure) species and a Species of Greatest Conservation Need in Texas (TPWD 2011) that occurs at the Main Station and NOLF Waldron (Figure 2-24). This species was identified in a TNC survey conducted in 1997 (Wolfe et al. 1998) as well as a follow-up survey conducted in 2007 by Texas A&M University – Kingsville (Cortez et al. 2007). Soils of the Encinal Peninsula are of the Galveston Series (Franki et al. 1965), which consists of deep, loose soils well-suited for pocket gophers (Schwartz and Schwartz 1981). The maritime pocket gopher is considered a Species of Greatest Conservation Need in Texas, as its population is isolated from other adjacent pocket gopher (*Geomys personatus*) populations by a heavy clay soil unsuitable for pocket gopher tunneling. This species is only known to occur in Nueces and Kleberg counties, Texas (TPWD 2013). Based on surveys of the Main Station and casual observations of Installation environmental staff, this species is fairly common at the Main Station, and in surrounding areas where suitable soils exist.



*Maritime pocket gopher*  
(*Geomys personatus maritimus*)

Source: J.D. Cortez (Cortez et al. 2007)



Z:\projects\NAVFAC\100\_NRS\_T23330\_JM03\_CRPS\_CHRSTGIS\MXD\FIGURES\20130130\_REVISIONS\TPP\_T23330-JM03\_Fig2-22-PocketGopher.mxd, SMH

This page intentionally left blank.



---

Pocket gopher presence is easily ascertained through observation of their large, fan-shaped mounds. These mounds should not be confused with those of the red imported fire ant, which is present on all Installation parcels. Fire ant mounds are smaller, irregularly shaped, and built up from the center, whereas pocket gopher mounds are built from dirt pushed out of a slanting tunnel (Wolfe et al. 1998). Gopher mounds have been observed on athletic fields, the golf course, residential areas, and vacant lots.

### **NOLF Cabaniss**

Based on survey information available for NOLF Cabaniss no federally listed wildlife species have been documented as occurring (Hickman et al. 2007 and Wolfe et al. 1998). No critical habitat for any federally listed species has been identified for NOLF Cabaniss or adjacent properties. Based on data available for Nueces County, 13 federally listed species have the potential to occur, including one fish, five marine reptile, four bird, and three mammal species (TPWD 2013). There are several other species that are known or have the potential to occur that are identified as USFWS BCC species (USFWS 2008), or are listed as rare, threatened, or endangered by the state of Texas (Appendix E, Table E-13). Several bird species that are listed as rare, threatened, or endangered by the state of Texas, or are listed as USFWS BCC species have the potential to occur at NOLF Cabaniss. Of these only one species, painted bunting (*Passerina ciris*), has been documented as occurring (Hickman et al. 2007). Painted bunting is a USFWS BCC species for the region, and is globally secure and apparently secure at the state level.

Only two fish species have been documented within the freshwater habitat of NOLF Cabaniss (Hickman et al. 2007), neither of which are rare, threatened, or endangered. All of the rare, threatened, or endangered fish species that have the potential to occur in Nueces County are associated with brackish or sea water habitats, and as such, these do not have the potential to occur at NOLF Cabaniss.

None of the amphibian or reptile species that have been documented at NOLF Cabaniss are considered rare, or are listed at the federal or state level. Thorn brush woodland and mesquite savannah habitats within the Coastal Bend area provide habitat for Texas indigo snake (*Drymarchon corais ssp. erebennus*) (Tennant 1985), a species listed as threatened in the state of Texas (TPWD 2012c). Texas indigo snake and the Texas tortoise have the potential to occur at NOLF Cabaniss based on the presence of appropriate habitat that would support these species (Navy 2006b).

Of the mammals that have been documented at NOLF Cabaniss, none are considered rare, threatened, or endangered. The maritime pocket gopher species has not been identified at NOLF Cabaniss, where soils of the Victoria association consist of dark-gray, calcareous, heavy clays that are unsuitable for this species (Franki et al. 1965). The Gulf Coast jaguarundi and ocelot have the potential to occur in Nueces County; however, the 1997 TNC survey did not identify any habitat areas that would support these two listed species of big cats at NOLF Cabaniss or the surrounding area (Wolfe et al. 1998).

## NOLF Waldron

Based on survey information available for NOLF Waldron, no federally-listed species have been documented (Woodin et al. 2010, Cortez et al. 2007, Hickman et al. 2007, and Wolfe et al. 1998). No critical habitat for any federally listed species has been identified for NOLF Waldron or adjacent properties. Based on data available for Nueces County, 13 federally-listed species have the potential to occur, including one fish, five marine reptile, four bird, and three mammal species (TPWD 2013). There are several other species that are known or have the potential to occur that are identified as USFWS BCC species (USFWS 2008), or are listed as rare, threatened, or endangered by the state of Texas (Appendix E, Table E-13).

White-tailed hawk, a state of Texas threatened species and USFWS BCC species, also has been documented at NOLF Waldron (Hickman et al. 2007). Five other USFWS BCC species are known to occur at NOLF Waldron, including lesser yellowlegs (non-breeding population), sedge wren (*Cistothorus platensis*) (non-breeding population), least tern (*Sternula antillarum*) (BCC status is for the non-listed subspecies or population of threatened and endangered species), Le Conte's sparrow (*Ammodramus leconteii*) (non-breeding population), and grasshopper sparrow (*A. savannarum*) (Woodin et al. 2010) (Appendix E, Table E-7 and Table E-13). Several other bird species that are listed as rare, threatened, or endangered by the state of Texas, or are listed as USFWS BCC species have the potential to occur at NOLF Waldron.

No rare, threatened, or endangered fish species have the potential to occur at NOLF Waldron due to the lack of surface water resources on this parcel. No rare, threatened, or endangered herpetofauna species have been documented at NOLF Waldron, although there is suitable habitat for Texas indigo snake, a state-listed threatened species in Texas (Hickman et al. 2007) (TPWD 2012c).

A large population of maritime pocket gopher, a state-ranked S4 (Apparently Secure) species and a Species of Greatest Conservation Need in Texas (TPWD 2011) known to occur only in Nueces and Kleberg counties Texas, also occurs at NOLF Waldron (Cortez et al. 2007 and Wolfe et al. 1998) (Figure 2-24). More information on maritime pocket gopher is provided in the rare, threatened, and endangered species discussion for the Main Station. Based on surveys, information and casual observations of Installation environmental staff, this species is common at NOLF Waldron and in surrounding areas where suitable soils exist. The Gulf Coast jaguarundi and ocelot have the potential to occur in Nueces County; however, the 1997 TNC



*Pocket gopher mounds, NOLF Waldron*

Source: L. Rivard

survey did not identify any habitat areas that would

support these two listed species of big cats at NOLF Waldron or surrounding area (Wolfe et al. 1998).

### **NOLF Goliad**

Based on survey information available for NOLF Goliad, no federally listed species have been documented at NOLF Goliad (Texas A&M University – Corpus Christi 2012, USFWS 2012a, and USFWS 2012b); however, a focused survey of this parcel for the presence of rare, threatened, and endangered species has not been conducted. No critical habitat for any federally listed species has been identified for NOLF Goliad or adjacent properties. Based on data available for Goliad County, eight other federally listed species have the potential to occur, including two mollusks, four birds, and two mammal species (TPWD 2013). There are several other species that are known or have the potential to occur that are identified as USFWS BCC species (USFWS 2008), or are listed as rare, threatened, or endangered by the state of Texas (Appendix E, Table E-14).

Of the bird species that have been document at NOLF Goliad, three species are USFWS BCC species: little blue heron (*Egretta caerulea*), loggerhead shrike (*Lanius ludovicianus*), and scissor-tailed flycatcher (*Tyrannus forficatus*) (Texas A&M University – Corpus Christi 2012). Three federally-listed species have the potential to occur, including whooping cranes, interior least terns (*Sterna antillarum* ssp. *athalassos*), and Attwater’s greater prairie-chickens (Appendix E, Table E-14). Several other bird species that are listed as rare, threatened, or endangered by the state of Texas (TPWD 2013), or are listed as USFWS BCC species have the potential to occur at NOLF Goliad.

No rare, threatened, or endangered fish, amphibian, or reptile species have been identified at NOLF Goliad (USFWS 2012a and 2012b), although based on county records four mollusks, an insect, a fish, three amphibians, and seven reptile species that are considered rare or listed at the federal or state level have the potential to occur (TPWD 2013). Two mammal species that are federally endangered, red wolf (*Canis rufus*) and ocelot, have the potential to occur.

## **2.4 FORESTRY RESOURCES**

It is Navy policy to manage forestlands by restoration, enhancement, and improvement of forest resources. The Navy shall accomplish this through an active program of professional forest management, based on soil-site capabilities, in a multi-disciplinary, ecologically sound manner. Navy forest management shall include, as appropriate, harvest, reforestation, afforestation, and silvicultural treatments that shall foster forest health and vigor, structural and biological diversity, and regeneration (OPNAVINST 5090.1D, 12-3.8[j]).

Installations with forests or lands with the potential for the growth and production of forest products will provide for optimum sustainable yield of forest products and the improvement of forest resources, consistent with the military mission and installation INRMP. INRMPs will, when appropriate, include current forest inventories, conditions, trends, and potential uses; silvicultural goals; maintenance of forested areas and access roads; forest and stand improvement methods; harvesting and reforestation methods and schedules; and protection and enhancement of other natural resources. All Navy installations with commercial forestry programs shall employ or use a professional forester to manage forest resources. This includes preparation and

oversight of all forestry service and sales contracts and monitoring the use of reimbursable forestry funds provided to support the program (OPNAVINST 5090.1D, 12-3.8[j]).

Forestry resources at the Installation are limited to the gallery forests associated with riparian areas along Oso Creek at NOLF Cabaniss, swamp forest located at NOLF Waldron, and the Post Oak and Grassland Mosaic natural community located at NOLF Goliad (see Section 2.2.7). Management of these resources is considered as part of land management of natural communities and vegetation. There are no forest habitats at the Installation that would require focused forestry management actions.

### **3.0 NATURAL RESOURCES MANAGEMENT**

#### **3.1 GOALS, OBJECTIVES, AND STRATEGIES**

This section presents the goals, objectives, and management strategies for natural resources at the Installation for the five-year plan period.

##### **3.1.1 Definitions**

**Goals:** Goals are general expressions of desired future conditions that represent the long-range aim of management. For this INRMP, goals are compatible with the military mission of the Installation and provide conservation and ecosystems management targets and direction.

**Issues:** Issues that must be addressed are identified to establish objectives for achieving the INRMP goals established for the Installation. Issues may include the presence, abundance, distribution, function, condition, and sensitivity of a particular natural resources feature; resources-based human function or other attribute of the Installation; or a broader ecological or community setting. Issues also may include the effectiveness or ineffectiveness of existing or past management practices or use of Installation resources.

**Objectives:** Objectives are defensible targets or specific components of a goal, the achievement of which represents measurable progress toward that goal. Objectives help focus management activities and provide a measurement tool for evaluating and communicating results. One or more objectives may be identified for successfully achieving a particular goal. Objectives are comprised of strategies and defined actions or projects.

**Strategies:** Strategies establish the approach and expected end result for the actions that are necessary to accomplish stated objectives. One or more strategies may be identified for accomplishing a particular objective. Strategies define certain actions to be taken by the Navy, such as the completion of specific projects and/or the implementation of other management initiatives at the Installation. Strategies usually specify timeframes for completion of various actions.

**Projects:** Projects are discrete actions for fulfilling a particular strategy. Projects may be required to fulfill Installation's compliance and/or regulatory requirements related to natural resources management, or may enhance existing conditions for ensuring compliance. Other projects may not be compliance-driven, but allow for more effective and efficient management of natural resources and provide for sound natural resources stewardship. Projects may or may not require additional labor resources and/or funding in addition to the day-to-day natural resources management requirements.

##### **3.1.2 Goals, Issues, and Objectives Specific to the Installation**

Four INRMP goals have been identified for the Installation:

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- 
- Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.**
- Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**
- Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

Goal 1 covers a broad range of management issues, including those associated with Land Management (Section 3.2.1) and Fish and Wildlife Management (Section 3.2.2). Goal 2 primarily pertains to Outdoor Recreation Management (Section 3.2.3). Goals 3 and 4 primarily pertain to Integrated Ecosystems Management and Partnering (Section 3.2.4). By implementing these goals, the Installation will create and maintain a balance between management of natural resources and implementation of the military mission. To ensure success in achieving these goals, a framework or “road map” of objectives, strategies, projects, and management initiatives is provided in this section. The goals, issues, objectives, strategies, projects, and initiatives are referenced throughout the INRMP where appropriate and relevant.

### 3.1.2.1 Goal 1

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Issue:** Development and training activities have a significant potential to affect land area at NASCC; as a result, land management decisions and practices are important aspects of ecosystems management. The use and management of lands for military mission needs, and the decision-making process regarding such land use, directly affects the sustainability of the ecosystem.

Land and water management decisions will become increasingly important at the Installation as development and training activities increase. Land and water use during military training, and the decision-making progress regarding such land and water use, directly affect ecosystems sustainability. To protect and maintain natural resources while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objectives:

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.2:** Achieve no net loss of wetlands.
- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall

management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

**Objective 1.5:** Maintain vegetation to reduce BASH potential.

**Objective 1.6:** Maintain vegetation to reduce wildland fire hazards.

**Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.

**Objective 1.8:** Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.

**Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.

**Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, EOs, regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.

**Issue:** Human activities at the Installation and in the surrounding community have removed native vegetative communities and altered natural habitats. Environmental resources at the Installation provide vital habitat for fish and wildlife, especially in view of the considerable development and economic growth in the surrounding regions of the parcels located in Nueces County. To protect and maintain wildlife habitats while ensuring the continuation of the military mission, the Installation will implement practices to meet the following objective:

**Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

**Issue:** Occasionally, nuisance wildlife species (e.g., feral cats, wild hog, and some bird species) become overpopulated or congregate in areas creating a threat to human health and/or the military mission. In such cases, these wildlife species must be controlled to prevent problems. To protect, maintain, and restore habitat for native plants and wildlife, while preventing nuisance wildlife from negatively impacting quality of life and the military mission, the Installation will implement programs to address the following objective:

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

---

**Issue:** Federally or state-listed plant and animal species that occur at the Installation have been identified as conservation priorities and require special protection efforts. Managing federally listed threatened and endangered species, and other rare species, is important to achieving no net loss in mission capability. To provide for protection and conservation of the state and federal rare, threatened or endangered species known or with the potential to occur at the Installation, the Installation will implement programs to address the following objective:

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

### 3.1.2.2 Goal 2

**Goal 2:** Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.

**Issue:** In accordance with the SAIA, an INRMP shall, to the extent appropriate and applicable, provide for public access to an installation for use of natural resources, including outdoor recreation, subject to safety, military security considerations, and the military mission. Additionally, public access for the use of the natural resources for outdoor recreation should not result in degradation of installation natural resources. In addition to traditional outdoor recreation activities such as hiking, wildlife watching, outdoor recreation activities can include educational programs that foster a sense of responsible stewardship for military personnel and the general public who are authorized access to an installation for these recreational purposes. The following objectives were developed to address Goal 2.

**Objective 2.1:** Evaluate additional opportunities for natural resources-related outdoor recreation.

**Objective 2.2:** Provide and promote outdoor recreation opportunities (e.g., wildlife observation) to DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors.

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.



---

### 3.1.2.3 Goal 3

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Issue:** Plans and programs for maintaining and managing natural resources at the Installation need to fully consider the interrelationships of resources and insuring no net loss in mission capability. Often in the past, existing programs and plans have frequently focused on the management of individual resources in accordance with federal or state laws. Ecosystems management cannot be accomplished solely through the implementation of programs and plans focused on individual resources. A coordinated effort among all programs and personnel, from tenant commands to decision-making authorities, is necessary to protect the interdependent components of communities that define an ecosystem. The coordinated effort will address the consequences of actions on related resources, and will resolve conflicts between competing programs and plans for use of the natural resources at the Installation.

Ecosystems management is a holistic, adaptive management concept that transcends human-made boundaries, both internal and external to the Installation. Management intended to promote sustainable ecosystems requires awareness, education and training, and responsible participation of all individuals potentially affecting the ecosystem, as well as adjustments in management principles and practices to respond to new knowledge and dynamic conditions. To participate in adaptive ecosystems management, the Installation will implement programs to meet the following objectives:

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.4:** Establish a planning team to review and update the INRMP in accordance with OPNAVINST 5090.1D, 12-3.4.
- Objective 3.5:** Promote educational awareness of the Installation natural resources and the importance of natural resources stewardship.

### 3.1.2.4 Goal 4

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Issue:** The input and cooperation of regulatory agencies and other experts will ensure the success of the plans and programs implemented as part of this INRMP.

- 
- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.
  - Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.
  - Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

Table 3-1 provides a cross-reference of how these goals and objectives are integrated with the management topics outlined in this section of the document.

### **3.2 NATURAL RESOURCES MANAGEMENT FOCUSES**

This section discusses the natural resources management practices and activities at the Installation. This section is divided into four natural resources management focuses: 1) Land Management (Section 3.2.1), 2) Fish and Wildlife Management (Section 3.2.2), 3) Outdoor Recreation Management (Section 3.2.3), and 4) Integrated Ecosystems Management and Partnering (Section 3.2.4). The natural resources management actions described in this INRMP are for the benefit of land, fish and wildlife, and outdoor recreation resources at the Installation. Each activity described in the followings sections is associated with goals, issues, objectives, strategies, and projects to help maintain a balance between the Installation’s natural resources management and the military mission.

#### **3.2.1 Land Management**

The land use patterns at the Installation have been influenced by natural and man-made constraints that have been guided by previous master planning efforts, and includes a variety of military and civilian activities. The Master Plan for the Installation was last updated in July 2011 and contains development plans for the Main Station, NOLF Cabaniss and NOLF Waldron. The Master Plan does not address NOLF Goliad. With respect to the land use, the 2011 Master Plan Update for the Installation recommends the following strategies:

1. Optimize the use and future development potential along the flight line.
2. Minimize existing and future functional land use conflicts.
3. Provide future expansion areas for all major tenants.
4. Consolidate training functions.
5. Retain separation of housing and operations.

Future development at the Installation is guided by these recommendations and the Integrated Priority List contained in the 2011 Master Plan Update. NOLF Goliad was reacquired by the Navy in 2011 and has been included in the 2011 Master Plan Update.

**Table 3-1. Crosswalk of Management Areas with INRMP Goals and Objectives.**

INRMP Goals and Objectives	Land Management							Fish and Wildlife Management							Outdoor Recreation Management		Integrated Ecosystems Management and Partnering			
	Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleas	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs
<b>Goal 1 - Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.</b>																				
<b>Objective 1.1</b> Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.	✓	✓	✓			✓	✓	✓		✓				✓				✓		
<b>Objective 1.2</b> Achieve no net loss of wetlands.	✓							✓												
<b>Objective 1.3</b> Improve and enhance water quality by reducing nonpoint source pollution.	✓			✓		✓				✓										
<b>Objective 1.4</b> Preserve, protect, and enhance water resources including within 100-year floodplain and coastal zone resources.	✓		✓							✓										
<b>Objective 1.5</b> Maintain vegetation to reduce BASH potential.			✓	✓	✓					✓										
<b>Objective 1.6</b> Maintain vegetation to reduce wildland fire hazards.					✓															
<b>Objective 1.7</b> Maintain and enhance native vegetation to promote community diversity and manage invasive species.			✓	✓	✓	✓	✓	✓												
<b>Objective 1.8</b> Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.			✓	✓																
<b>Objective 1.9</b> Manage natural habitats to promote use by a diverse range of wildlife species.								✓	✓					✓						
<b>Objective 1.10</b> Ensure that land management and land use decisions comply with all applicable laws and regulations, and that adverse impacts to the natural environment are minimized.				✓						✓				✓						
<b>Objective 1.11</b> Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with the BASH Program.			✓					✓	✓	✓	✓			✓						

INRMP Goals and Objectives	Land Management							Fish and Wildlife Management							Outdoor Recreation Management		Integrated Ecosystems Management and Partnering			
	Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleasings	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs
<b>Objective 1.12</b> Prevent and control invasive and nuisance wildlife species and wildlife diseases.			✓			✓		✓			✓	✓	✓							
<b>Objective 1.13</b> Provide adequate special management or protection of threatened, endangered, rare, and at-risk species and habitats.			✓		✓	✓	✓	✓	✓		✓		✓							
<b>Goal 2 - Provide quality, outdoor recreational and educational opportunities to improve the quality of life for U.S. Department of Defense (DoD) personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.</b>																				
<b>Objective 2.1</b> Evaluate additional opportunities for natural resources-related outdoor recreation.															✓			✓		
<b>Objective 2.2</b> Provide and promote outdoor recreation opportunities to DoD personnel and their guests.																		✓		
<b>Objective 2.3</b> Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.															✓	✓		✓		
<b>Goal 3 - Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.</b>																				
<b>Objective 3.1</b> Provide adequate staffing, equipment, technology, and training for the Natural Resources Program to ensure proper INRMP implementation.			✓		✓		✓											✓		✓
<b>Objective 3.2</b> Incorporate the concept of ecosystems management into all planning and management processes.					✓		✓		✓									✓		✓
<b>Objective 3.3</b> Implement training, education, and stewardship initiatives for ecosystems management.			✓		✓		✓											✓		✓
<b>Objective 3.4</b> Establish a planning team to review and update the INRMP in accordance with OPNAVINST 5090.1D, 12-3.4.																				✓
<b>Objective 3.5</b> Promote educational awareness of Installation natural resources and stewardship.							✓		✓									✓		

INRMP Goals and Objectives	Land Management							Fish and Wildlife Management							Outdoor Recreation Management		Integrated Ecosystems Management and Partnering			
	Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleases	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs
<b>Goal 4 - Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.</b>																				
<b>Objective 4.1</b> Maintain interagency cooperation with USFWS and TPWD.							✓	✓	✓				✓					✓		✓
<b>Objective 4.2</b> Develop partnerships with various agencies and organizations to implement monitoring and protection programs.				✓			✓	✓	✓					✓	✓	✓		✓		✓
<b>Objective 4.3</b> Coordinate natural resources activities with local community, conservation organizations, and private groups.								✓	✓					✓	✓	✓		✓		

This page intentionally left blank.

This section addresses the development and implementation of techniques and programs for managing land resources at the Installation. The land management activities of this INRMP are described in the following sections:

### 3.2.1 Land Management

#### 3.2.1.1 Water Resources Management

##### 3.2.1.1.1 Watershed and Floodplains Management

##### 3.2.1.1.2 Wetlands Management

##### 3.2.1.1.3 Water Quality Management

#### 3.2.1.2 Coastal Zone Management

#### 3.2.1.3 Vegetation and Habitat Management

##### 3.2.1.3.1 Riparian Areas Management

##### 3.2.1.3.2 Management of Vegetation to Reduce BASH Potential

##### 3.2.1.3.3 Invasive Plant and Noxious Weed Management

##### 3.2.1.3.4 Grounds Maintenance and Landscaping Management

#### 3.2.1.4 Agricultural Outleasements Management

#### 3.2.1.5 Wildland Fire Management

#### 3.2.1.6 Rare and Sensitive Ecosystems Management

#### 3.2.1.7 Rare, Threatened, and Endangered Plant Species Management

### 3.2.1.1 Water Resources Management

Water resources are an important part of natural ecosystems due to the diverse biological and ecological functions they support and hydrologic functions they perform, such as improving water quality, groundwater recharge, pollution control and treatment, nutrient cycling, provision of wildlife habitat and niches for flora and fauna, stormwater runoff and detention, and erosion protection (Benton et al. 2008).

The Navy recognizes the importance of the nation's water resources, and as such is committed to supporting their conservation. The Main Station, NOLF Cabaniss and NOLF Waldron are located within the Nueces-Rio Grande Coastal Basin, which drains to the Laguna Madre Estuary. NOLF Goliad is located along the border of the San Antonio-Nueces Coastal Basin and the San Antonio River Basin. All of the drainage basins associated with the Installation eventually drain into the Gulf of Mexico and Atlantic Ocean. In addition to the estuarine waters and wetlands that surround the Main Station, freshwater sources at the Installation include ponds, perennial and intermittent streams, creeks, drainages, and freshwater wetlands.



*Water resources at the Main Station*

Source: L. Rivard

---

The Texas State Soil and Water Conservation Board (TSSWCB) is a statutorily mandated member of the Texas Groundwater Protection Committee, the Coastal Coordination Council, the Drought Preparedness Council, and the Water Conservation Advisory Council. The TSSWCB is the state agency responsible for administering Texas' soil and water conservation law and coordinating conservation and non-point source (NPS) abatement programs. The TSSWCB provides assistance to 216 soil and water conservation districts (SWCDs) located throughout the state. Local SWCDs provide many services including assistance with operation and maintenance of flood control structures, and sponsoring pesticide workshops.

The TSSWCB administers the Texas Brush Control Program in coordination with various state and federal entities. This Program was developed to assist in addressing the water needs, which has become one of the most limiting natural resources in Texas. Brush control is recognized as a method of vegetation control that can help to increase the availability of water. Currently, the TSSWCB does not have an active role in management of the water resources at the Installation.

NASCC takes steps to conserve water, such as not irrigating during drought conditions nor within 24 hours of rain storms. The installation has also established that irrigation shall not create ponding or pooling.

The following sections provide additional detail on the specific water resources management issues, projects, and management strategies covered by this INRMP.

### ***3.2.1.1.1 Watershed and Floodplains Management***

According to OPNAVINST 5090.1D, 12-5.57, a watershed is a geographic area of land, water, and biota within the confines of a drainage divide. EO 12088, Federal Compliance with Pollution Control Standards, and the CWA require Navy facilities to comply with all requirements applicable to point and NPS pollution, which could impact a watershed in which a Navy facility is located. Floodplains are defined as areas that are periodically flooded by lateral overflow of a body of water. Well-managed watersheds and floodplains are integral to the functioning of the overall ecosystem because they act as repositories of water, wood, sediment, and nutrients; attenuate floods; and provide habitat for plant and wildlife species (Federal Emergency Management Agency 2011).

Floodplains receive protection through EO 11988, *Floodplain Management*, which directs federal agencies to reduce the risk of flood loss by not building in floodplains, and to restore and preserve the natural and beneficial values served by floodplains. Development within floodplains is regulated at the municipal level where local ordinances detail the rules and requirements for floodplain development, and permits are issued accordingly. The TWDB has been designated by state law as the state's National Flood Insurance Program coordinating agency, which administers state and federal grant programs and the implementation of flood mitigation projects. The program works with other organizations and state agencies, such as the Texas Floodplain Management Association and the Texas Division of Emergency Management, to offer flood mitigation workshops and training and provide resources to communities and builders on risks, best practices, and other useful information. Development within floodplains is regulated at the municipal level where local ordinances detail the rules and requirements for floodplain development and permits are issued accordingly.



---

### *Issue*

A review of the Federal Emergency Management Agency Flood Insurance Rate Map floodplain mapping data determined that portions of the Main Station are located within the 100-year and 500-year floodplains of Corpus Christi Bay (Figure 2-16), and portions of the 100-year floodplain of Oso Creek extend into the southern and eastern portions of NOLF Cabaniss, covering almost half of the parcel (Figure 2-17). The 500-year floodplain of Corpus Christi Bay and Oso Bay covers portions of the Main Station, including the airfield. The 500-year floodplain of Oso Creek covers portions of the airfield at NOLF Cabaniss. There are no Federal Emergency Management Agency-designated floodplains at NOLF Waldron or NOLF Goliad.

### *Goals and Objectives*

Manage land resources to avoid activities that would reduce floodplain capacity or increase flooding rates.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

There are no INRMP projects directly related to floodplains management; however, other projects that manage and/or restore water resources, such as tidal flats and wetlands, also will provide benefit to floodplain areas at the Installation.

#### **Management Strategies**

Management strategies related to protection of watersheds and floodplains at the Installation include the following.

1. Avoid activities, particularly vegetation clearing and ground-disturbing activities that would adversely affect floodwater attenuation.
2. Clear stream or drainage blockages such as beaver dams or obstructed culverts that could result in increased flood levels or prevent floodwaters from subsiding. This effort is the responsibility of the PWD, with assistance provided by the NRM.
3. Comply with requirements of the spill prevention plan to ensure for protection of water resources.

### ***Long-term Management***

The long-term management of the Installation floodplain areas includes careful project planning and maintaining updated floodplain maps for planning purposes. New construction projects should be located outside of the designated 100-year floodplain areas at the Installation. This is especially important in long-term planning that takes into consideration climate change impacts that may result in an increased number and level of flooding events, and sea level rise. Water quality management actions described in Section 3.2.1.1.3 will ensure protection of water quality within the Installation watersheds.

### ***Integration with Other Natural Resources Management Activities***

- Water quality management, Section 3.2.1.1.3 – avoid impacts to surface waters from stormwater, erosion, and sedimentation.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain vegetative buffers around wetlands and surface waters, and avoid vegetation clearing and ground-disturbing activities that could impact surface water quality or cause erosion and sedimentation into surface waters.
- Agricultural outleasings management, Section 3.2.1.4 – as required by agricultural outlease contracts, the contractor will notify the NRM prior to any herbicide or pesticide applications, and the NRM will monitor use and application of herbicides and fertilizers to minimize NPS pollution of surface waters.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of water quality for protection of watersheds and floodplains.

GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to monitor surface waters and floodplains.

### ***Ecosystems Management***

Maintaining healthy watersheds and floodplains provides and protects wildlife habitat and supports important ecosystems services such as water purification and control of stormwater and runoff.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Watershed and Floodplains Management***

- Clean Water Act (CWA) Section 303(d), Water Impairment Identification, requires states to identify waters that do not or are not expected to meet applicable water quality standards with technology-based controls alone, and to develop programs to achieve state standards.
- CWA Section 404, Permits for Dredged or Fill Materials, 1986, 33 USC 1344, establishes a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands.

- 1972 CZMA Section 6217, Coastal Nonpoint Pollution Control Program, 16 USC 1451 et seq., requires states with Coastal Zone Management Programs to develop Nonpoint Pollution Control Programs with approval from NOAA and EPA.
- EO 12962 (9 June 1995), *Recreational Fisheries*, requires federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities.
- EO 11988 (24 May 1977), *Floodplain Management*, requires federal agencies to evaluate effects of actions on floodplains.
- Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 USC 1801 et seq., establishes policies for the sustainable management of fishery resources and the protection of essential fish habitat (EFH).
- Rivers and Harbors Act, 33 USC 401 et seq., requires authorization from the USACE for the construction of any structure in or over any navigable waters of the U.S. and the excavation/dredging or deposition of material in these waters, or any obstruction or alteration in navigable water.
- Clean Water Action Plan (15 October 2009), is an initiative introduced by President Bill Clinton in 1998 to restore and protect America's waters. Implementation of the plan is overseen by EPA, and is intended to revamp enforcement of clean water laws. The plan identifies the nation's challenges for improving enforcement efforts to improve water quality and describes the actions that will be implemented to overcome them.

### ***Additional Sources of Information***

- EPA Office of Wetlands, Oceans, and Watersheds (<http://water.epa.gov/type/watersheds/index.cfm>)
- EPA, Office of Enforcement and Compliance Assurance, Clean Water Action Plan (<https://www.epa.gov/enforcement>)
- TSSWCB, Watershed Protection Plan Program (<http://www.tsswcb.texas.gov/wpp>)
- Texas Water Resources Institute, Texas Watershed Planning (<http://watershedplanning.tamu.edu/>)
- TPWD *Texas Watersheds* Newsletter ([https://tpwd.texas.gov/landwater/water/habitats/wetland/publications/tx\\_wetland\\_newsletter.phtml](https://tpwd.texas.gov/landwater/water/habitats/wetland/publications/tx_wetland_newsletter.phtml))

### ***3.2.1.1.2 Wetlands Management***

Wetlands are transitional zones between the terrestrial and aquatic environment, and are characterized by physical, chemical, and biological features that indicate hydrological conditions. Wetlands are an important part of natural ecosystems due to the diverse biological and hydrologic functions they perform, such as improving water quality, groundwater recharge, pollution treatment, nutrient cycling, provision of wildlife habitat and niches for unique flora and fauna, stormwater storage, and erosion protection (Benton et al. 2008).

---

### *Issue*

Wetlands provide valuable wildlife habitat and water quality protection. Formal wetland delineations are needed to allow for proper management of Installation wetlands. A wetlands delineation at the Installation was completed in 2004 for the Main Station, NOLF Cabaniss, NOLF Waldron (Turner Collie & Braden Inc. 2004). Those delineations are out-of-date so new surveys should be performed as part of any pending projects that might impact wetlands. The 2004 delineations identified 338 ac (137 ha) of jurisdictional wetlands between the three parcels. NOLF Goliad has not been formally surveyed for wetlands since being re-acquired by the Navy. The Installation is required to balance wetland protection with support of the military mission.

### *Goals and Objectives*

Protection and management of the wetlands present at the Installation must be addressed according to state and federal regulations. EO 11990, *Protection of Wetlands*, and OPNAVINST 5090.1D, 12-3.8(b), instruct Navy facilities to manage lands with the goal of no net loss of wetlands. All federal agencies are required by EO 11990 to use reasonable efforts to preserve and enhance the natural and beneficial values of wetlands under their stewardship. The DoD Natural Resources Conservation Program also requires military installations to inventory and manage significant or sensitive environmental features, including wetlands. The SAIA, as amended, calls for improving wetlands for the benefit of plants and animals when it is consistent with the military mission and readiness.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.2:** Achieve no net loss of wetlands.
- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.
- Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for wetlands management.

**Project No. 1 – Biological Inventory**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

---

## **Project No. 4 – NASCC INRMP Updates**

## **Project No. 7 – Habitat Management and Restoration**

### **Management Strategies**

Management strategies related to protection of wetlands at the Installation include the following.

1. For new projects that may impact wetlands, identify and locate jurisdictional waters of the U.S, including wetlands that have the potential to be impacted by activities associated with the military mission, as directed by the CWA. Obtain a jurisdictional determination from the USACE for such wetlands. Jurisdictional determinations will be used in project planning to avoid impacts to Installation wetlands. They can also assist the NRM and other environmental staff in proper management of wetlands and to identify management measures that will enhance wetland functions and the military mission (Navy 2006b). Jurisdictional determinations are usually valid for a period of five years, after which time the wetland delineation would need to be repeated to validate the status of wetlands.
2. Use bioengineering techniques where restoration or enhancement opportunities exist to improve wetland function and stabilize compromised streambanks, and plant using native species. Consider BASH Program requirements for all enhancement/restoration actions identified for the Installation when identifying sites for shoreline and habitat improvement.
3. Avoid wetland and riparian areas during future construction of structures and other facilities, including roads, unless essential to the military mission. Locate new roads outside riparian areas, whenever possible. Design stream crossings to minimize the area disturbed, and unimproved stream crossings are prohibited.
4. Implement appropriate wetland mitigation for unavoidable wetland impacts, as authorized and required by the federal and state permit process and the CWA.
5. Monitor stormwater runoff to ensure wetlands are not negatively impacted by stormwater flows, sedimentation, or erosion.
6. Maintain regulated buffers around wetland areas to avoid ground-disturbance activities with these areas.
7. Provide wetlands identification and management training to natural resources personnel.

### ***Long-term Management***

Proper management of wetlands, understanding their functions and values, and meeting regulatory requirements when conducting activities within wetlands requires knowledge of their extent and distribution. The USACE regulates and protects wetland resources in the U.S. Delineating jurisdictional wetlands is accomplished using the *1987 Corps of Engineers Wetland Delineation Manual* and the *2008 Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region*. Areas that meet the regulatory definition of a wetland are protected by Section 404 of the CWA, and any activity that may deposit fill into a wetland requires a permit from the USACE.

---

Ensuring regulatory compliance and managing wetland resources to enhance their value are the primary management issues for Installation wetlands. Wetland management generally is conducted within and around natural and man-made wetlands to protect, restore, and improve degraded wetlands. Issues associated with wetland management include the following.

1. Protecting natural wetlands from loss, or degradation by actions not related to the military mission.
2. Meeting regulatory requirements for activities that unavoidably impact wetlands.
3. Creating, enhancing, and restoring wetlands as mitigation for unavoidable impacts and to meet requirements of the SAIA.

Due to the important functions and values provided by wetlands, potential impacts to all wetlands, regardless of jurisdictional determination, will be avoided to the greatest extent practicable. As required by USACE, any unavoidable impacts to wetlands will be subject to appropriate compensatory mitigation to achieve no net loss of wetlands. Impacts to wetlands at the Installation can occur directly or indirectly from daily operations, including maintaining drainage channels, vegetation management, or from directly altering the areas (fill, drain, or a change in hydrology) or altering upland areas surrounding wetlands. Mission needs and requirements may necessitate an unavoidable clearing of land and filling of wetlands to build additional facilities. The need to comply with other environmental regulations, as well as the needs of the mission, may result in an unavoidable loss of some wetlands.

Variable characteristics (habitat value and function) among wetlands at the Installation make management decisions more complex and require thorough consideration regarding compliance with current environmental laws and regulations, while supporting the military mission. Careful management of wetlands located in proximity to Installation airfields also is needed to reduce their potential to attract wildlife and contribute to BASH.

Section 404 of the CWA (33 USC 320-330) prohibits the discharge of dredged or fill material into waters of the U.S., including wetlands, unless authorized by a USACE permit. Whereas the USACE has primary responsibility for implementing the CWA, other agencies, including the EPA, USFWS, USDA NRCS, TPWD, and Texas Natural Resource Conservation Commission, play important regulatory and advisory roles. If a project will impact wetlands or other specially designated aquatic sites, the USACE has the authority to require mitigation in the form of avoidance, minimization or compensation, to minimize the adverse effects of the project.

Development of roads, installation of new culverts, and grading or fill activities are examples of impacts that have the potential to impact wetlands and waters of the U.S., and a permit may be required before implementing these activities in accordance with Section 404 of the CWA. Certain actions that have minimal adverse impact on wetlands and other water resources may qualify for a Nationwide Permit. The Nationwide Permit Program was designed to streamline the Section 404 permitting process, and covers activities conducted in waters of the U.S., including maintenance activities such as repairing, rehabilitating, or replacing existing structures, and removing accumulated fill or debris from within or around existing structures. Activities associated with aquatic habitat restoration, establishment, or enhancement also may qualify for streamlined authorization under a Nationwide Permit.

Impacts to wetlands (including their function) and other surface waters by planned future projects at the Installation will be minimized or eliminated in accordance with EO 11990 and current Navy regulations. A formal jurisdictional delineation of wetland and water resources of the Installation is needed to verify resource boundaries before undertaking activities that disturb regulated wetlands or waterbodies for which a CWA Section 404 permit may be required; formal delineations expire after five years. If wetland impacts are unavoidable and a permit is required to authorize the activity, appropriate impact minimization and mitigation will be required, and will be determined through consultation with the appropriate federal and state agencies (USACE, USFWS, and TPWD). Additionally, Section 404 may require restoration of wetlands damaged by project activities, and although in-kind replacement of wetlands is the preferred mitigation strategy, other types of mitigation that may be applied include conservation easements, mitigation banking, and other mitigation as dictated by the federal and state agencies involved in the permitting and consultation process.

The Installation adheres to the requirement of “no net loss” of wetlands on federal lands, as mandated by EO 11990. This order protects and restores wetland function by buffering wetlands from direct human pressures and maintaining important external natural processes that act upon wetlands. Physical buffers minimize the effects of the abrupt transition between two different habitats (edge effects) on the numbers and kinds of organisms, reduce the amount of marginal habitat for species, and mitigate water quality impacts. A buffer typically consists of a suitably wide (i.e., 50-ft [15 m]) band of vegetation along the perimeter of a wetland or waterbody. An effective buffer must consider wetland functional value (e.g., level of degradation and sensitivity to disturbance), intensity of adjacent land use, buffer characteristics (i.e., vegetation density, structural complexity, and soil condition), and specific buffer functions required as described in Castelle et al. (1994):

- sediment removal and erosion control;
- nutrient transformation and removal;
- reduction of metals and other pollutants;
- stormwater runoff reduction through infiltration;
- alteration of water temperature;
- reduction of human impacts by limiting easy access and minimizing edge effects from noise, light, temperature, and other changes; and
- protection of interior wetland species.

Natural wetlands are not to be used for water quality treatment of point or NPS pollution (Fields 1993). Untreated point source discharges to wetlands have been eliminated through the National Pollutant Discharge Elimination System (NPDES) program in Section 402 of the CWA. Remaining point source discharges are of secondarily treated effluent, which is typified by greater biochemical oxygen demand, amounts of suspended solids, and nutrient levels as compared to natural inputs. Proper management dictates that wetlands and surface waters be protected from such inputs using water quality standards promulgated by each state. Although significant NPS loading to wetlands is undesirable, this issue will take time to address, and management measures will likely result in reduced, but not eliminated, loadings to wetlands.

It is important to develop and implement strategies for the long-term protection of wetlands at the Installation. Incorporating wetland management and protection would involve classifying wetland resources according to their relative function and value, and identifying specific management tasks based upon those findings. Issues pertaining to wetland protection and management include the following:

- Gathering biological baseline data to assess function and value of wetland resources, decisions regarding how to manage natural wetlands, enhance degraded wetlands, and analyze potential impacts can be obtained from this baseline data.
- Addressing erosion problems that exist along many of the drainage canals and sparsely vegetated areas, and that contribute to habitat loss and degradation of water quality.
- Regularly reviewing grounds maintenance, pest management, and construction BMPs to ensure that wetland water quality is not impacted by runoff.
- Balancing wetland protection and enhancement with BASH Program requirements.
- Reducing NPS pollution from erosion, vehicles, dumping, pest management, grounds maintenance, and weed control. NPS pollution from runoff can degrade wetland quality and function.
- Developing recreational and aesthetic opportunities within and adjacent to wetlands, such as nature trails and wildlife observation areas to increase awareness of wetland importance.

Detailed delineations of wetlands and waterbodies of the Installation are planned in accordance with training, operational, and construction needs and, upon verification by the USACE, the data will be disseminated to various Installation staff for permitting and mitigation purposes.

***Integration with Other Natural Resources Management Activities***

- Water quality management, Section 3.2.1.1.3 – maintain water quality of stormwater runoff into wetlands and minimize potential impacts to wetlands from sedimentation.
- Coastal zone management, Section 3.2.1.2 – maintain healthy wetland ecosystems in support of coastal zone management.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – reduce BASH risks associated with wetland habitats.
- Invasive plant and noxious weed management, Section 3.2.1.3.3 – control invasive species in wetlands areas and maintain natural wetland buffers.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain wetland buffers, and properly apply herbicides and fertilizers to avoid NPS pollution in runoff to wetlands.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – manage wetlands to provide important wildlife habitat for species, consistent with the BASH Program.
- Migratory bird management, Section 3.2.2.2 – manage wetlands to provide important habitat for migratory birds, consistent with the BASH Program.



- 
- Outdoor recreation management, Section 3.2.3 – avoid impacts to wetlands from outdoor recreation activities.
  - Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of wetlands ecosystems.
  - Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on wetlands management, including proper use of BMPs to prevent stormwater runoff, erosion and sedimentation from impacting wetland habitats (AHEC 2013).
  - GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map and monitor wetlands.
  - Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – partner with appropriate agencies to obtain strategies that enhance management of wetlands, and obtain necessary permits for projects that have the potential to impact wetlands.

### ***Ecosystems Management***

Wetlands management is an essential component of ecosystems management because such a large number of plants and animals utilize wetlands. Additionally, healthy, protected wetlands store and purify water, provide open space and aesthetic value, and provide habitats for migratory birds, fish, and other wildlife.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Wetlands Management***

- EO 11990 (24 May 1977), *Protection of Wetlands*, as amended, requires government agencies, in carrying out agency actions and programs affecting land use, to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
- CWA Section 401, Water Quality Certification, 1986, 33 USC 1341, requires that states certify compliance with federal permits or licenses and with state water quality requirements and other applicable state laws. Under Section 401, states have the authority to review any federal permit or license that may result in a discharge to wetlands or other waters under the state's jurisdiction to ensure that the actions would be consistent with the state's water quality requirements.
- CWA Section 404, Permits for Dredged or Fill Materials, 1986, 33 USC 1344, establishes a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- OPNAVINST 5090.1D, 12-3.8(b), discusses natural resources management related to wetlands management.
- Coastal Wetlands Planning, Protection and Restoration Act, 16 USC 3951-3956, enacted to identify, prepare, and fund construction of Texas coastal wetlands restoration projects.

- Energy Policy Act Section 384, Coastal Impact Assistance Program, 2005, 42 USC 13201 et seq., assists coastal producing states and their political subdivisions (parishes, counties, and boroughs) in mitigating the impacts from Outer Continental Shelf oil and gas production.
- Rivers and Harbors Act, 33 USC 401 et seq., requires authorization from the USACE for the construction of any structure in or over any navigable waters of the U.S. and the excavation/dredging or deposition of material in these waters or any obstruction or alteration in navigable water.
- Clean Water Action Plan (15 October 2009), is an initiative introduced by President Bill Clinton in 1998 to restore and protect America's waters. Implementation of the plan is overseen by EPA, and is intended to revamp enforcement of clean water laws. The plan identifies the nation's challenges for improving enforcement efforts to improve water quality and describes the actions that will be implemented to overcome them.

#### ***Additional Sources of Information***

- USACE, Regulatory Division, Wetlands and Waters of the U.S. (<http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx>)
- EPA, Office Wetlands, Oceans, and Watersheds (<https://www.epa.gov/wetlands>)
- EPA, Office of Enforcement and Compliance Assurance, Clean Water Action Plan (<https://www.epa.gov/enforcement>)
- USFWS, National Wetlands Inventory (<https://www.fws.gov/wetlands/>)
- USDA NRCS (<https://www.nrcs.usda.gov/wps/portal/nrcs/site/tx/home/>)
- Society of Wetland Scientists (<http://www.sws.org/links.mgi>)
- Society for Ecological Restoration (<https://www.ser.org/>)
- TPWD, Wetlands Habitats (<https://tpwd.texas.gov/landwater/water/habitats/wetland/>)
- TSSWCB, Coastal Nonpoint Source Pollution Control Program (<https://www.tsswcb.texas.gov/programs/texas-nonpoint-source-management-program/coastal-nonpoint-source-pollution-control-program>)

#### ***3.2.1.1.3 Water Quality Management***

The quality and quantity of water runoff generally depends upon the land use type and impervious surface area. In developed urban areas, there is significant impervious area that causes runoff to have increased pollutant concentrations. Industrial, commercial, and residential activities bring pollutants into contact with stormwater runoff, carrying them into receiving streams, rivers, lakes, and bays. Areas with substantial pavement and structures generate considerable runoff and pollutants. The condition and maintenance of drainage systems plays an important role in stormwater management. Undeveloped land and low-density residential areas have little impervious area, so impacts on stormwater quality in these areas are expected to be minimal.

---

Soil erosion contributes to water quality and conveyance problems, which may include: 1) elimination of habitat (terrestrial and aquatic); 2) reduction in reservoir capacity and stream flow; 3) increased flooding potential; 4) impacts to water quality; and 5) increased maintenance time and costs associated with stormwater facilities (e.g., culverts, ditches, and swales). Water quality is affected by increased sedimentation, which is particularly detrimental to benthic organisms and many fish species.

### ***Issue***

The CWA legislates protection of the quality of surface and groundwaters of the U.S., and requires states to develop a program to identify and reduce NPS pollution to surface and groundwater. Federal agencies, including the Navy, are required to be consistent with state NPS water pollution management programs under the CWA, Section 319. Texas has developed surface water quality standards that define the maximum acceptable levels of specific metals and organic compounds, including pesticides and herbicides, in surface waters. The standards were set with consideration of the level each pollutant would cause chronic and acute injury to aquatic organisms. Guidance and funding from the CWA Section 310 program is available to promote water pollution prevention programs and projects.

Under the Clean Water Action Plan, states are allowed to designate watersheds for protection and restoration. The state of Texas has accomplished this through a Unified Watershed Assessment. At present, the Corpus Christi Bay area (Nueces River Basin) has not been designated for restoration.

The Texas State Soil and Water Conservation Board (TSSWCB) is the state agency responsible for administering Texas' soil and water conservation law and coordinating conservation and NPS pollution abatement programs. The TSSWCB is the lead state agency for the planning, management, and abatement of agricultural and silvicultural (forestry) NPS pollution, and administers the Texas Brush Control Program. The TSSWCB works with other state and federal agencies on NPS issues as they relate to Water Quality Standards and Criteria, Total Maximum Daily Loads, Watershed Protection Plans, and the CMP.

The TCEQ routinely monitors surface water quality in the state. Water quality results for all monitored stream segments are reported biannually in TCEQ's "Texas Integrated Report for CWA Sections 305(b) and 303(d)." Water quality results are used to identify streams, reservoirs, estuaries, and/or Gulf of Mexico segments that require advanced water treatment to meet water quality standards set by the Texas Surface Water Quality Standards (TSWQS). Segments are classified as "water quality limited" when one of the following is applicable: 1) surface water quality monitoring data indicate significant violations of criteria in the TSWQS that are protective of aquatic life, contact recreation, public water supply, or oyster waters uses; 2) advanced water treatment for point source wastewater discharges is required to meet water quality standards (advanced waste treatment is defined as treatment equal to or more stringent than 30-day average of 10 milligrams per liter carbonaceous biochemical oxygen demand and 12 milligrams per liter ammonia nitrogen); or 3) the segment is a public water supply reservoir (i.e., requires special wastewater treatment considerations). All other segmented waters are classified "effluent limited," indicating that water quality standards are being maintained and that

---

conventional wastewater treatment is adequate for protection of existing conditions (Texas Natural Resource Conservation Commission [TNRCC] 1996).

Storm water runoff from the Installation flows into the Coastal Bend Bay System, and has the potential to affect water quality. In general, water quality in the bays adjacent to the Main Station is good. Runoff drains into monitored bays and estuaries segments of the Nueces-Rio Grande Coastal Basin, including Segment 2485, 2491 and 2481. These segments are reported to have limited water quality, and have designated water uses of contact recreation, exceptional aquatic life and oyster waters (TNRCC 1996). Appropriate water uses are designated by TCEQ for classified segments based on physical, chemical, and biological characteristics of the waterbody. As defined by TSWQS, contact recreation activities are those activities involving a significant risk of ingestion of water such as wading by children, swimming, and water skiing. However, waters with designated use of contact recreation are not completely safe of disease-causing organisms. Exceptional aquatic life use is the highest level of aquatic life use and is based on dissolved oxygen levels, presence of toxic substances, pH, and other factors. Oyster water use is assigned to most coastal bays to protect existing and potential harvests of edible species of clams, oysters, and mussels (TCEQ 2010). Goliad County Groundwater Conservation District (GCD), created in 2001, provides for the protection, preservation, and conservation of groundwater of the Gulf Coast Aquifer. The Goliad County GCD Management Plan guides its conservation and preservation efforts, and this plan was updated in 2012 (TWDB 2010b).

### ***Goals and Objectives***

The 1987 amendments to the CWA (33 USC 1251) created the NPDES stormwater program. This program regulates stormwater discharges from certain industrial activities, including airport operations. EO 12088, *Federal Compliance with Pollution Control Standards*, requires that the heads of each Executive Agency ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency. Ground disturbing projects should be covered by a site-specific Storm Water Pollution Prevention Plan (SW3P) or an erosion and sediment control plan (ESCP) that identifies measures to reduce pollution of receiving water from stormwater runoff from a project site.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.
- Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

## ***Projects and Management Strategies***

### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for water quality management.

#### **Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

#### **Project No. 4 – NASCC INRMP Updates**

#### **Project No. 7 – Habitat Management and Restoration**

### **Management Strategies**

Management strategies related to protection of water quality at the Installation include the following.

1. Minimize impacts of construction activities at the Installation. All ground-disturbing activities conducted will incorporate appropriate stormwater and erosion and sediment controls and will coordinate the timing of land-disturbing activities and implementation of erosion and sedimentation control measures to reduce NPS pollution that could result from those activities. To ensure that such controls are applied consistently, an ESCP will be developed for all land-disturbing activities, as needed in accordance with state regulations.
2. Maintain routine water quality monitoring in accordance with specifications outlined in the existing NPDES Stormwater Permit.
3. Minimize the impacts of fertilizers and pesticides on water quality using management practices that balance the desire to have aesthetically pleasing grounds while protecting water quality.
4. Maintain proper function of stormwater control and conveyance structures by frequently removing debris. Litter and yard wastes can clog inlets, catch basins and outlets, lead to overflows, erosion, and unintended flooding, and make these devices ineffective for stormwater pollutant removal.

### ***Long-term Management***

EO 12088, *Federal Compliance with Pollution Control Standards*, requires that the heads of each Executive Agency ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to federal facilities and activities under the control of the agency. Soil erosion is a source of water pollution (sediment loadings), and will be controlled in compliance with this EO. A continuous cover of vegetation is the most effective way to prevent soil erosion and to minimize impacts to the environment.

The Installation SW3P was recently updated in 2013 to meet the requirements of the reissued multi-sector general permit issued by EPA in 1995 (AHEC 2013). The major components of the Installation SW3P are storm water monitoring, development and implementation of BMPs, and reporting requirements. It also should be noted that the state of Texas has been granted delegation of the NPDES program from EPA and is currently phasing in the various aspects of that program.

Quality of stormwater is affected by more than sediment loads; it also is affected by dissolved nutrients, pesticides, herbicides, and petroleum residues that flow via stormwater runoff and sheetflows into the Installation drainage system and ultimately into the bays and estuarine waters of the Gulf of Mexico and Atlantic Ocean. The implementation of the SW3P is the primary management issue related to water quality; however, implementation of the SW3P also benefits other management issues identified in this INRMP such as erosion control and conservation of wetlands and riparian areas.

Although the Installation has an effective SW3P in place, small areas may exist that are not vegetated adequately to prevent soil erosion, and are contributing to NPS water pollution. The use of off-road vehicles is prohibited off of established roadways, unless they are involved in military training or they are an emergency or security vehicle. In order to minimize erosion and sedimentation, ground disturbing projects should be covered by a site-specific SW3P or an ESCP that identifies measures to reduce pollution of receiving water from stormwater runoff from a project site. The Installation prepares project-specific SW3Ps and ESCPs on an as-needed, project-specific basis, and in accordance with state regulations. SW3Ps and ESCP that are developed for these purposes identify potential sources of erosion and sedimentation prevention controls. One of the major upcoming ground-disturbing projects that is anticipated to be implemented in the next few years at the Main Station is relocation of approximately half of the Gulf Winds Golf Course to an undeveloped region of the southeast corner of the parcel. The relocation of a portion of the Gulf Winds Golf Course is necessary to allow for construction of three new buildings near the hospital. The Installation will develop a SW3P prior to implementing the Gulf Winds Golf Course relocation project that identifies BMPs and other measures to protect water quality, conserve soil, and minimize run-off at Main Station during the project period.

The Installation SW3P contains BMPs that meet the Installation's Multi-Sector General Permit requirements for areas identified as industrial activity sectors as defined in the TCEQ permit for the Installation (AHEC 2013). Potential pollutants associated with industrial activities are associated with metal fabrication and finishing, paint stripping, surface coating, and other similar activities needed to meet the military mission. Grounds maintenance and agricultural outlease contracts, and maintenance of golf course greens utilize measures—such as not overwatering—to reduce the potential for chemical fertilizers, herbicides and pesticides, which can be dissolved by surface runoff and carried into surface waters, to degrade the quality of these waters.

To protect water quality at the Installation, and within surrounding areas, existing and potential erosion problem areas must be identified so that appropriate measures, including sedimentation control and shoreline stabilization projects, can be implemented. Installation environmental staff also must review erosion and sedimentation control plans for construction sites and provide oversight to ensure BMPs are being applied properly and consistently for all ground-disturbing activities.

### ***Integration with Other Natural Resources Management Activities***

- Watershed and floodplains management, Section 3.2.1.1.1 – maintain water quality of stormwater runoff into surface waters and minimize potential impacts to surface waters from sedimentation.

- 
- Wetlands management, Section 3.2.1.1.2 – maintain water quality of runoff to wetland habitats.
  - Riparian areas management, Section 3.2.1.3.1 – maintain intact riparian areas that act as buffers and to attenuate NPS pollution from runoff into adjacent surface waters and wetlands.
  - Invasive plants and noxious weeds management, Section 3.2.1.3.3 – use BMPs to avoid impacts to water quality resulting from disturbed soils associated with control and removal of invasive plants and noxious weeds.
  - Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain vegetative buffers around wetlands and surface waters to assist in maintaining water quality; avoid vegetation clearing and ground-disturbing activities that could impact surface water quality or cause erosion and sedimentation into surface waters and wetlands; and limit use of pesticides and herbicides in areas where NPS pollution could impact water quality.
  - Agricultural outleaves management, Section 3.2.1.4 – monitor use and application of herbicides, pesticides, and fertilizers to minimize NPS pollution of surface waters.
  - Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on management of water resources to maintain water quality, including proper use of BMPs to prevent stormwater runoff, erosion and sedimentation from impacting water resources (AHEC 2013).
  - GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to monitor areas identified as having water quality issues, stormwater outfalls, and water resources enhancement projects.
  - Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – partner with appropriate agencies to ensure that water quality standards are met, and to identify management activities that can improve water quality.

### ***Ecosystems Management***

Effective management of water quality is essential to realizing the ecosystems management concept. Implementation of BMPs in developed, semi-developed, and unimproved areas will help protect water quality and habitat for aquatic life (AHEC 2013). BMPs address the reduction of sedimentation, nutrient loading, bacterial and parasitic pests, and harmful chemicals in stormwater. Construction of any new stormwater ponds in accordance with the stormwater and water quality management concept will increase wildlife habitat and reduce the potential for additional discharge from new developments; these will be implemented in consideration of BASH Program requirements.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Water Quality Management***

- Federal Water Pollution Control Act, as amended by the CWA of 1977, 33 USC 1251, describes guidelines for the control of NPS pollution.

- 
- CWA Section 303(d), Water Impairment Identification, 1977, requires states to identify waters that do not or are not expected to meet applicable water quality standards with technology-based controls alone and to develop programs to achieve the state standards.
  - CWA Section 401, Water Quality Certification, 1986, 33 USC 1341, requires that an applicant for a federal license or permit provide a certification that any discharges from the facility will comply with the act, including water quality standard requirements.
  - CWA Section 402, NPDES Program, 2002, 33 USC 1251, controls direct discharges into navigable waters. NPDES permits, issued by either the EPA or an authorized state/tribe, contain industry-specific, technology-based and water quality-based limits and establish pollutant monitoring and reporting requirements.
  - CWA Section 404, Permits for Dredged or Fill Materials, 1986, 33 USC 1344, establishes a program to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands.
  - CZMA Section 6217, Coastal Nonpoint Pollution Control Program, 16 USC 1451 et seq., requires states with Coastal Zone Management Programs to develop Nonpoint Pollution Control Programs with approval from NOAA and EPA.
  - Safe Drinking Water Act, 1974, 42 USC 300f et seq., protects the quality of drinking water in the U.S. whether from above ground or underground sources.
  - National Invasive Species Act, 16 USC 4321, prescribes policies to prevent the introduction and spread of non-indigenous species into U.S. waters.
  - EO 11990 (24 May 1977), *Protection of Wetlands*, as amended, directs the preservation and enhancement of wetlands.
  - EO 12088 (13 October 1978), *Federal Compliance with Pollution Control Standards*, as amended, ensures that all necessary actions are taken to prevent, control, and abate environmental pollution with respect to federal facilities and activities under control of the agency.
  - Oil Pollution Act, 1990, 33 USC 2701, requires planning for, rescue of, minimization of injury to, and assessment of damages or injury to fish and wildlife resources from the discharge of oil.
  - Comprehensive, Environmental Response, Compensation and Liability Act, 42 USC 9601 et seq., authorizes Natural Resource Trustees to recover damages for injury to, destruction of, or loss of natural resources resulting from the release of a hazardous substance.
  - OPNAVINST 5090.1D, Ch.39, discusses natural resources management relating to NPS pollution and establishes requirements, guidelines, and standards for the assessment of damages arising from the release of oil or hazardous substances.
  - Clean Water Action Plan (15 October 2009), is an initiative introduced by President Bill Clinton in 1998 to restore and protect America's waters. Implementation of the plan is overseen by EPA, and is intended to revamp enforcement of clean water laws. The plan



identifies the nation's challenges for improving enforcement efforts to improve water quality and describes the actions that will be implemented to overcome them.

### ***Additional Sources of Information***

- EPA, Water Quality Standards for Surface Waters (<https://www.epa.gov/standards-water-body-health>)
- EPA, Ground Water and Drinking Water (<https://www.epa.gov/ground-water-and-drinking-water>)
- EPA, Office of Enforcement and Compliance Assurance, Clean Water Action Plan (<https://www.epa.gov/enforcement>)
- TPWD, Water Quality ([http://tpwd.texas.gov/landwater/water/enviroconcerns/water\\_quality/](http://tpwd.texas.gov/landwater/water/enviroconcerns/water_quality/))
- TSSWCB, Coastal Nonpoint Source Pollution Control Program (<http://www.tsswcb.texas.gov/coastalnps>)
- TWDB (<http://www.twdb.texas.gov/>)
- Goliad County GCD (<http://www.goliadcogcd.org/>)

### **3.2.1.2 Coastal Zone Management**

The coastal zone provides important habitat, including submerged aquatic vegetation, for migratory birds, fish, marine mammals, and sea turtles. The coastal zone also acts as a necessary buffer zone, and protection of the coastal zone is mandated through the CZMA.

#### ***Issue***

With the exception of NOLF Goliad, all of the Installation properties are located in the Texas Coastal Zone, a federally approved coastal zone that includes a portion of 18 counties in southeastern Texas, extending offshore to nine nautical miles (Texas General Land Office, CMP 2010). Land use activities may negatively impact sensitive habitats in the coastal zone.

In accordance with the CZMA and the Texas CMP, abatement of coastal erosion is a primary concern for coastal areas. In addition, coastal erosion can contribute to water quality degradation and loss of upland and aquatic habitat. The Main Station has approximately 9 mi (15 km) of shoreline. In its natural state, these areas are dynamic environments, constantly being changed due to natural processes. Only a small portion of the shoreline along the Main Station is relatively stable. Areas along Oso Bay, along Corpus Christi Bay outside the north gate, and along the Laguna Madre Estuary are actively eroding. At the Main Station, erosion of the shoreline also is encroaching on operational areas, and could eventually interfere with the military mission.

Under Section 6217 of the Coastal Zone Act Reauthorization Amendments, states with coastal zone management programs are required to develop a coastal NPS pollution control program. According to the program requirements, the state must develop enforceable policies and mechanisms to ensure the implementation of the management measures throughout the coastal

---

management area. Texas received approval of its CMP in 1996 and is currently developing its coastal NPS pollution control program.

Seagrass beds are special aquatic sites located in the coastal zone. Management of submerged aquatic vegetation is discussed in Rare and Sensitive Ecosystems Management (3.2.1.6).

### ***Goals and Objectives***

The CZMA encourages states to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife supported by those habitats. The CZMA grants Texas and other coastal states that have a federally approved CMP the authority to review federal activities, federal license or permit activities, and federally funded activities to ensure that federal actions that may affect its coastal area meet the “enforceable policies” of the state’s coastal program (NOAA 1999).

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

### ***Projects and Management Strategies***

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for coastal zone management.

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 7 – Habitat Management and Restoration**

**Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to protection of coastal zone resources at the Installation include the following.

1. Minimize impacts of construction activities in the coastal zone through use of appropriate BMPs.
2. Consider and be aware of any Installation activities that could impact the Texas Coastal Zone, including but not limited to, sedimentation problems, and activities that could affect wetlands and habitats for rare, threatened, and endangered species which are

---

covered under the Texas Coastal and Estuarine Land Conservation Program (TCELCP) and the CBBEP, and if necessary coordinate with the Texas Land Office.

3. Conduct a federal consistency review for any activity that may affect the natural resources in the Texas Coastal Zone, and include coordination with the Texas Land Office to ensure consistency with CZMA and the TCELCP.
4. Develop a partnership with the CCBEP to protect and enhance the health and productivity of the Coastal Bend Bay system by participating in CCBEP discussions and projects.

### ***Long-term Management***

The Texas CMP, established in 1978, is funded by NOAA, managed by the Texas Land Commissioner, and is a partnership among local, regional, and state agencies for the purpose of ensuring the long-term environmental and economic health of the Texas coast through management of coastal natural resource areas. The Management Program was developed pursuant to the CZMA, which was passed by Congress in 1972 in response to concerns about the rapid deterioration of coastal areas throughout the nation. Administered by NOAA, the CZMA law authorized funding for state coastal programs around the country to improve the environmental and economic health of America's coastal areas by establishing federal-state partnerships, and providing the legal framework related to management of the nation's coastal resources (Texas General Land Office, CMP 2010).

The Texas CMP was accepted into the Coastal Zone Management Program in 1997. The goals of the CMP are to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resources areas and to ensure sound management of all coastal resources by allowing for compatible economic development and multiple human uses of the coastal zones (Texas General Land Office, CMP 2010). The three Installation airfield parcels located in Nueces County are included in the boundary map for the CMP (Texas General Land Office, CMP 2010).

The process by which a state decides whether a federal action meets its enforceable policies is called federal consistency review. Federal consistency applies to any activity that is in or affects land use, water use, or any natural resource in the coastal zone, if the activity is conducted by or on behalf of a federal government agency; requires a federal license or permit; receives federal funding; or is a plan for exploration, development or production from any area leased under the Outer Continental Shelf Lands Act. The Texas General Land Office, which manages the CMP, reviews federal actions within the Texas Coastal Zone Boundary to ensure consistency with the goals and policies of the CMP, supports protection of natural habitats and wildlife, and provides baseline data on the health of Gulf Coast waters. Through the review process, the Land Office ensures that project plans meet the goals and policies of the Coastal Zone Management Program to the maximum extent practicable (NOAA, Ocean and Coastal Resource Management 2013). Management strategies identified in this INRMP for protection of coastal zone resources reflect strategies recommended by the Texas CMP.

The TCELCP was approved by NOAA in 2010 pursuant to the adoption of the Appropriations Act of 2002 (Public Law 107-77). The purpose of the TCELCP is the protection of important

coastal and estuarine areas that have significance conservation, recreation, ecological, historical, or aesthetic values; or are threatened by conversion from their natural or recreational state to other uses. Whereas the Texas CMP boundary only covers a portion of Nueces County, the TCELCP boundary includes all the geographic area of the 18 coastal counties, including Nueces and Goliad counties (NOAA 2010).

The Texas State Soil and Water Conservation Board (TSSWCB) works with other state and federal agencies on NPS issues as they relate to Water Quality Standards and Criteria, Total Maximum Daily Loads, Watershed Protection Plans, and the CMP.

The U.S. Congress established the Estuary of National Significance program through legislation enacted as part of the Water Quality Act of 1987 (Navy 2006b). Two areas within the Coastal Bend Bay System that are located within the vicinity of the Main Station have been designated as an Estuary of National Significance, including Oso Bay/Mud Bridge located approximate 4 mi (6 km) southwest of the Main Station, and Nueces Bay Causeway located approximately 10 mi



*View of Corpus Christi Bay from the Main Station*

Source: L. Rivard

(16 km) northwest of the Main Station (EPA 2012). After the Coastal Bend Bay system was designated as an Estuary of National Significance in 1992, the Corpus Christi National Estuary Program was established. Using a collaborative approach, the program developed the Coastal Bend Bays Plan to address priority issues such as altered freshwater inflows, loss of wetlands and estuarine habitats, degradation of water quality, altered estuarine circulation, bay debris, and public health concerns. The mission of the Coastal Bend Bays Plan is to protect and restore the health and productivity of the bays and estuaries while supporting continued economic growth and public use of the bays (CBBEP 1998). The CBBEP is a non-profit organization whose mission is to implement the Coastal Bend Bays Plan for the 12 counties of the Coastal Bend Council of Governments. The region of focus extends from the land-cut in the Laguna Madre Estuary, through the Corpus Christi Bay system, and north to the Aransas National Wildlife Refuge, encompassing a total of 515 mi<sup>2</sup> (1,334 km<sup>2</sup>). The CBBEP pursues voluntary partnerships with industry representatives, environmental groups, bay users, local governments, and resource managers to accomplish its goals. Past projects include enhancement of migratory bird nesting habitat on Causeway Island, purchase of whooping crane habitat on Lamar Peninsula, and conducting fish surveys (CBBEP n.d. a). The Installation comprises an important component of the Coastal Bend Bay system and the Installation may consider partnering with the CBBEP for management of its coastal resources.

### ***Integration with Other Natural Resources Management Activities***

- Watershed and floodplains management, Section 3.2.1.1.1 – maintain healthy watersheds and manage floodplains in support of coastal zone management.
- Wetlands management, Section 3.2.1.1.2 – maintain healthy wetland habitats in support of coastal zone management.
- Water quality management, Section 3.2.1.1.3 – maintain water quality within surface waters within the coastal zone in support of coastal zone management.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of coastal zone resources.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to monitor important natural resources located within the coastal zone.

### ***Ecosystems Management***

The coastal zone should be managed with an ecosystem-based approach because it provides important habitat for migratory birds and other wildlife and supports ecosystem services that protect natural resources.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Coastal Zone Management***

- Federal Water Pollution Control Act, as amended by CWA of 1977, 33 USC 1251 prohibits the discharge of dredged or filled materials into waters of the U.S., including wetlands, without first obtaining a permit from the USACE (Section 404 of the CWA).
- CZMA, Section 6217, Coastal Nonpoint Pollution Control Program, 16 USC 1451 et seq., requires states with Coastal Zone Management Programs to develop Nonpoint Pollution Control Programs with approval from NOAA and EPA.
- Coastal Wetlands Planning, Protection and Restoration Act, 16 USC 3951-3956, enacted to identify, prepare, and fund construction of Texas coastal wetlands restoration projects.
- Oil Pollution Act, 1990, 33 USC 2701, requires planning for, rescue of, minimization of injury to, and assessment of damages or injury to fish and wildlife resources from the discharge of oil.
- Water Quality Act, Public Law 1004, 1987, establishes the Estuary of National Significance Program.
- 15 CFR 923, Coastal Zone Management Program Regulations, establishes requirements for review of approved management programs and grant application procedures for program funds.
- 15 CFR 930, Federal Consistency with Approved Coastal Management Programs, describes the obligations of all parties who are required to comply with the federal consistency requirements of the Coastal Zone Management Act.

- Texas Natural Resources Code, Title 2, Chapter 33, Coastal Public Lands Management Act, 1973, establishes that the natural sources of coastal public lands shall be preserved and that the public interest in the use of public coastal lands shall be protected.
- Texas Administrative Code, Title 301, Chapter 501, Coastal Management Program, establishes the Coastal Management Program to provide for more effective and efficient use of public funds to manage coastal natural resource areas.
- EO 12088 (13 October 1978), *Federal Compliance with Pollution Control Standards*, as amended, ensures that all necessary actions are taken to prevent, control, and abate environmental pollution with respect to federal facilities and activities under control of the agency.
- OPNAVINST 5090.1D, Ch.39, discusses natural resources management relating to NPS pollution and establishes requirements, guidelines, and standards for the assessment of damages arising from the release of oil or hazardous substances.

#### ***Additional Sources of Information***

- CBBEP (<http://www.cbbep.org/>)
- NOAA, Ocean and Coastal Management in Texas (<https://coast.noaa.gov/states/texas.html>)
- Texas General Land Office, CMP (<http://www.glo.texas.gov/coast/grant-projects/cmp/index.html>)
- TPWD, Conservation of Texas Bays and Estuaries (<https://tpwd.texas.gov/landwater/water/habitats/bays/>)
- Texas State Historical Association, Coastal Zone (<http://tshaonline.org/handbook/online/articles/rrc16>)

#### **3.2.1.3 Vegetation and Habitat Management**

Vegetation management is an important component of natural resources management at the Installation. Maintaining vegetation around the Installation airfields is an essential component of the BASH Program. Grasslands and other habitats in the airfield areas and safety zones shall be managed to reduce their potential to attract wildlife. Oversight of the grounds maintenance program provides opportunities to enhance the visual appeal of the environment, implement beneficial landscaping concepts, improve wildlife habitat as practicable and consist with the Installation BASH Program, and reduce the costs of grounds maintenance. This may include adopting an integrated vegetation management approach by encouraging establishment of certain vegetation communities. Beneficial landscape and turf management practices, such as planting native species to reduce water and nutrient demands, and increased use of shade trees and protective vegetation, are encouraged.

The broad community type data that is available for Installation properties will provide a cursory level of baseline data that will aid in implementing responsible management practices; however, GIS data should be collected and ground-truthed to update the Installation plant species inventory and natural community types. Management priorities should be directed toward

---

protecting the ecological communities that are largely unaffected by current activities necessary to support the operational mission. General habitat management includes avoiding negative impacts to and encouraging the proliferation of natural communities.

Seagrass beds are a special aquatic vegetation community located in the offshore areas of the Main Station. Management of submerged aquatic vegetation is discussed in Rare and Sensitive Ecosystems Management (3.2.1.6).

### ***3.2.1.3.1 Riparian Areas Management***

Maintaining well-vegetated riparian buffers along streams and other waterbodies are an important part of a healthy environment, and provide benefits to humans and wildlife. Riparian buffer functions include maintaining habitat for fish and wildlife, nutrient cycling, streambank stability, natural stream flow, and water quality (Muhlberg and Moore 1998). Conserving and restoring riparian buffers minimizes erosion and subsequent loss of streambank habitat.

#### ***Issue***

Riparian and wetland habitats on military lands may provide important habitat for migratory birds and provide valuable habitat for a variety of wildlife. In accordance with the MOU established between DoD and the USFWS to promote the conservation of migratory birds (71 Federal Register [FR] 168) DoD will strive to prevent the destruction or degradation of wetlands and riparian vegetation, and also will restore those habitats, when feasible, where they have been degraded.

#### ***Goals and Objectives***

Manage land resources to mitigate or avoid activities that would damage the sensitive riparian ecosystems at the Installation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.

#### ***Projects and Management Strategies***

##### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for riparian areas management.

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

## **Project No. 7 – Habitat Management and Restoration**

### **Management Strategies**

Management strategies related to protection of riparian areas at the Installation include the following.

1. Avoid and minimize impacts to vegetated buffer areas along streams and other waterbodies during disturbance activities through use of appropriate BMPs (AHEC 2013).
2. Implement riparian enhancement projects in consideration of BASH Program requirements.

### ***Long-term Management***

Impacts to vegetated buffer areas, including riparian buffers along streams and other waterbodies, should be avoided or minimized to maintain habitat for fish and wildlife, to protect water quality, and to provide streambank stability. Restoration and enhancement opportunities for riparian buffer habitat should be identified, and bioengineering techniques and native plantings should be used to stabilize compromised streambanks. The application of fertilizers, herbicides, and pesticides should be avoided, to the extent practicable, to protect water quality. Riparian areas will be avoided during future construction of structures and other facilities, including roads. New roads will be located outside riparian areas, whenever possible.

### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – maintain riparian areas around wetlands, as these function as important wetland buffers.
- Water quality management, Section 3.2.1.1.3 – maintain riparian areas around surface waters, as these function as important vegetative buffers and help to maintain water quality.
- Coastal zone management, Section 3.2.1.2 – keep riparian areas intact in support of coastal zone management.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain riparian buffers around wetlands and surface waters, and properly apply herbicides and fertilizers to avoid NPS pollution in runoff to riparian areas.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of riparian areas.



*Oso Creek riparian area,  
NOLF Cabaniss*

Source: L. Rivard



- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map and monitor riparian areas.

### ***Ecosystems Management***

Maintaining well-vegetated riparian buffers along streams and other waterbodies is an important part of a healthy environment, and supports humans and wildlife by providing habitat and nutrient cycling and supporting streambank stability, natural stream flow, and water quality.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Riparian Areas Management***

- CWA Section 401 Water Quality Certification, 1986, 33 USC 1341 requires that states certify compliance with federal permits or licenses, and with state water quality requirements and other applicable state laws. Under Section 401 states have the authority to review any federal permit or license that may result in a discharge to wetlands or other waters under the state's jurisdiction to ensure that the actions would be consistent with the state's water quality requirements.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- OPNAVINST 5090.1D-12-3.8(b), discusses natural resources management relating to wetland management.
- ESA, 26 USC 1531 et seq., provides for affirmative protection for riparian areas if they occur on federal lands and provide habitat to any listed species or any species proposed for listing, or if they are within designated Critical Habitat for certain fish, mammals, birds, and reptiles.
- CZMA, 16 USC 1451 et seq., requires riparian area protection and restoration as a means of meeting the pollution-abatement goals of the CZMA.

### ***Additional Sources of Information***

- TPWD, Riparian Wetlands ([https://tpwd.texas.gov/landwater/water/habitats/wetland/ecology/riparian\\_wetlands.phtml](https://tpwd.texas.gov/landwater/water/habitats/wetland/ecology/riparian_wetlands.phtml))
- USDA NRCS (<https://www.nrcs.usda.gov/wps/portal/nrcs/site/tx/home/>)
- EPA, Riparian Zone and Stream Restoration (<https://archive.epa.gov/ada/web/html/riparian.html>)
- USFWS, A System for Mapping Riparian Areas in the Western United States ([www.fws.gov/wetlands/Documents/A-System-for-Mapping-Riparian-Areas-In-The-Western-United-States-2009.pdf](http://www.fws.gov/wetlands/Documents/A-System-for-Mapping-Riparian-Areas-In-The-Western-United-States-2009.pdf))
- Texas Riparian Association (<http://www.texasriparian.org/>)
- Society for Ecological Restoration (<https://www.ser.org/>)
- Texas State Soil and Water Conservation Board (<http://www.tsswcb.texas.gov/>)

---

### ***3.2.1.3.2 Management of Vegetation to Reduce BASH Potential***

The purpose of the BASH Program is to manage the hazard associated with collisions between wildlife and aircraft. The NASCC BASH Instruction was revised in February 2013 (Naval Air Station Corpus Christi Instruction [NASCORPCINST] 3750.16A) (Appendix B), and covers activities conducted at all of the Installation airfields. The Bash Instruction includes information for implementing a bird hazard warning system, wildlife hazard reporting protocols, wildlife detection and dispersal team procedures, BASH dispersal equipment, land management procedures, and guidance for managing off-base land use. Additionally the USDA prepared a Wildlife Hazard Assessment to help mitigate wildlife risks on the airfield (USDA 2012). The BASH Program should promote the use of BMPs to ensure aviation safety through a proactive approach of managing potential wildlife hazards and raising awareness of potential collisions.

The NASCC BASH Reduction Plan covers all four of the Installation airfields (Navy 2011). The purpose of this plan is to identify areas on or near Installation properties that are attractants for wildlife habitation, and to establish active and passive techniques to decrease airfield attractiveness to birds and other wildlife that may cause an aviation hazard.

Per DoDI 4165.67 Clear Zones are required to be maintained at the end of all runways for aircraft safety. This includes cutting or topping trees, shrubs, brush, or other forms of obstructions to ground level, where DoD determines these obstructions would interfere with the operation of aircraft, including emergency landings.

#### ***Issue***

The Installation has a large wildlife population and is located within the Central Flyway, a major migratory bird route. During a 10-year (2000–2009) study of Navy facilities, the greatest number of bird strikes (642) occurred at the Installation (Navy Safety Center 2009). Daily animal movements in the vicinity of the airfields create various hazards to aircraft. The conditions that attract birds and wildlife, and the potential for strikes varies among the Installation airfields, due to their location and habitats. For instance, birds may flock to an airfield or may cause hazards en route; hazards may be seasonal or year round; bird activity may change as area crop production and rotations change, as sanitary landfills are opened or expanded, or as wildlife refuges are established or improved. Management of vegetation to reduce the attractiveness to wildlife species that may pose a BASH risk is a primary component of the Installation's BASH Program, and is a key management strategy to reduce BASH potential.

#### ***Goals and Objectives***

As directed by SAIA, natural resources must not conflict with the installation's military mission. A major goal of this INRMP is to provide a plan for enhancement of the natural resources at the Installation. Many options for natural resources enhancement exist, but many of these techniques, if done without consideration of aircraft operations, could increase the potential for BASH. The Navy intends to continue to manage Installation vegetation in accordance with BASH program requirements and INRMP recommendations. It may initially appear that the BASH Program is counterproductive to the environmental stewardship demanded in the SAIA and other environmental enactments; however, for safety reasons the BASH Program must

decrease an airfield's attractiveness to birds and wildlife that have the potential for becoming involved in an aircraft strike.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.5:** Maintain vegetation to reduce BASH potential.

**Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for management of vegetation to reduce BASH potential.

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 7 – Habitat Management and Restoration**

#### **Management Strategies**

Management strategies related to vegetation management to reduce BASH potential at the Installation include the following.

1. Conduct careful management of wetlands and open water located in proximity to the Installation airfields in order to reduce their potential to attract wildlife and contribute to BASH.
2. Schedule mowing around the airfield when grass height approaches high end and mow grass to low end of height threshold. Mowing schedule and restrictions are included in grounds maintenance contracts, which require grasses around the airfields be mowed to a height of less than the recommended range of 7–14 in (18–36 cm).
3. Map habitat types around the airfield using a global positioning system (GPS) unit and enter information into the GIS database.
4. Coordinate implementation of any INRMP projects that have the potential to conflict with BASH Program requirements, including vegetation conversion actions, with the NASCC Air Operations Officer responsible for implementing the BASH Program.
5. In accordance with BASH Program requirements, the USDA Wildlife Biologist will inform Navy personnel responsible for maintaining the NASCC database of incidents with any BASH incident data.
6. The USDA Wildlife Biologist will conduct a BASH training workshop for staff members, and provide refresher training as needed.

7. In accordance with BASH Program requirements, the NASCC Air Operations Officer will procure and maintain BASH response equipment (i.e., propane cans, electronic scare devices, calls).

### ***Long-term Management***

The Bird Hazard Working Group (BHWG) was established to implement and monitor the BASH Program; collect, compile, and review wildlife hazard data; and to recommend actions in land and wildlife management and/or operational procedures to reduce wildlife hazards to aircraft. BHWG is a local committee of base, community citizens, and unit offices concerns with bird hazards, which executes and makes recommendations for the NASCC BASH Program; its members include civilian and military personnel from various departments. In accordance with the requirements of the NASCC 2013 BASH Instruction, the BHWG shall meet quarterly, or as needed, to review wildlife hazard data and discuss possible solutions. The BHWG is responsible for disseminating wildlife activity data as provided by the BASH Coordinator. The NASCC Commanding Officer is responsible for the BASH Program and is the approving authority for all recommended modifications to the plan.

Land management projects such as those that manage vegetation, surface water, and other natural features will aid in the long-term reduction of BASH risks. Likewise, BASH risks will decline over time by effectively managing wildlife and obtaining, storing, and utilizing information on the distribution and abundance of BASH hazards to form effective wildlife management actions.

### ***Integration with Other Natural Resources Management Activities***

- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain appropriate grass heights around airfields to reduce BASH potential.
- Agricultural outleasement management, Section 3.2.1.4 – monitor crop selection in agricultural outlease areas to ensure FAA regulations are being followed in regards to crop selection, and as identified in agricultural outlease contracts.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – manage wildlife habitats to reduce BASH potential around airfields, and enhance wildlife habitat in consideration of BASH Program requirements.
- Fisheries and aquatic species management, Section 3.2.2.3 – manage fish and aquatic species habitats to reduce BASH potential.
- Outdoor recreation management, Section 3.2.3 – establish outdoor recreation activities in consideration of BASH Program requirements.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of fish and wildlife habitat in consideration of BASH Program requirements.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to identify fish and wildlife habitats and other natural resources that need to be managed in consideration of BASH Program requirements.

---

### ***Ecosystems Management***

The BASH potential will be reduced by managing wildlife on undeveloped, semi-developed, and developed areas around the airfields and within habitats of the Installation. By tracking BASH-related airfield incidents using a georeferenced data set, including information on habitat types at and near each incident's location, a more complete understanding of risks and potential causes of strikes can be developed, leading to more effective management actions.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Management of Vegetation to Reduce BASH Potential***

- DoDI 4165.67, Revitalizing Base Closure Communities—Base Closure Community Assistance, requires clear zones be maintained at the end of all runways. This includes cutting or topping trees, shrubs, brush, or other forms of obstructions to ground level, where DoD determines these obstructions would interfere with the operation of aircraft, including emergency landings.
- DoDI 4715.03, Natural Resources Conservation Program, implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.
- SAIA, USC 670a-f, promotes effectual planning, development, maintenance, and coordination of wildlife, fish, and game conservation and rehabilitation on military lands.
- Commander, Navy Installations Command (CNIC) CNICINST 3700, Navy BASH Program Implementing Guidance, establishes policy and procedures for implementing the CNIC BASH Program, establishes mandatory BASH event reporting and remains collection procedures, and establishes BASH program procedures.
- Commander, Navy Installations Command, BASH Manual, presents additional recommended policies, procedures, and instructional material to serve as an aid to CNIC shore aviation commands in developing local BASH policies and related personnel training programs; and identifies key BASH statutory and regulatory requirements, and provides advisory information for management of Navy airfields.
- OPNAVINST 3750.6, Naval Aviation Safety Program, issues policies and provisions of the Naval Aviation Safety Program.
- OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.
- NASCORPCINST 3750.16A, NAS Corpus Christi BASH Instruction, provides guidance that will minimize wildlife hazards on and around the airfield that pose a threat to aviation safety.
- Federal Aviation Authority (FAA), Advisory Circular 150/5200-32A, Reporting Aircraft Wildlife Strikes, explains the importance of reporting collisions between aircraft and wildlife (i.e., wildlife strikes), and examines recent improvements in the FAA's Bird/Other Wildlife Strike Reporting system; how to report a wildlife strike; what happens to the wildlife strike report data; how to access the FAA National Wildlife Aircraft Strike Database; and the FAA's Feather Identification program.

- FAA, Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.

#### ***Additional Sources of Information***

- FAA, Airport Safety and Operations Division ([http://www.faa.gov/about/office\\_org/headquarters\\_offices/arp/offices/aas/aas300/](http://www.faa.gov/about/office_org/headquarters_offices/arp/offices/aas/aas300/))
- FAA, Wildlife Strike Database (<https://wildlife.faa.gov/>)
- FAA, Wildlife Hazard Mitigation ([https://www.faa.gov/airports/airport\\_safety/wildlife/](https://www.faa.gov/airports/airport_safety/wildlife/))
- DoD PIF BASH Planning ([https://www.partnersinflight.org/working\\_groups/dod-pif/](https://www.partnersinflight.org/working_groups/dod-pif/))
- Air Force Safety Center (<https://www.afsc.af.mil/organizations/bash/>)

#### ***3.2.1.3.3 Invasive Plant and Noxious Weed Management***

An invasive plant is defined as an alien species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health. The definition of invasive species is expanded for natural areas to include aggressive plants that produce a significant change in terms of species composition, community structure or ecosystem function. A noxious weed is a plant that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the U.S., the public health, or the environment. Although introduced grasses can provide suitable forage for livestock and some species of wildlife with proper management, introduced grass species typically develop into monotypic stands of vegetation that do not provide high quality grassland habitat or short grass prairie habitat that can support a diversity of wildlife species.

The NASCC Exotic Species Management Plan provides management recommendations for reducing or controlling nuisance and invasive plant infestations and invasions, specifically for populations of Brazilian pepper, chinaberrytree, Chinese tallow, and guineagrass at the Main Station, NOLF Cabaniss, and NOLF Waldron (Wiemers et al. 2007). The NASCC Exotic Species Management Plan describes the geographic location of infestations of these species and provides management recommendations for use in reducing or controlling invasive plant infestations and invasions. These species have been identified as those that have the highest need for control; however, other invasive, introduced, and exotic species are known to occur at the Installation.

#### ***Issue***

Flora surveys for Installation properties have identified 22 species at the Main Station, 23 species at NOLF Cabaniss, 11 species at NOLF Waldron, and 11 species at NOLF Goliad that are considered introduced or invasive (Texas A&M University – Corpus Christi 2012, Woodin et al. 2010, Hickman et al. 2007, Wiemers et al. 2007, Navy 2006b, and TPWD 1992). The 2007 NASCC Exotic Species Management Plan does not cover NOLF Goliad and should be updated to document locations of invasive and introduced species populations and control recommendations for this property. Additionally, the 2007 population data should be updated for

the Main Station, NOLF Cabaniss and NOLF Waldron to identify effectiveness of controls that have been implemented since adoption of the plan, as well as identify any new species or populations that are recommended for control. A 2016 survey of NASCC shoreline habitat recorded invasive species including Brazilian peppertree, Chinaberrytree, tamarisk, white lead tree, buffelgrass, giant reed, and guineagrass. Invasive species were not detected where tidal waters occurred and inundated the area for significant time (Texas A&M 2017). Approximately 19 acres of shoreline were subsequently treated to remove woody exotics and restore the habitat (Texas A&M 2018b).

### ***Goals and Objectives***

DoDI 4715.03 calls for the control and removal of exotic species where appropriate and defines exotic species as “species that occur in a given place, area, or region as the result of direct or indirect, deliberate or accidental introduction of the species by human activity.” Exotic plants and animals are those species that are brought into an area from outside the immediate area and have adapted or are managed to ensure their survival in the area.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.

### ***Projects and Management Strategies***

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for invasive plant and noxious weed management.

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

---

## **Project No. 7 – Habitat Management and Restoration**

### **Management Strategies**

Management strategies related to control of invasive plants and noxious weeds at the Installation include the following.

1. Manage invasive species at Installation by mowing, cut-stump, chemical control (e.g., basal bark application of herbicides), and removal by mechanical or manual means, or a combination of control methods used to control exotic and invasive species.
2. Control and eradicate non-native species of plants and replace them with regionally native plants to restore wildlife habitat and native ground cover.
3. Ensure that the use of herbicides to remove invasive and exotic plants is conducted in accordance with federal and state laws regulating the laws of pesticides.

### ***Long-term Management***

The Installation NRM will use an adaptive approach to manage exotic and invasive plants and will explore alternative ways to meet management objectives, predict the outcomes of each alternative based on the current state of knowledge, implement one or more of these alternatives, and use the results to increase knowledge and adjust management actions. In cases where resources such as time, money, and staff are limited, management planning will ensure that the Installation uses resources wisely to manage exotic and invasive plants for the long term. Navy Applied Biology (under NAVFAC) writes the Integrated Pest Management Plan and the Installation currently has an Integrated Pest Management Plan in place (NAVFAC 2012) that is focused on removal of wildlife pests. Currently control of invasive and introduced flora is conducted in accordance with the 2007 NASCC Exotic Species Management Plan.

Guineagrass is an aggressive invader that occurs at the Main Station and NOLF Cabaniss (Wiemers et al. 2007). This invasive species can pose a severe fire threat under dry conditions because of its heavy, clumping growth habit and growth to heights of greater than 6 ft (1.8 m) (Navy 2006b). Invasive/exotic species mapping efforts that are conducted at the Installation should include identification and documentation of populations of guineagrass.

### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – control invasive plants and noxious weeds which have the potential to impact the natural diversity of wetland flora, and alter the natural hydrology of wetland habitats.
- Water quality management, Section 3.2.1.1.3 – use appropriate BMPs when conducting invasive plant and noxious weed control to stabilize soils; and reduce use of herbicides to minimize impacts to water quality.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – conduct invasive plant and noxious weed control, and use native plant species in landscaping management.
- Rare, threatened, and endangered plant species management, Section 3.2.1.7 – control invasive plants and noxious weeds that compete with rare, threatened, and endangered plant species; and that impact diversity of natural communities.



- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management for control of invasive plants and noxious weeds.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to identify and monitor populations of invasive plants and noxious weeds; and restoration projects.

### ***Ecosystems Management***

Invasive plant and noxious weed management is consistent with an ecosystems approach since it relies on the functions and characteristics of native plant species to reduce the demand for irrigation, fertilizers, and pesticides. Control and reduction of invasive plants and noxious weeds will help to restore wildlife habitat and ground cover at the Installation, and will limit the spread of these species to areas in the region.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Invasive Plant and Noxious Weed Management***

- DoDI 4715.03, Natural Resources Conservation Program, requires the control and removal of exotic species where appropriate and encourages the use of beneficial techniques such as using regionally native plants; using construction practices that minimize adverse effects on the natural habitat; preventing pollution by reducing fertilizers and pesticides, using Integrated Pest Management (IPM) techniques, recycling green waste, and minimizing runoff; using water-efficient practices; and creating outdoor demonstrations incorporating native plants, as well as pollution prevention and water conservation techniques, to promote awareness of the environmental and economic benefits of implementing this directive.
- National Invasive Species Act, 16 USC 4321, prescribes policies to prevent the introduction and spread of non-indigenous species into U.S. waters.
- Federal Insecticide, Fungicide and Rodenticide Act, 7 USC 136, governs the use and application of pesticides in natural resources management plans.
- 1994 President's Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds, 60 FR 40837, emphasizes the use of beneficial landscape practices as defined above.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- EO 13148 (21 April 2000), *Greening the Government through Leadership in Environmental Management*, mandates that environmental management considerations must be a fundamental and integral component of federal government policies, operations, planning, and management and that sustainable management is pursued through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment.
- OPNAVINST 5090.1D, 12-3.10, prohibits the introduction of exotic species into a natural ecosystem and requires control or eradication of exotic species and noxious weeds on federal lands.

### ***Additional Sources of Information***

- USDA, National Invasive Species Information Center, Texas State Resources (<https://www.invasivespeciesinfo.gov/us/texas>)
- TPWD, Exotic and Invasive Species (<https://tpwd.texas.gov/huntwild/wild/species/exotic/>)
- TPWD, Nuisance Aquatic Vegetation ([https://tpwd.texas.gov/landwater/water/environconcerns/nuisance\\_plants/](https://tpwd.texas.gov/landwater/water/environconcerns/nuisance_plants/))
- Society for Ecological Restoration (<https://www.ser.org/>)
- Center for Plant Conservation (<http://www.centerforplantconservation.org/>)
- Native Texas Nurseries (<https://npsot.org/wp/resources/finding-natives/>)
- Texas Invasives (<https://www.texasinvasives.org/>)
- Native Plant Society of Texas (<https://npsot.org/wp/>)
- TNC, Protecting Native Plants and Animals (<https://www.nature.org/en-us/what-we-do/our-priorities/protect-water-and-land/>)
- Lady Bird Johnson Wildflower Center (<https://www.wildflower.org/>)

#### ***3.2.1.3.4 Grounds Maintenance and Landscaping Management***

Grounds maintenance and landscaping management is defined as landscaping design, construction practices, and pest management intended to enhance wildlife habitat, control soil erosion and NPS water pollution, and generate long-term cost savings.

#### ***Issue***

Management issues related to grounds maintenance at Installation include reducing expenditures needed for grounds maintenance activities, and reducing NPS water pollution. The hot South Texas summers and sandy soils of the Encinal Peninsula create extreme pressures on plants used in landscaping. These soils have low available water capacity and rapid permeability. This combination can lead to low availability in plant nutrients, requiring frequent and sometimes heavy addition of chemical fertilizers to maintain an acceptable cover of ornamental vegetation.

#### ***Goals and Objectives***

To the extent practicable, the exclusive use of regionally native plants for landscaping and other beneficial techniques, including using construction practices that minimize adverse effects on the natural habitat, reduce use of fertilizers and pesticides, use IPM techniques, recycle green waste, minimize runoff, use water-efficient practices, and create outdoor demonstrations to promote awareness of the benefits of implementing sustainable and environmentally beneficial grounds maintenance and landscaping management will be implemented at NASCC.

EO 13148, *Greening the Government Through Leadership in Environmental Management*, required federal agencies to reduce the use of selected toxic chemicals, hazardous substances, and pollutants, including fertilizers and pesticides by 50 percent by 31 December 2006. Within

---

the past few years (exact date not known) the Installation achieved this 50% reduction goal, and has been maintaining requirements of EO 13148 since that time (Mitton 2013d).

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.8:** Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for grounds maintenance and landscaping management.

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 7 – Habitat Management and Restoration**

#### **Management Strategies**

Management strategies related to grounds maintenance and landscaping at the Installation include the following.

1. Use regionally native plant species and beneficial landscaping practices to the extent practicable. Use supplemental plantings of native trees and shrubs in maintained open areas and around building and recreational areas where consistent with current and planned land uses and the NASCC BASH Program, to help enhance habitat diversity, control erosion, and meet wildlife management objectives. Native trees, shrubs, and herbaceous species should be selected that are adaptable, drought tolerant, and conserve water.
2. Avoid application of fertilizers because increased nutrients may result in colonization by more aggressive, nutrient demanding species. When nutrients are added to the system either by exposing new soil or through fertilization, optimum growing conditions for the specialized target flora are compromised.
3. Preserve ground cover and natural drainage, using drainage channels and retention ponds instead of a closed, expensive system.
4. Use native plant material instead of manmade controls for controlling erosion.

5. Use native groundcover and shrubs instead of turf wherever possible to reduce maintenance and irrigation requirements.
6. Revegetate disturbed areas with indigenous plant materials that promote wildlife habitat (where compatible with the BASH Program) and minimize erosion and runoff. Although Bermuda grass is listed in seed mixtures, this species and other introduced species should be avoided as much as possible.

### ***Long-term Management***

The potential exists for disturbances to wildlife habitat and NPS pollution to occur during grounds maintenance and landscaping. This potential can be reduced by designing grounds maintenance and landscaping management strategies that help to minimize capital costs, maintain an ecological balance within the region, minimize engineering requirements, and enhance the living environment and the aesthetic qualities of Installation.

The hot South Texas summers and sandy soils of the Encinal Peninsula create extreme pressures on plants used in landscaping, resulting in soils that have low available water capacity and rapid permeability. This combination can lead to low availability in plant nutrients, requiring frequent and sometimes heavy addition of chemical fertilizers to maintain an acceptable cover of ornamental vegetation. The choice of plants used in landscaping has a direct effect on expenditures allocated for grounds maintenance. Using ornamental plants that are not adapted to the humid subtropical climate of the Corpus Christi Bay area requires increased irrigation to prevent the loss of plants to water stress. Regionally native plants are better able to survive the extremes in rainfall and temperature of the region within and among years, while maintaining an acceptable appearance during those extremes. Regionally native plants are less likely to be nutrient limited, which would reduce the need for application of chemical fertilizers and grounds maintenance expenditures, as well as reduce the potential for NPS water pollution to occur. Regionally native plants also are more resistant to diseases and pests found in the area, and use of these plants can reduce pest management costs, and costs associated with replacement of dead or dying ornamental vegetation.

Although the Installation Grounds Maintenance Services Contract requires palm trees in all family housing areas at the Main Station to be pruned between 1 July and 31 October, the pruning schedule was changed in 2006 so as not to conflict with the successful rearing of young (pups) by southern yellow bats, which roost in the dead palm fronds and give birth to bat pups from April to May. TPWD and Bat Conservation International guidance recommends delaying pruning until August each year to ensure potential impacts to young bats that are unable to fly are avoided. In addition to these measures, the frequency of pruning also should be reviewed to determine whether less than annual pruning of palms will still meet aesthetic needs (Navy 2006b).

Present grounds maintenance practices keep grasses around the airfields mowed to a height of less than the recommended range of 7–14 in (18–36 cm). This height recommendation is in place to make the open grass areas surrounding runways unattractive to birds. Short open grass areas provide suitable foraging areas for many species of birds, and frequent mowing promotes more grass seed production in comparison to less frequent mowing. Implementation of a less-frequent mowing regime should be considered in accordance with BASH habitat recommendations. In

addition to reducing the BASH potential around airfields, a reduction in mowing frequency also would result in a reduction in grounds maintenance expenses associated with mowing incurred by the Navy (Navy 2006b).



*Gulf Winds Golf Course, Main Station*

Source: L. Rivard

The 18-hole Gulf Winds Golf Course is situated in the middle of the Main Station. As a rule, golf courses are exceptionally water- and chemical-consumptive. The Audubon Cooperative Sanctuary Program (ACSP) for Golf provides advice for existing golf courses on conducting proactive environmental projects. This program was created by Audubon International and is sponsored by the U.S. Golf Association. Goals of the program include the enhancement of wildlife habitats on existing golf

courses, and encouragement of active participation in conservation programs by golfers, course superintendents and officials, and the general public. The ACSP encourages habitat enhancement, establishment of IPM programs, and protection of water resources. It currently is not feasible for the Installation to participate in the ACSP, as this would directly conflict with BASH goals, and furthermore would be in direct violation of FAA guidelines for BASH programs.

EO 13112 *Invasive Species* instructs federal agencies to provide for restoration of native species and habitat conditions in ecosystems that have been invaded by exotic species. It also instructs against authorization, funding, or implementation of actions likely to cause or promote the introduction or spread of invasive species. The present landscaping scheme on the Installation is dominated by large expanses of frequently mowed lawns dotted with a few species of palms, non-native ornamental shrubs, and small- to medium-sized trees. Native species will be used in the landscaping program at the Installation. As a component of native plant use in the landscaping program, the NRM will investigate the potential for implementation of a prairie restoration project on NOLF Cabaniss.

TPWD's Wildscapes Program is a habitat restoration plan for rural and urban settings designed to increase heterogeneity in landscaping to provide food, water, and shelter for native wildlife. Creating 'backyard habitat' by replacing lawn areas with native species provides wildlife habitat and decreases maintenance costs. Not only do most native plants require less water and fertilizer, they also attract a variety of wildlife, which may in turn decrease the need for pesticide use by functioning as natural insect controls. The NRM will work with the TPWD Wildlife Diversity Program to develop one or more wildscapes at the Installation where consistent with BASH Program requirements. Once these wildscapes are established, the Installation will register with the Wildlife Diversity Program to receive a certificate and weatherproof sign designating the site as a certified Texas Wildscape site. A list of native landscaping plants and local nurseries for the Installation is provided in Appendix E. Appendix R of the South Texas Plain Wildlife

---

Management Plan contains a Texas Wildscapes native plant list for the South Texas Plains (TPWD 2010).

### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – maintain vegetative buffers around wetlands and surface waters, and avoid vegetation clearing and ground-disturbing activities that could impact surface water quality or cause erosion and sedimentation into surface waters.
- Water quality management, Section 3.2.1.1.3 – avoid impacts to surface waters from stormwater runoff, erosion, and sedimentation associated with grounds maintenance and landscaping, including minimizing use of herbicides, pesticides, and fertilizers to protect water quality.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – maintain grass heights in the vicinity of Installation airfields to reduce BASH potential.
- Invasive plants and noxious weeds management, Section 3.2.1.3.3 – conduct invasive plant and noxious weed control, and use native plant species in landscaping management; and minimize use of herbicides.
- Agricultural outleasement management, Section 3.2.1.4 – maintain grass heights around agricultural outlease areas located in the vicinity of Installation airfields to reduce BASH potential.
- Rare, threatened, and endangered plant species management, Section 3.2.1.7 – conduct grounds maintenance and landscaping activities in consideration of management requirements for protection of rare, threatened, and endangered plant species locations.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management of grounds maintenance and landscaping activities; including management of rare, threatened, and endangered plant species.

### ***Ecosystems Management***

Proper grounds maintenance and landscaping through construction and design practices is consistent with an ecosystems approach since it reduces the need for irrigation, pesticides, and fertilizers, and relies on the functions and characteristics of native plant species. Reducing the demand for irrigation, fertilizers, and pesticides reduces the costs associated with grounds maintenance and reduces pollutant loading into runoff and surrounding surface waters and aquatic communities.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Grounds Maintenance and Landscape Management***

- DoDI 4715.03, Natural Resources Conservation Program, states that each installation shall, to the extent practicable, use regionally native plants for landscaping and other beneficial techniques, including planting regionally native plants, using construction practices that minimize adverse effects on the natural habitat, reducing fertilizers and pesticides, using IPM techniques, recycling green waste, minimizing runoff, using water-

efficient practices, and creating outdoor demonstrations to promote awareness of the benefits of implementing this directive.

- 60 FR 40837, the President's 16 April 1994 Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds, provides guidance developed by the interagency workgroup under the direction of the Federal Environmental Executive to assist federal agencies in the implementation of environmentally and economically beneficial landscape practices, and requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.
- EO 13148 (21 April 2000), *Greening the Government through Leadership in Environmental Management*, mandates that environmental management considerations must be a fundamental and integral component of federal government policies, operations, planning, and management and that sustainable management is pursued through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment.
- Federal Insecticide, Fungicide and Rodenticide Act, 7 USC 136, governs the use and application of pesticides in natural resources management plans.
- Federal Water Pollution Control Act, as amended by CWA of 1977, 33 USC 1251 prohibits the discharge of dredged or filled materials into waters of the U.S., including wetlands, without first obtaining a permit from the USACE (Section 404 of the CWA).
- OPNAVINST 5090.1D, 12-3.8(e), discusses natural resources management relating to environmentally and economically beneficial landscaping.
- FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.

#### ***Additional Sources of Information***

- TPWD, Wildlife Diversity Program ([https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/about/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/about/))
- TPWD, Wildscapes Program ([https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/wildscapes/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/wildscapes/))
- Society for Ecological Restoration (<https://www.ser.org/>)
- Native Texas Nurseries (<https://www.nativetx.com/>)

#### **3.2.1.4 Agricultural Outleases Management**

Agricultural outlease areas are those areas on which an agricultural lease may exist. These areas may be designated for production of hay or row crops, or for livestock grazing. Agricultural outlease areas have the potential to provide food for many types of birds during different seasons and conditions of the fields. The control of the types of crops planted in the outleasing program is important to both the migratory birds and the primary mission and safety at the Installation;

however currently no crop restrictions are in place for the various agricultural outleases associated with NASCC properties.

The TSSWCB is the lead Texas agency for oversight of agricultural and silvicultural NPS pollution abatement.

### ***Issue***

Agricultural outleases at the Installation include lands leased for livestock grazing, hay production, and row crop production, and are located in multiple areas of the Installation properties, with the exception of the Main Station (or at Peary Place Transmitter Site). The Installation leases acreage to private individuals at NOLF Cabaniss and NOLF Waldron for agricultural purposes. Agricultural outleases at NOLF Cabaniss includes approximately 116 ac (46.9 ha) of land leased for hay production and approximately and 40 ac (16.2 ha) of land located in the Clear Zone leased for row crop production. Three separate leases for grazing cattle and horses totaling 64 ac (25.9 ha) are located in the Clear Zone areas at NOLF Waldron. The Navy recently designated approximately 500 ac (202 ha) of NOLF Goliad as agricultural outlease lands, that will include hay production within areas surrounding the runways at this site. This parcel is currently being mowed and will have herbicide applications in the spring of 2014 to prepare the designated lands for agricultural outleasing.

The primary objective of maintaining the Clear Zones free of trees and large shrubs around Navy airfields is to facilitate development in and around Navy air installations that is compatible with noise and safety hazards associated with aircraft operations. Agricultural outleasing parcels must remain consistent with BASH reduction guidelines including restrictions on the types of crops that can be planted; however, there are no crop restrictions in place for the various agricultural outlease contracts associated with NASCC parcels.

To ensure protection of water quality and compliance with BASH Program requirements, development of conservation protection standards and evaluation of agricultural outleases for compliance with these requirements and standards is needed. If necessary to protect natural resources and ensure airfield safety, the agricultural outlease agreements that have been established at the Installation should be modified to ensure compliance with the BASH Program and conservation protection standards should be developed. Modifications to these outlease agreements may include crop restrictions and requirements, and limitations on the use of agricultural herbicides and pesticides.

### ***Goals and Objectives***

DoDI 4715.03 requires that all installations assess lands for agricultural outlease suitability. Any such uses shall support the military mission, be addressed in and be compatible with the INRMP, and be consistent with long-term ecosystem-based management goals that place ecological sustainability objectives above revenue optimization goals. Each agricultural outlease requires adherence to a conservation plan, the Installation's IPM plan that details BMPs to sustain natural resources, and the BASH Program. The use of pesticides and herbicides shall be limited whenever possible.



---

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.
- Objective 1.5:** Maintain vegetation to reduce BASH potential.
- Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.
- Objective 1.8:** Implement environmentally beneficial and cost-effective landscaping and grounds maintenance practices.
- Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, EOs, regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

- Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

***Projects and Management Strategies***

**Project (detailed in Appendix K)**

Participation in the following project will support the goals and objectives established for agricultural outleases management.

**Project No. 8 – Natural Resources Outreach**

**Management Strategies**

Management strategies related to agricultural outleases at the Installation include the following.

1. Regularly review all existing and future agricultural outleases to ensure that there are no conflicts between natural resources management recommendations made in this INRMP and the agricultural outlease contracts, especially in regards to crop selection and the use of pesticides/herbicides.
2. Ensure that all agricultural outleases are updated as required by FAA guidelines or DoD instructions.

3. Consider haying versus planting of certain types of row crops in the agricultural outlease areas with regard to the BASH Program requirements. Evaluate whether agricultural outlease areas should be transitioned out of crop production and included as part of the Installation's mowing contract, or if crop restrictions should be established as part of the agricultural outlease contracts.

### ***Long-term Management***

In managing agricultural outleases, the Installation will continue to prioritize ecological sustainability objectives above revenue optimization goals as directed by DoDI 4715.03. This is consistent with long-term ecosystem-based management of natural resources since it emphasizes conservation and restoration through reduction in demand for irrigation and pesticides, and reduces BASH potential.

### ***Integration with Other Natural Resources Management Activities***

- Water quality management, Section 3.2.1.1.3 – reduce use of herbicides, pesticides, and fertilizers to minimize impacts to water quality.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – monitor crop selection in agricultural outlease areas to ensure FAA regulations are being followed, and as identified in agricultural outlease contracts; and maintain grass heights around the Installation airfields to reduce BASH potential.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – maintain appropriate grass heights around agricultural areas located in the vicinity of the Installation airfields to reduce BASH potential.
- Rare and sensitive ecosystems management, Section 3.2.1.6 – restrict mowing and herbicide applications within the 17-ac (7-ha) area located north of the fire station for protection of bracted blazing star, and to allow for mature seeds to develop.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – monitor crop selection in agricultural outlease areas to ensure FAA regulations are being followed, and as identified in agricultural outlease contracts to reduce BASH potential.
- BASH reduction, Section 3.2.2.4 – monitor crop selection in agricultural outlease areas to ensure FAA regulations are being followed, and as identified in agricultural outlease contracts; and maintain grass heights around the Installation airfields to reduce BASH potential.
- Integrated ecosystems management and partnering, Section 3.2.4 – collaborate with appropriate agencies to remain current on DoD, FAA, and Navy policies related to agricultural outleases.

### ***Ecosystems Management***

Managing agricultural outleases to limit the use of pesticides/herbicides, inclusion of conservation protection standards, and to decrease the likelihood of BASH incidents is consistent with an ecosystems approach since it promotes long-term ecological sustainability above revenue optimization.

Much of the outleased land at NOLF Waldron supports the live oak-redbay vegetation community (Section 3.2.2.1 provides additional information on the benefits of this habitat type to wildlife). One of the past agricultural outleases that was in place at NOLF Waldron encouraged the lessee to remove brush as part of their contractual management responsibilities; however, this lease has since been modified to discourage the current lessee and future lease holders from removal of brush within this ecologically sensitive location. The USFWS may be able to provide assistance in educating lessees regarding the importance of native brush to migrating neotropical birds. With each lease renewal, information should be provided to lessees that assists them with identifying and distinguishing valuable brush species from less desirable or undesirable species.

***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Agricultural Outleases Management***

- Federal Water Pollution Control Act, as amended by the CWA of 1977, 33 USC 1251, describes guidelines for the control of NPS pollution.
- Federal Insecticide, Fungicide and Rodenticide Act, 7 USC 136, governs the use and application of pesticides in natural resources management plans.
- Armed Forces, Leases; non-excess property of military departments and Defense Agencies, 10 USC 2667, provides general requirements for leasing certain lands that will promote national defense or be in the public interest.
- EO 12088 (13 October 1978), *Federal Compliance with Pollution Control Standards*, as amended, ensures that all necessary actions are taken to prevent, control, and abate environmental pollution with respect to federal facilities and activities under control of the agency.
- DoDI 4715.03, Natural Resources Conservation Program, requires that all agricultural outleases support the military mission and place ecological sustainability objectives above revenue optimization goals.
- Commander, Navy Installations Command CNICINST 3700, Navy BASH Program Implementing Guidance, establishes policy and procedures for implementing the CNIC BASH Program, establishes mandatory BASH event reporting and remains collection procedures, and establishes BASH program procedures.
- Commander, Navy Installations Command, BASH Manual, presents additional recommended policies, procedures, and instructional material to serve as an aid to CNIC shore aviation commands in developing local BASH policies and related personnel training programs; and identifies key BASH statutory and regulatory requirements, and provides advisory information for management of Navy airfields.
- OPNAVINST 3750.6, Naval Aviation Safety Program, issues policies and provisions of the Naval Aviation Safety Program.
- FAA, Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.

### ***Additional Sources of Information***

- FAA, Airport Safety and Operations Division ([https://www.faa.gov/about/office\\_org/headquarters\\_offices/arp/offices/aas/aas300/](https://www.faa.gov/about/office_org/headquarters_offices/arp/offices/aas/aas300/))
- FAA, Wildlife Hazard Mitigation ([https://www.faa.gov/airports/airport\\_safety/wildlife/](https://www.faa.gov/airports/airport_safety/wildlife/))
- FAA, Wildlife Strike Database (<https://wildlife.faa.gov/>)
- USDA, APHIS Wildlife Services (<https://www.aphis.usda.gov/aphis/home/>)
- USDA, National Conservation Practice Standards (<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/rangepasture/>)
- Conserving Biodiversity on Military Lands ([http://www.dodbiodiversity.org/ch5/index\\_6.html](http://www.dodbiodiversity.org/ch5/index_6.html))
- Sustainable Agriculture Network (<https://www.sare.org/>)

#### **3.2.1.5 Wildland Fire Management**

Prescribed fires are a management tool used to reduce forest fuels that could generate a high intensity fire and destroy natural resources. Prescribed fires conducted during the growing season (summer) are typically used to reduce midstory hardwood trees and encourage the reproduction and growth of herbaceous vegetation. Prescribed fires conducted to reduce fuel loads are generally conducted during the dormant season (winter) when temperatures are lower and the weather is more predictable. Dormant season burns also minimize damage to desirable vegetation. Management of any wildfire and/or human-caused ignition will be evaluated on a case-by-case basis to determine if the fire should be controlled or allowed to burn out.

DoD has recently adopted the National Wildfire Coordination Group's Federal Wildland Fire Policy to govern all wildland fire activities carried out by DoD personnel. DoD is presently exploring the possibility of seeking membership in the National Wildfire Coordination Group. The National Wildfire Coordination Group is made up of all federal agencies (except DoD) with wildland fire responsibilities and the National Association of State Foresters. The Federal Wildland Fire Policy requires that all personnel involved in prescribed fire and/or wildfire activities meet certain training and physical qualifications. DoD is presently reviewing how it will implement this requirement. Some military installations have already implemented this requirement with most of them making it mandatory for new hires and positions, and voluntary for current employees.

#### ***Issue***

To decrease the risk of wildland fires and maintain the vegetation and habitat necessary to reduce the BASH potential, it is recommended that the Installation develop a wildland fire management plan for conducting prescribed burns at NASCC to reduce the risk of wildland fires. In addition to reducing the potential for wildland fires, prescribed burns also could be used to support vegetation management in support of the BASH Program, enhance native plant diversity through control of unwanted vegetation, and improve wildlife habitat in appropriate areas.

---

### *Goals and Objectives*

Manage lands using wildland fire management to decrease wildfire risk and maintain vegetation and habitat necessary to reduce the BASH potential at the Installation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.5:** Maintain vegetation to reduce BASH potential.

**Objective 1.6:** Maintain vegetation to reduce wildland fire hazards.

**Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.

**Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.

**Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for wildland fire management.

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 7 – Habitat Management and Restoration**

#### **Management Strategies**

Management strategies related to wildland fire at the Installation include the following.

1. Maintain vegetation to reduce wildland fire hazards and BASH potential.
2. Control wildland fires with fire breaks and understory vegetation management.

3. Implement prescribed burns where consistent with the mission, sound ecological practices, and safety considerations.

### ***Long-term Management***

The development and implementation of a wildland fire management plan for Installation will provide for the long-term management of wildland fire and prescribed burns, and allow for vegetation maintenance to reduce BASH risk.

### ***Integration with Other Natural Resources Management Activities***

- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – maintain appropriate grass heights around Installation airfields to reduce BASH risks through mowing and use of controlled burns.
- Rare, threatened, and endangered plant species management, Section 3.2.1.7 – conduct prescribed burns in consideration of rare, threatened, and endangered plant species.
- Rare, threatened, and endangered wildlife species management, Section 3.2.2.7 – improve wildlife habitat that supports rare, threatened, and endangered wildlife species through the appropriate use of controlled burns, and in consideration of BASH Program requirements.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management of natural resources in conducting prescribed burns and/or control of wildland fires.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive wildland fire training to enable participation in prescribed burns and to respond to naturally occurring wildland fires as needed.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to identify areas targeted for prescribed burns.

### ***Ecosystems Management***

Prescribed fires, implemented through an established wildland fire management plan, would provide an ecosystem-based management tool for prevention of wildfires, improvement of wildlife habitat, restoration of natural ground cover, and would assist in reduction of BASH potential. Additionally, prescribed burns can potentially benefit wintering populations of Sprague's pipit at the Installation.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Wildland Fire Management***

- The Forest Service Directive System consists of the Forest Service Manual and Handbooks, which codify the agency's policy, practice, and procedure. The system serves as the primary basis for the internal management and control of all programs and the primary source of administrative direction to Forest Service employees.
- The Guidance for Implementation of Federal Wildland Fire Management Policy provides for consistent implementation of the 1995/2001 Federal Fire Policy, as directed by the Wildland Fire Leadership Council. This guidance also calls for increased dialogue and collaboration between federal agencies and tribal, local, and state agencies as plans are

updated and implemented to manage wildfires in order to accomplish resource and protection objectives.

- DoDI 6055.6, DoD Fire and Emergency Services Program establishes a comprehensive Fire and Emergency Services Program and prescribes policies to prevent and minimize loss of DoD lives and damage to property and the environment.

#### ***Additional Sources of Information***

- U.S. Forest Service, Fire and Aviation Management (<https://www.fs.fed.us/managing-land/fire>)
- U.S. Forest Service, Fire Effects Information System (<https://www.feis-crs.org/feis/>)
- National Interagency Fire Center (<https://www.nifc.gov/>)
- Texas A&M University Forest Service, Wildlife Preparedness (<https://tfsweb.tamu.edu/WildlandUrbanInterfacePrograms/>)

#### **3.2.1.6 Rare and Sensitive Ecosystems Management**

Rare and sensitive ecosystems present at the Installation include seagrass beds at the Main Station and the oak-redbay community at the Main Station and NOLF Waldron. A 17-ac area located north of the fire station at NOLF Goliad also is being managed for the potential presence of bracted blazing star, and Critical Habitat for conservation of piping plover located at the Main Station is being preserved (see Section 3.2.2.7 Rare, Threatened, and Endangered Wildlife Species Management).

Seagrass habitat is located at the Main Station along the shorelines of Oso Bay and Laguna Madre Estuary (Figure 2-19). Seagrass beds are special aquatic sites as defined in 40 CFR 230.43, and are protected from actions that may lead to loss of values of these sites from the discharge of dredge or fill material. The loss of values from discharge of dredge or fill material may be direct (smothering vegetation) or indirect (changes in water quality that lead to loss of submerged aquatic vegetation). The seagrass beds within Corpus Christi Bay offshore of the Main Station are important habitats for fish, and are protected by the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

The coastwide Seagrass Conservation Plan for Texas has been in existence since 1996, formed by TPWD, Texas General Land Office, TCEQ, Corpus Christi and Galveston Bay National Estuary Programs, and research scientists and educators. The major components of the plan address research and management issues for Texas, environmental awareness through education and public outreach, and implementation of seagrass objectives (TPWD 1999b).

The TCELCP was approved by NOAA in 2010 pursuant to the adoption of the Appropriations Act of 2002 (Public Law 107-77). The purpose of the TCELCP is the protection of important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values; or are threatened by conversion from their natural or recreational state to other uses. Preservation and conservation of seagrass within Laguna Madre and Corpus Christi Bay, and oak-redbay forest habitat along the coast are both identified as conservation priorities in the TCELCP.

---

The oak-redbay community is considered globally rare (G2) and rare within Texas (S2), and is imperiled due to rarity (generally 6–20 occurrences) or due to other factors that make it vulnerable to extinction. The live oak (laurel oak)-redbay woodlands found throughout much of the undeveloped western part of NOLF Waldron are fairly high quality representatives of this uncommon plant community of restricted distribution in Texas (TPWD 1992). A smaller occurrence of this community can be found on the Main Station. Much of the outleased land at NOLF Waldron supports the oak-redbay vegetation community.

With the continued conversion of coastal woodlot habitat to urban use, these few, small remaining pockets of habitat become increasingly vital for the survival of many neotropical birds. This habitat provides essential shelter, resting, and foraging resources to birds during spring and fall migrations.

In accordance with the U.S. Fish and Wildlife Conservation Act (16 USC 2901 et seq.) and DoDI 4715.03, the live oak (laurel oak)-redbay community at the Main Station and NOLF Waldron is required to be managed and preserved for its uniqueness and its role in providing high-quality habitat.

To protect potential occurrences of bracted blazing star at NOLF Goliad, mowing and herbicide applications are currently being restricted within a 17-ac (7-ha) area located north of the fire station. These measures will allow mature seeds to develop, which may result in spread of current populations of *Liatris* sp. within this area. If it is determined that implementation of mowing and herbicide application restrictions within this area cannot be continued, such as due to airfield safety requirements or other activities required to support the military mission, it is recommended the area not be mowed during the critical growth period (June – December), or the protection area be relocated to another area of NOLF Goliad known to contain *Liatris* sp. **Issue**

Although seagrass beds have been recognized as highly important and productive habitats, they are often subject to natural and man-made disturbances. Such factors as brown tide, degradation of water quality, channel dredging activities, boat propeller scarring, and shoreline development are identified as contributors to the fragmentation of seagrass beds (CBBEP n.d. b). Dense algal blooms (e.g., brown tide), possibly related to anthropogenic changes in nutrient levels from point source and NPS pollution, have resulted in seagrass loss in the Upper Laguna Madre Estuary. Practically all seagrass beds have been lost from the Galveston Bay system since the late 1970s, however the net seagrass acreage in the Corpus Christi Bay/Redfish Bay area appears fairly stable over the past 40 years (Navy 2006b).

Continued increases in nutrient loading will lead to long-term or irreversible damage to estuarine resources. Detrimental impacts to this important shallow-water habitat should be of concern to natural resources managers, as the negative responses of seagrasses to nutrient enrichment is well documented and warrant immediate action to restrict the release of nutrients from point and NPS to Texas coastal waters (Navy 2006b). These points are supported by the Seagrass Conservation Plan for Texas (TPWD 1999b), and in addition to a number of state and federal regulations, it is clear that the Installation must take measures to reduce erosion, minimize pesticide use, reduce the potential for pollutant runoff into Corpus Christi Bay and the Laguna Madre Estuary.



---

When issuing permits under Section 404 of the CWA, the USACE considers the uniqueness and importance of seagrasses. Like wetlands, seagrass beds are considered “special aquatic sites” and are generally recognized as significantly influencing or positively contributing to the general overall health or vitality of an ecosystem (40 CFR 230). In addition, the Texas CMP has designated vegetated shallows (seagrass beds) as critical areas to be avoided unless there is no practicable alternative (31 Texas Administrative Code Section 501). The TCEQ also has added seagrasses as a beneficial aquatic-life use in the TSWQS.

Animal abundance within seagrass beds can be 2–25 times greater in comparison to animal abundances within adjacent unvegetated areas (Navy 2006b). Seagrass beds are recognized as vital nursery habitat for estuarine fisheries and wildlife. They also are the major source of organic biomass for coastal food webs; major biological agents in nutrient cycling and water quality processes; direct food sources for fish, waterfowl, and sea turtles; and play a major role in the stabilization of coastal erosion and sedimentation. Seagrass beds also are important biological indicators of estuarine water quality and ecosystem health. The high light requirements of seagrasses for photosynthesis make these plants susceptible to turbidity and sediment resuspension from activities that disturb seagrass beds and nearby bay and estuary bottoms.

Management of the naturally occurring seagrass beds is included in this INRMP because activities occurring on the Main Station have the potential to impact the seagrass beds that occur within the shoreline areas of this parcel, which are considered EFH by NMFS under the MSA. Any activities that may directly impact these beds will require coordination with NMFS. Natural resources management actions that reduce or prevent the risk of direct or indirect impacts, such as from polluted surface runoff to seagrass beds or sediment-disturbing activities are important to the proper management of this resource and to proper Navy stewardship of natural resources under their jurisdiction. Additional management information for EFH is provided in Fisheries and Aquatic Species Management (Section 3.2.2.3).

The TCELCP has identified conservation of live oak-redbay forests as one of their eight conservation priorities, largely because this habitat supports a high diversity of resident wildlife, as well as high numbers of migratory, neotropical birds (TCELCP 2010). The live oak-redbay vegetation series is considered very rare and local throughout its range and rare or uncommon in Texas. Threats to this habitat include development, nuisance or exotic species, and erosion.

### *Goals and Objectives*

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.

- Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.
- Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.
- Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.
- Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for rare and sensitive ecosystems management.

#### **Project No. 1 – Biological Inventories**

#### **Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

#### **Project No. 3 – Invasive Species Control**

#### **Project No. 4 – NASCC INRMP Updates**

#### **Project No. 6 – Neotropical Bird Survey**

#### **Project No. 7 – Habitat Management and Restoration**

#### **Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to rare and sensitive ecosystems management at the Installation include the following.

1. Continue to review management practices and their effects on rare and sensitive ecosystems at Installation.
2. Seek additional management guidance and recommendations from federal, state, and Navy wildlife biologists for protection of rare and sensitive ecosystems to occur at the Installation.
3. Continue to conduct monitoring programs for natural communities at the Installation, to keep these inventories up-to-date.
4. Coordinate with the Environmental Section of the PWD during the planning process for all construction projects at the Installation. Review the location and footprint of the project and conduct an analysis of the project against known locations of rare and sensitive ecosystems.

### ***Long-term Management***

Installation personnel should follow recommendations in the Seagrass Conservation Plan and TCELCP to preserve rare and sensitive ecosystems.

### ***Integration with Other Natural Resources Management Activities***

- Water quality management, Section 3.2.1.1.3 – use BMPs to avoid impacts to water quality, which could threaten rare and sensitive ecosystems that occur in aquatic habitats such as seagrass beds (AHEC 2013).
- Coastal zone management, Section 3.2.1.2 – protect seagrass beds in support of coastal zone management.
- Vegetation and habitat management, Section 3.2.1.3 – conduct vegetation and habitat management in consideration of protection of rare and sensitive communities.
- Invasive plants and noxious weeds management, Section 3.2.1.3.3 – utilize IPM techniques to reduce herbicide use in control of invasive plants and noxious weeds and to reduce impacts to aquatic habitats that support rare and sensitive ecosystems.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – utilize BMPs and maintain vegetative buffers around rare and sensitive ecosystems to avoid impacts to areas, which support these ecosystems.
- Rare, threatened, and endangered plant species management, Section 3.2.1.7 – protect vital seagrass beds, especially those that show signs of decline due to anthropogenic changes in nutrient levels.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – conduct biological inventories for the presence of rare and sensitive ecosystems.
- Fisheries and aquatic species management, Section 3.2.2.3 – protect seagrass beds to provide vital nursery habitat and food sources for fish and other aquatic species.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of rare and sensitive ecosystems.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map and manage rare and sensitive ecosystems known to occur at the Installation.

### ***Ecosystems Management***

Improvement and conservation of submerged aquatic vegetation and oak-redbay communities at the Installation is a component of ecosystems management, as management of these special habitats is related to water quality, coastal zone, vegetation, grounds maintenance and landscaping, and fish and wildlife management.

---

***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Rare and Sensitive Ecosystems Management***

- Federal Water Pollution Control Act, as amended by CWA of 1977, 33 USC 1251 prohibits the discharge of dredged or filled materials into waters of the U.S., including wetlands, without first obtaining a permit from the USACE (Section 404 of the CWA).
- MSA, 16 USC 1801 et seq., establishes policies for the sustainable management of fishery resources and the protection of EFH.
- 40 CFR 230, Guidelines for Specification of Disposal Sites for Dredge or Fill Materials, provides procedures for the disposal of dredged or fill materials in the ocean and outlines potential impacts on physical, chemical, and biological characteristics of the aquatic ecosystem and special aquatic sites.
- 40 CFR 230.43, Potential Impacts on Special Aquatic Sites, defines vegetated shallows as a special aquatic site and describes possible loss of values.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- Texas Administrative Code, Title 31, Chapter 501, Coastal Management Program, establishes the CMP to make more effective and efficient use of public funds and to more effectively and efficiently manage coastal natural resource areas and the activities that may affect them.
- Texas Parks and Wildlife Code, Subchapter G, Aquatic Vegetation Management, establishes guidelines for developing state and local aquatic vegetation management plans according to the principles of integrated pest management.
- Seagrass Conservation Plan for Texas, developed in 1999 by TPWD, Texas General Land Office and Texas Natural Resource Conservation Commission, identifies resource management problems and outlines planning objectives and long and short range strategies and actions to protect and preserve Texas seagrasses.
- TSWQS, set and implemented by TCEQ, defines seagrasses as a beneficial aquatic-life use in Texas.

***Additional Sources of Information***

- USFWS, Chesapeake Bay Field Office, Decline of Submerged Plants in Chesapeake Bay (<https://www.fws.gov/chesapeakebay/savpage.htm>)
- TCEQ, 2010 TSWQS (<https://www.tceq.texas.gov/waterquality/standards/2010standards.html>)
- TPWD, Aquatic Vegetation Management in Texas: A Guidance Document ([https://tpwd.texas.gov/publications/pwdpubs/media/pwd\\_pl\\_t3200\\_1066.pdf](https://tpwd.texas.gov/publications/pwdpubs/media/pwd_pl_t3200_1066.pdf))
- TPWD, Seagrass Conservation Plan (<https://tpwd.texas.gov/landwater/water/habitats/seagrass/conservation>)

- Texas A&M University AgriLife Extension, AquaPlant Diagnostics Tool (<https://aquaplant.tamu.edu/plant-identification/category-submerge-plants/>)

### 3.2.1.7 Rare, Threatened, and Endangered Plant Species Management

This subsection describes the management of rare, threatened and endangered plant species identified on the Installation. The management of rare, threatened and endangered wildlife species at NASCC is described in Section 3.2.2.7 of this INRMP. Table 3-2 provides a cross-walk of how INRMP projects and management areas described in this document will benefit all of the rare, threatened, and endangered plants (and wildlife) known or with the potential to occur at the Installation.

The federal ESA was enacted to conserve endangered and threatened species and the ecosystems on which these species depend, and provides conservation programs for endangered and threatened species. Federal agencies are required to ensure that no actions undertaken will likely jeopardize the continued existence of any threatened or endangered species, except as provided within the ESA. Whenever there is a possibility that a threatened or endangered species may be present in an area affected by an action of a federal agency, that agency is required to conduct a biological assessment within the affected area to document the presence/absence of threatened or endangered species. If such species are found, the federal agency must make reasonable efforts to avoid actions that would have a detrimental impact on the federally listed species.

The Texas ESA provides for protection of threatened and endangered plant species identified for Texas, as described in TPWD Code Title 5 (Wildlife and Plant Conservation), Subtitle G (Plants), Chapter 88 and Sections 69.01-61.9 of the Texas Administrative Code. The Navy believes that actions taken to protect federally listed plant species will confer benefit to state-listed plant species protected by the Texas ESA. A list of state-listed plant species known or with the potential to occur at NASCC is provided in Appendix E, Table E-13.

This section describes the management recommendations and benefits of this INRMP for federally threatened and endangered plants species that are known to occur at the Installation. Currently no federally listed plant species are known to occur; however, updates to the federal ESA listings, such as the listing or removal of a species under the ESA, or a change in species presence at the Installation as documented through surveys or other observations, may require changes in management practices to address these changes.

#### *Goals and Objectives*

The ESA requires federal agencies to review their actions to determine whether they are likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of federally designated critical habitat. If such review reveals the potential for effects, the federal agency must consult with the USFWS and/or TPWD as appropriate.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- 
- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
  - Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.
  - Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.
- Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

***Projects and Management Strategies***

**Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for rare, threatened, and endangered plant species management.

**Project No. 1 – Biological Inventories**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

---

## **Project No. 7 – Habitat Management and Restoration**

### **Management Strategies**

Management strategies related to protection of rare, threatened, and endangered plant species at Installation include the following.

1. Continue to conduct species survey updates to identify changes in populations and habitat on the properties, as needed. Use species information provided by these surveys to modify management practices, if necessary. Modification of management practices will be administered by the NRM in consultation with environmental staff at NAVFAC Southeast, and federal and state agency representatives. Determining the presence of federally endangered or threatened plant species or habitats that could support them at the Installation, as well as the other rare plant species identified in Appendix E, Tables E-13 and E-14 of this document will be specifically targeted in the next plant survey conducted at Installation. A rare plant survey of NOLF Goliad has not been conducted, and should be completed within the plan period for this INRMP.
2. Coordinate with the Environmental Section of the PWD during the planning process for all construction projects at the Installation. Review the location and footprint of the project and conduct an analysis of the project against known occurrences of rare, threatened, and endangered species. During the planning process, it is advised that the NRM review the TPWD Project Coordination and Review Request to obtain information regarding rare, threatened, and endangered species. Database queries by county or species names can be conducted on the Rare, Threatened, and Endangered Species of Texas website (see text box for link) or specific information can be requested from the Texas Natural Diversity Database. Additionally, the Wildlife Habitat Assessment Program, administered by TPWD, is available to assist project developers in identifying, evaluating, and addressing potential impacts to natural resources of conservation concern in Texas. Guidance on obtaining information on endangered species, important natural resources, project documentation and review, and applicable state and federal regulations, including planning tools and BMPs is available on their website (see text box for link).
3. Coordinate, and conduct informal or formal consultation if necessary, with the USFWS and/or TPDW as appropriate to determine if actions at the Installation are likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat of such species.

### ***Long-term Management***

Ecologically sensitive areas are sensitive to human activities and must be carefully managed to prevent degradation or loss of extremely valuable ecosystems. It is important that accurate and current information regarding rare, threatened, and endangered species on Installation properties be available to assist in planning for future land use and facilities in support of the military mission, while staying in compliance with the ESA and maintaining the highest level of responsible stewardship possible.

During the planning process for Navy actions and projects that impact any identified threatened or endangered species, the Navy will coordinate as early as practical with USFWS and TPWD.

When actions or projects are mission essential and/or severely time-constrained, agency coordination may not occur except as required by laws or regulations.

### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – manage rare, threatened, and endangered plant species that are associated with wetland habitats.
- Coastal zone management, Section 3.2.1.2 – manage rare, threatened, and endangered plant species that occur within coastal zone habitats.
- Riparian areas management, Section 3.2.1.3.1 – manage rare, threatened, and endangered plant species that are associated with riparian areas.
- Invasive plants and noxious weeds management, Section 3.2.1.3.3 – control invasive plants and noxious weeds that compete with rare, threatened, and endangered plant species; and that impact diversity of natural communities.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – educate grounds maintenance and landscaping personnel on the requirements for protection and conservation of rare, threatened, and endangered plant species.
- Outdoor recreation management, Section 3.2.3 – properly educate recreational participants on the importance of conservation and protection of rare, threatened, and endangered plant species; and restrict outdoor recreation activities where rare, threatened, or endangered plants species occur.
- Educational outreach, Section 3.2.3.2 – provide educational outreach related to the protection and conservation of rare, threatened, and endangered plant species known to occur at the Installation.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive up-to-date training on state and federal regulations related to rare, threatened, and endangered plant species conservation and protection.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to monitor and manage rare, threatened, and endangered plant species occurrences.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – partner with appropriate agencies to ensure rare, threatened, and endangered plant species are properly protected; and coordinate research projects to enhance knowledge related to conservation of rare, threatened, and endangered species known to occur.

### ***Ecosystems Management***

Ecosystems management is a holistic, adaptive management concept that transcends human-made boundaries, both internal and external to the Installation. Management of rare, threatened, and endangered species known to occur at the Installation will promote sustainable ecosystems, and includes maintaining habitat requirements for these species, and educational outreach. Furthering knowledge of federally listed plant species occurring at the Installation will ensure Navy's stewardship requirements and compliance with the ESA. Participation in proper management actions for protection of rare, threatened, and endangered plant species of the



Installation is the responsibility of all individuals potentially affecting these species. Ecosystems management for protection of listed plant species requires periodic adjustments in management principles and practices to respond to new knowledge and dynamic conditions.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Rare, Threatened, and Endangered Plant Species Management***

- ESA, 16 USC 1531 et seq., as amended, provides for the identification and protection of threatened and endangered species of plants and their critical habitats and requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.
- 50 CFR 17, Endangered and Threatened Wildlife and Plants, prescribes policies for the conservation and restoration of endangered and threatened wildlife and plants.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- Texas Administrative Code 69.01-9, Endangered, Threatened, and Protected Native Plants, contains laws and regulations pertaining to threatened or endangered plant species.
- Texas Parks and Wildlife Code, Title 5 (Wildlife and Plant Conservation), Subtitle G (Plants), Chapter 88, contains definitions, regulations, state lists, penalties and permits for endangered plants in Texas.
- OPNAVINST 5090.1D, 12-3.7, discusses natural resources management relating to protection of threatened or endangered species.

### ***Additional Sources of Information***

- USFWS, Endangered Species Program (<https://www.fws.gov/endangered/laws-policies/index.html>)
- USDA NRCS, Plants Database (<https://plants.usda.gov/java/>)
- TPWD, Endangered Plant Species ([https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/nongame/listed-species/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/listed-species/))
- TPWD, Texas Natural Diversity Database ([https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/txnnd/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/txnnd/))
- TNC (<https://www.nature.org/en-us/>)
- NatureServe (<http://www.natureserve.org/about-us>)

### **3.2.2 Fish and Wildlife Management**

OPNAVINST 5090.1D, 12-3.5, defines fish and wildlife management as those actions designed to preserve, enhance, and regulate indigenous wildlife and its habitats, including conservation of protected species and non-game species, management and harvest of game species, BASH reduction, and animal damage control. This section addresses the development and

implementation of techniques and programs for managing fish and wildlife. The fish and wildlife management activities of this INRMP are described in the following sections:

### 3.2.2 Fish and Wildlife Management

#### 3.2.2.1 Wildlife Management and Habitat Enhancement

#### 3.2.2.2 Migratory Bird Management

#### 3.2.2.3 Fisheries and Aquatic Species Management

#### 3.2.2.4 BASH Reduction

#### 3.2.2.5 Invasive and Nuisance Wildlife Management

#### 3.2.2.6 Zoonosis Prevention

#### 3.2.2.7 Rare, Threatened, and Endangered Wildlife Species Management

Wildlife management opportunities are limited by the presence of natural habitats at the Installation. The Installation's small size and security concerns prevent management of game species for any type of hunting; however, management of both game and non-game species is possible. Whereas there is no opportunity for hunting on Installation, opportunities exist for sustainable uses and stewardship of non-game wildlife populations as identified in the SAIA. Fishery resources at the Installation are found in the estuarine waters of the bay system that surround the Main Station, and within the freshwater resources located at NOLF Cabaniss and NOLF Goliad.

#### 3.2.2.1 Wildlife Management and Habitat Enhancement

Wildlife management at the Installation is primarily driven by BASH Program requirements. In addition to BASH Program requirements, other factors that limit the types and level of natural resource management activities include variances in terrain, and the availability of personnel to work on the construction of various enhancement projects.

Many of the mammals, birds, and reptiles found on or near the Main Station benefit from the diversity of woodland, field, wetland, and edge habitats found across the Encinal Peninsula. Proper stewardship requires that this diversity be maintained on the Main Station in a manner consistent with the SAIA and the military mission. The woodland/shrub habitats of the Main Station, NOLF Cabaniss, and NOLF Waldron provide important habitat to neotropical migratory birds, small mammals, amphibians, and reptiles. Other ecologically important areas include the riparian corridor along Oso Creek on NOLF Cabaniss, and designated Critical Habitat for wintering piping plover at and in the vicinity of the Main Station. Management activities will be conducted with the sensitivity of these habitats in mind (Navy 2006b).



*Black-tailed jackrabbit (Lepus californicus),  
Main Station*

Source: L. Rivard

In 2001 and 2002, Congress established the Wildlife Conservation and Restoration Program and the State Wildlife Grant Program. These programs were developed to provide financial assistance to state and tribal fish and wildlife entities for the conservation of a multitude of wildlife species, including threatened and endangered species. Prior to these programs, there was little financial assistance available to states for conservation efforts targeting non-game wildlife species. In order to be eligible for federal grants and to adhere to the requirements for participating in the State Wildlife Grant program, each state was required to develop and submit for approval a statewide wildlife action plan or similar plan by October of 2005. The purpose of these plans was to summarize the abundance and distribution of each state's wildlife resources, identify Species of Greatest Conservation Need, and threats and key habitats associated with these species. In addition, the plans were to include conservation actions designed to address the threats identified for the Species of Greatest Conservation Need.

A state wildlife action plan for Texas was adopted in 2005, and a major revision to the plan was completed in 2012. The Texas Conservation Action Plan (formerly the Texas Comprehensive State Wildlife Management Plan) is a Comprehensive Wildlife Conservation Strategy that has been developed to assist TPWD and its conservation partners with the development of nongame initiatives and goals that will address the needs of animal species and habitats (TPWD 2005). The 2012 revision included development of several smaller functional handbooks (versus the four large volumes of information that were associated with the 2005 version), all of which are available online (see text box for access to plan information). Handbooks developed include an

Overview document, State-Wide and Multi-Regional handbooks, and eleven ecoregion handbooks (TPWD 2012a). The Texas Conservation Action Plan meets the eight required elements, as identified by Congress, of the State Wildlife Grant program that are outlined by USFWS (Association of Fish and Wildlife Agencies 2012). These elements include species, habitats, threats, conservation actions, monitoring species and effectiveness, review and revision, partnerships with land management agencies and tribes, and public participation. Details on the eight required elements are available on the Association of Fish and Wildlife Agency website (see text box).

The Texas Conservation Action Plan includes handbooks for each of the 11 ecoregions identified for Texas. The Main Station, NOLF Cabaniss, and NOLF Waldron are located in the Gulf Coast Prairies and Marshes ecoregion and NOLF Goliad is located in the East Central Texas Plains ecoregion (TPWD 2012a). Natural resources management actions occurring on Installation properties will consider the initiatives and goals set forth in this plan to adequately address nongame species and habitats. The INRMP management measures identified in this document will provide both direct and indirect benefits to state listed wildlife species that have been identified at the Installation.

The Texas Conservation Action Plan handbooks are available at:  
<https://tpwd.texas.gov/landwater/land/tcap/handbooks.phtml>

State Wildlife Action Plan Revision and Best Management Practices, including information on the eight required elements are available from the Association of Fish and Wildlife Agencies at:  
<https://www.fishwildlife.org/afwa-informs/state-wildlife-action-plans>

---

### *Issue*

Installation parcels provide habitat for numerous and varied species of mammals, birds, amphibians, reptiles, and fish, including designated Critical Habitat for wintering piping plover. The SAIA, as amended, requires that, to the extent appropriate and applicable, military installations must provide for wildlife management, wildlife habitat enhancements and modifications, and wetland protection, enhancement, and restoration where necessary to support wildlife, and plants. These actions are to be planned and conducted in cooperation with federal and state wildlife agencies.

### *Goals and Objectives*

Many of the fish, amphibians, reptiles, birds, and mammals found on or near Installation properties benefit from the diversity of woodland, field, wetland and edge habitats that are present at the Installation and surrounding areas. Proper stewardship requires that this diversity be maintained consistent with the SAIA and the military mission.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.2:** Achieve no net loss of wetlands.
- Objective 1.7:** Maintain and enhance native vegetation to promote community diversity, and to control and monitor noxious, invasive, and exotic plant species.
- Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.
- Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.
- Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.
- Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.

**Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

**Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for wildlife management and habitat enhancement.

**Project No. 1 – Biological Inventories**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 6 – Neotropical Bird Survey**

**Project No. 7 – Habitat Management and Restoration**

**Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to wildlife management and habitat enhancement at the Installation include the following.

1. Conduct censuses of wildlife populations as necessary to monitor the effectiveness of management activities in reaching management goals. These surveys should document the relative abundance of selected species that are indicators of healthy, self-sustaining ecosystems.
2. Provide habitat enhancement for wildlife, including designated Critical Habitat and habitat that supports rare, threatened, and endangered species as well as migratory birds, in consideration of BASH Program requirements.
3. Establish conservation partnerships with state and federal agencies, universities, and NGOs.

### *Long-term Management*

The SAIA directs military installations to provide for sustainable use of natural resources, including wildlife, consistent with the military mission of the installation. These uses can be consumptive (hunting, fishing) or non-consumptive (wildlife viewing, nature education), as long as such uses do not cause conflict with the military readiness of the installation or adversely

affect the natural resources under the stewardship of the DoD. The SAIA also requires that, to the extent appropriate and applicable, military installations must provide for wildlife management; wildlife habitat enhancements or modifications; and wetland protection, enhancement, and restoration where necessary for support of wildlife or plants. Opportunities exist for sustainable uses and stewardship of both game and non-game wildlife populations at the Installation, as provided in the SAIA. Stewardship of wildlife resources has high public relations value, and provides educational and partnership opportunities to local civic, conservation and youth groups.

Wildlife surveys should be conducted to update the Installation species inventory as necessary, and to minimize, mitigate, and monitor the take of wildlife species, especially migratory birds. Natural resources management should look into opportunities to enter into conservation partnerships with federal, state, and local agencies, and NGOs to improve wildlife habitat at the Installation, including designated Critical Habitat for wintering piping plover that is located at the Main Station. Where possible, military readiness activities should be located to avoid and minimize impacts on wildlife species and habitat.

#### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – manage wildlife species that are associated with wetland habitats.
- Coastal zone management, Section 3.2.1.2 – manage wildlife species that rely on healthy vegetative and aquatic habitats located within the coastal zone for survival.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – manage vegetation and wildlife habitats located near airfields to reduce BASH potential.
- Invasive plants and noxious weeds management, Section 3.2.1.3.3 – utilize IPM techniques to reduce herbicide use in control of invasive plants and noxious weeds and to reduce impacts to wildlife species habitats; and remove invasive plants and noxious weeds to promote natural plant diversity in wildlife habitats.
- BASH reduction, Section 3.2.2.4 – manage and enhance wildlife habitat in consideration of BASH Program requirements, and to reduce BASH potential.
- Invasive and nuisance wildlife management, Section 3.2.2.5 – manage and control invasive and nuisance wildlife to promote native wildlife diversity and for human health and safety.
- Zoonosis prevention, Section 3.2.2.6 – remove nuisance wildlife to prevent spread of wildlife diseases.
- Rare, threatened, and endangered wildlife species management, Section 3.2.2.7 – conduct biological surveys for presence of rare, threatened, and endangered wildlife species, and map wildlife habitat types; and conserve and protect designated Critical Habitat for wintering piping plover located at NASCC.
- Public access, Section 3.2.3.1 – provide access to the Installation for the purpose of public participation in educational outreach activities, as appropriate and authorized in consideration of military readiness and security requirements.

- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training to identify wildlife management and habitats enhancement opportunities.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map wildlife habitats and to identify habitat enhancement opportunities.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – enter into conservation partnerships with federal, state, and local agencies, universities, and NGOs to conduct fish and wildlife surveys, improve habitat, and allow for wildlife research.

### ***Ecosystems Management***

Baseline biological data will help develop efficient management and research programs for wildlife resources. Such programs should include information about development and improvement of habitat for optimum conditions, need, and means to restore desired species abundances, wildlife control as necessary, and protection of wildlife resources. Improvements to wildlife habitat must be conducted in consideration of aircraft safety and BASH Program requirements, and should be focused in areas located away from Installation airfields. Consistent with the BASH Program, areas of grassland habitat that support wintering populations of Sprague's pipit will be preserved. Protection of coastal habitats will support designated Critical Habitat for wintering populations of piping plover and migrating red knot populations.

The live oak (laurel oak)-redbay woodlands found at NOLF Waldron are fairly high quality representatives of this rare plant community in Texas (TPWD 1992). With the continued conversion of coastal woodlot habitat to urban use, the few, small remaining pockets of oak-redbay habitat are becoming increasingly vital for the survival of many neotropical birds. This habitat provides essential shelter, resting, and foraging resources to birds during spring and fall migrations. In accordance with the U.S. Fish and Wildlife Conservation Act (16 USC 2901 et seq.) and DoDI 4715.03, the oak-redbay community at the Installation is required to be managed and preserved for its uniqueness and its role in providing high-quality wildlife habitat.

Information for wildlife management and habitat enhancement that is applicable to rare, threatened, and endangered species management at the Installation is provided in Section 3.2.2.7 (Rare, Threatened, and Endangered Wildlife Species Management).

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Wildlife Management and Habitat Enhancement***

- Fish and Wildlife Coordination Act, 16 USC 661-666c, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.
- Fish and Wildlife Conservation Act, 16 USC 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.

- National Defense Authorization Act (NDAA), Public Law 107-314, 2003, exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.
- MBTA, 6 USC 703, protects migratory birds against “takings” for normal and routine operations such as military support functions.
- EO 13186 (10 January 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.
- SAIA, 16 USC 670a-o, requires that, to the extent appropriate and applicable, military installations must provide for fish and wildlife management, fish and wildlife habitat enhancements and modifications, and wetland protection, enhancement, and restoration where necessary to support fish, wildlife, and plants.
- DoDI 4715.03, Natural Resources Conservation Program, implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control. Additionally, DoDI 4715.03 requires biologically or geographically significant or sensitive natural resources, such as ecosystems or species, be monitored and managed for their protection and long-term sustainability.
- OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.

#### ***Additional Sources of Information***

- TPWD, Wildlife (<https://www.tpwd.state.tx.us/huntwild/wild/>)
- Texas General Land Office, Preserving Coastal Habitat ([www.glo.texas.gov/coast/coastal-management/forms/files/shoring-up-our-future.pdf](http://www.glo.texas.gov/coast/coastal-management/forms/files/shoring-up-our-future.pdf))
- Coastal Habitat Alliance (<https://www.gulfbase.org/organization/coastal-habitat-alliance>)
- Texas Wildlife Association (<https://www.texas-wildlife.org/>)
- The Wildlife Society, Texas (<https://tctws.org/>)
- TNC, Texas (<https://www.nature.org/en-us/about-us/where-we-work/united-states/texas/>)
- Texas A&M University, Department of Wildlife and Fisheries Sciences (<https://wfsc.tamu.edu/>)

#### **3.2.2.2 Migratory Bird Management**

Migratory birds face serious challenges that have resulted in species declines, including reductions in habitat quality and quantity, direct bird mortality attributable to human activities, invasive species, collisions with artificial structures, and environmental contaminants. Because migratory birds cross the boundaries of nations, watersheds, and ecosystems, protecting them requires a coordinated effort involving multiple jurisdictions and interests.



---

In 2004, Congress mandated the DoD Migratory Bird conservation revision to the MBTA through language in the 2004 NDAA. The Secretary of Interior was charged with developing an incidental take process for migratory birds on DoD lands involving military mission activities (e.g., training, research and development). DoD and the USFWS (on behalf of the Secretary of Interior) developed a MOU for Migratory Bird Conservation in 2006; shortly thereafter, the USFWS published the 2007 Final Rule for Migratory Bird Conservation on Military Lands, and DoD followed up by establishing guidance for natural resources managers to work cooperatively with the USFWS to implement the MOU. The Final Rule governs the incidental take on military installations in mission areas where training, research and development occur, whereas the MOU governs the mission-essential and non-mission areas (e.g., family housing, post exchanges, laundry facilities). The Final Rule requires that military installations evaluate any proposed action in the mission areas that may impact any migratory bird population (through NEPA analysis) and consult with the USFWS if the military determines that a potential effect may occur.

Protection of ecologically sensitive areas is provided by the SAIA, under the provisions of wildlife and fish habitat enhancement in support of managing these populations. Texas, especially south Texas, is world renowned for the variety of bird species that reside or migrate through the state to spend the winter months in Central and South America. Coastal habitats, including beaches and intertidal areas, forests, grasslands, and marshes are valuable feeding, nesting and resting areas for passerines, waterfowl, raptors, wading birds and shorebirds, for both resident and migrant species throughout the year. The diversity of habitats is extremely important to migratory birds because these habitats provide the necessary food and resting sites needed by migratory birds to replenish energy stores depleted during migration.

The parcels under the ecological management of the Installation are located within the Central Flyway, and provide a diverse array of habitats to both migratory and resident species. Throughout these parcels, there is a diverse assemblage of plant communities providing excellent habitat for a variety of birds, mammals, reptiles and insects. The sensitivity of the areas and their importance to avian populations requires the proper management of this complex of communities, and is central to the wildlife management program at the Installation. All of these areas are sensitive to human activities, and must be carefully managed to prevent degradation or loss of valuable ecosystems.

### ***Issue***

The MBTA of 1918, as amended and EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, protects migratory birds. The MBTA makes it illegal to take any migratory bird, except as allowed by the implementing regulations. EO 13186 requires that federal agencies avoid or minimize the impacts of their activities on migratory birds and make efforts to protect birds and their habitat. DoD guidance also requires each military installation with an INRMP to ensure that they incorporate migratory bird conservation into the INRMP and implement such elements as necessary.

Large congregations of birds of any size can increase the BASH potential. A Migratory Bird Depredation Permit from the USFWS is needed to take or harm most birds. A listing of birds not

---

protected by the MBTA can be found in the FR (70 FR 12710-12716). Examples of these birds would include pigeons, house sparrows and Eurasian collared doves (*Streptopelia decaocto*).

The 2004 NDAA exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities. Military readiness activities include all training and operations of the Armed Forces that relate to combat and the adequate testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use. The MBTA requires that the Secretaries of Defense and Interior identify ways to minimize, mitigate and monitor the take of migratory birds during military readiness activities.

In accordance with the MBTA, active nests may not be removed, even from man-made structures, without a permit issued by USFWS. Nests may only be removed after they are vacated by the resident birds and their fledglings. Efforts should therefore be made to prevent nesting on buildings and structures that are scheduled for demolition, improvement, or other construction activities. Similarly, nesting should be discouraged on structures essential to the military mission, such as antennas and radars, so that their functionality is not compromised by the presence of a nest. Otherwise, in most cases, such nests would have to remain in place until the hatchlings fledge.

### ***Goals and Objectives***

Minimize, mitigate, and monitor the take of migratory birds from military readiness activities at the Installation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.
- Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.
- Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.
- Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad

counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

**Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for migratory bird management.

**Project No. 1 – Biological Inventories**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 6 – Neotropical Bird Survey**

**Project No. 7 – Habitat Management and Restoration**

**Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to protection of migratory bird species at Installation include the following.

1. Reduce pesticide use at the Installation.
2. Implement habitat enhancement and maintain habitat diversity for migratory bird species, consistent with BASH Program requirements. Recommendations for habitat enhancement should be made to attract birds and other wildlife away from the flight operations areas. Additionally, modification to habitat also should take into consideration bird nesting and breeding seasons so as not to conflict with the MBTA.
3. Conduct bird surveys to monitor the bird populations at the Installation.
4. Control invasive bird species that compete with native migratory bird species and their habitats.
5. Update and maintain Migratory Bird Depredation Permits annually from the USFWS to allow take or harm to migratory birds at the Installation airfields as part of BASH Program requirements, and to maintain airfield safety.
6. Locate military readiness activities to avoid or minimize impacts on migratory birds, where possible. If the Installation notes clear evidence of a take as the result of military readiness activities, the Installation NRM will document the take, and work with the NASCC Air Operations Officer who is responsible for overseeing the BASH Program at

---

the Installation to evaluate these activities, and where practicable, identify strategies to reduce or eliminate the take of migratory birds.

7. Maintain compliance with the MBTA for all non-military readiness activities.
8. Request assistance from the DoD PIF Work Group, as needed, to assist and support migratory bird conservation while protecting the military mission.
9. Develop partnerships with federal, state, and local agencies, universities, and NGOs such as the National Audubon Society to enter into conservation partnerships, allow for bird research at the Installation, conduct monitoring surveys, and participate in International Migratory Bird Day.

### ***Long-term Management***

Migratory birds are protected under the MBTA against take for normal and routine operations such as military support functions. Under the MBTA, take could include mortality, pesticide application, nest and egg removal, and occasionally, tree removal. However, nest removal outside the nesting season would not constitute a take. Before routine support action is initiated at the Installation that may affect any migratory bird species, the NRM will be informed. Efforts should be made to prevent nesting on buildings and structures that are scheduled for demolition, improvement, or other construction activities. Similarly, nesting should be discouraged on structures essential to the military mission, such as antennas and radars, so that their functionality is not compromised by the presence of a nest. Otherwise, in most cases, such nests would have to remain in place until the hatchlings fledge, in accordance with the MBTA.

Large congregations of birds of any size can increase the BASH potential. A Migratory Bird Depredation Permit from the USFWS is needed to take or harm most birds. Take of migratory birds is authorized to relieve or prevent injurious situations impacting public safety. In emergency situations take, trapping, or relocating any migratory bird, nest, or egg is authorized, including species not specifically identified in the migratory bird depredation permit (except for bald eagles, golden eagles, endangered, or threatened species), when migratory birds, nests, or eggs are posing a direct threat to human safety (such as threat of serious bodily injury or risk to human life).

Take of migratory birds that are merely causing a nuisance are not authorized by the MBTA or the Installation migratory bird depredation permits. Birds nesting, roosting, or loafing on exterior and interior surfaces of all buildings and structures are generally considered nuisance birds, such as pigeons (Family Columbidae), starlings, house sparrows, and gulls. Although species that exhibit this behavior are generally species that are not protected by the MBTA, birds protected under the MBTA also may be associated with this activity. These species are known to be attracted to habitat near airstrips including ephemeral pools of water and low-cut grasses. Bird management programs may include trapping, harassment, lethal removal, non-lethal repellents, physical barriers, and toxic baits or perches. A listing of birds not protected by the MBTA can be found in the FR (70 FR 12710-12716). The NRM and NASCC Air Operations Officer responsible for implementing the BASH Program would determine if the possible impacts associated with routine actions that support the military mission would impact migratory bird species and, if necessary, would initiate discussions or negotiate a permit with the USFWS.

---

Per 30 CFR 21.43 (*Depredation order for blackbirds, cowbirds, grackles, crows and magpies*) a federal permit is not required to control yellow-headed blackbird (*Xanthocephalus xanthocephalus*), red-winged blackbird (*Agelaius phoeniceus*), rusty blackbird (*Euphagus carolinus*), and Brewer's blackbird (*E. cyanocephalus*); cowbirds (*Molothrus* spp.); and all grackles (Family Icteridae), crows (*Corvus* spp.), and magpies (Family Corvidae), if these species are determined to be impacting ornamental or shade trees, agricultural crops, livestock, or, wildlife; or they are concentrated in such numbers and manner that they constitute a health hazard or other nuisance, as long as:

- their plumage is sold or offered for sale (but may be possessed, transported, and otherwise disposed of or utilized);
- federal or state game or deputy game agents, wardens, protectors, or other game law enforcement officers are provided free and unrestricted access to the premises and information requested for which such operations have been, or are being conducted; and
- these actions are not in violation of any state laws or regulations, unless a permit has been obtained for such activities of concern by the state.

The Installation has received migratory bird depredation permits from USFWS for management of birds at the Installation airfields as part of the BASH Program. Separate depredation permits are obtained for the Installation parcels located in Nueces County and NOLF Goliad (Mitton 2013d), since the two areas have different ecosystems and attract different groups of birds and wildlife, resulting in different BASH issues for each region. These permits are renewed annually to allow continuation of techniques that remove (through live-trapping or lethal measures), or scare birds and/or wildlife away from these airfields.

#### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – maintain wetlands to provide habitat for migratory bird species.
- Coastal zone management, Section 3.2.1.2 – maintain coastal zone areas to provide healthy vegetative and aquatic habitats to support migratory bird species.
- Riparian areas management, Section 3.2.1.3.1 – maintain riparian areas to provide habitat for migratory bird species.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – manage vegetation around airfields to reduce their attractiveness to migratory birds and to reduce the BASH potential, including maintaining appropriate grass heights near airfields.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – maintain and enhance wildlife habitats to support migratory bird species, and conduct surveys for and monitor migratory birds at the Installation.
- BASH reduction, Section 3.2.2.4 – maintain migratory bird and wildlife depredation permits issued by USFWS (migratory birds) and TPWD (wildlife) to reduce BASH risks around airfields consistent with BASH Program requirements and to improve airfield safety.

- Invasive and nuisance wildlife management, Section 3.2.2.5 – manage and control invasive and nuisance wildlife to promote native wildlife diversity and for human health and safety.
- Rare, threatened, and endangered wildlife species management, Section 3.2.2.7 – maintain appropriate depredation permits to ensure airfield safety and locate military readiness activities to minimize take of migratory bird to the extent possible, including migratory bird species that are considered rare, threatened, or endangered.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map migratory bird observations and habitats, and to identify bird habitats that pose a BASH risk in and around the Installation airfields.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – create conservation partnerships with federal, state, and local agencies and NGOs to improve habitat for migratory birds, and allow for bird research, consistent with BASH Program requirements.

### ***Ecosystems Management***

Bird surveys should be conducted to monitor the bird populations and to minimize, mitigate, and monitor the take of migratory birds at the Installation. Surveys have been conducted to collect data on piping plovers and red knot (Texas A&M 2018a; Withers 2014; Woodin et al. 2010). Habitat improvements that will attract birds, such as preservation of grassland habitat that support wintering populations of Sprague’s pipit, will be undertaken in consideration of BASH Program requirements. Where possible, military readiness activities will be located to avoid and minimize impacts on migratory birds. If clear evidence of bird take is noted, such as the sight of numerous dead or injured birds, the Installation would consider modifying its activities, as practicable, to reduce take of migratory birds. The Installation also will seek out opportunities for entering into conservation partnerships with federal, state, and local agencies and NGOs to improve habitat and allow for bird research at the Installation.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Migratory Bird Management***

- ESA, 16 USC 1531 et seq., as amended, provides for the identification and protection of threatened and endangered species of plants and their critical habitats and requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.
- MBTA, 16 USC 703-712, protects migratory birds against “takings” for normal and routine operations such as military support functions.
- NDAA, Public Law 107-314, 2004, exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.
- 50 CFR Part 22, Bald and Golden Eagle Protection Act, protects eagles from commercial exploitation and safeguards their survival in the U.S.
- EO 13186 (10 January 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.

- OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.
- MOU, between DoD and the USFWS to Promote the Conservation of Migratory Birds (31 July 2006), describes specific actions that should be taken by the DoD to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD operations, other than military readiness activities, are consistent with the Migratory Bird Treaty Act, 50, CFR 21, Final Rule on the Take of Migratory Birds by the Armed Forces (28 February 2007). This rule directed the Armed Forces to assess the effects of military readiness activities on migratory birds, in accordance with NEPA and to develop and implement appropriate conservation measures if a proposed action may have a significant adverse effect on a migratory bird population.

#### ***Additional Sources of Information***

- USDA NRCS Migratory Bird Habitat Initiative (<https://www.nrcs.usda.gov/wps/portal/nrcs/site/tx/home/>)
- USFWS, Migratory Bird Program (<https://www.fws.gov/birds/index.php>)
- USFWS, Birds of Conservation Concern (<https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>)
- DoD PIF (<https://www.partnersinflight.org>)
- TPWD, Bird Migration (<http://tpwd.texas.gov/huntwild/wild/birding/migration/>)
- Audubon Texas (<http://tx.audubon.org/>)
- Gulf Coast Joint Venture (<http://www.gcjv.org/>)
- USFWS, Migratory Bird Program (<https://www.fws.gov/floridacaribbeanwildlife/>)

#### **3.2.2.3 Fisheries and Aquatic Species Management**

The Sikes Act provides for cooperation by the DoD with the USFWS and state wildlife agencies in planning, development, and maintenance of fish resources on military installations and requires the cooperative development and implementation of an INRMP on installations with sufficient resources. In addition, EO 12962, *Recreational Fisheries*, encourages the development and enhancement of recreational fisheries by federal agencies.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in U.S. federal waters. The MSA requires that the NMFS, the regional fishery management councils, and the Secretary of Commerce describe and identify EFH for important marine and anadromous fish species under Federal Fishery Management Plans. EFH includes all types of aquatic habitat, including wetlands, coral reefs, seagrasses, and rivers where fish spawn, breed, feed, or grow to maturity, and extends from offshore habitats to inland areas, where the salt-water influence subsides. The MSA requires that any federal activity that may have an impact on EFH be coordinated with NOAA NMFS, and

that if such activities would adversely affect any EFH identified under the MSA, the Secretary of Commerce shall recommend measures that can be taken to conserve the EFH in question.

As discussed in Rare and Sensitive Ecosystems Management (Section 3.2.1.6), seagrass meadows provide a unique habitat for many estuarine dependent plants and animals. This habitat plays a major role in the reproductive cycles of many recreationally and commercially important species in the Coastal Bend area of Texas. Fish and shellfish utilize seagrass habitats in the early stages of their life cycles, feeding on organic matter produced by decomposing seagrasses and hiding from larger predators among the seagrass blades (CBBEP n.d. b). The importance of managing seagrass beds is also described in Rare and Sensitive Ecosystems Management (Section 3.2.1.6).

### *Issue*

Development and mission-related activities at Installation can lead to increased sedimentation and stormwater runoff, which can negatively impact fisheries and aquatic species. EFH has been identified for the entirety of Corpus Christi Bay, Oso Bay, and the Laguna Madre Estuary. Species of particular concern in these EFH areas include white shrimp (*Penaeus setiferus*), pink shrimp (*P. duorarum*), brown shrimp (*P. aztecus*), Spanish mackerel (*Scomberomorus maculatus*), red drum (*Sciaenops ocellatus*) and gulf stone crab (*Menippe adina*). However, with implementation of the SW3P, none of the activities proposed for this INRMP are likely to impact EFH.

Fishing is allowed at the Installation; no fee is required, nor does the Installation issue fishing permits for this activity. Fishing activities primarily occur along the shoreline of the Main Station. Fishery resources at the Installation are primarily associated with the coastal areas surrounding the Main Station. Management of fisheries and aquatic species at the Installation is primarily related to protection and management of water quality.

### *Goals and Objectives*

Minimize impacts to EFH resulting from military readiness activities at the Installation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

- Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.
- Objective 1.3:** Improve and enhance water quality by reducing NPS pollution by continuing to implement and update as appropriate, an overall management strategy for the management of stormwater runoff and soil erosion to protect surface water bodies and wetlands.
- Objective 1.4:** Preserve, protect, and enhance water resources (e.g., wetlands, surface water, groundwater), including protection of undisturbed acreage located within 100-year floodplain areas and management of coastal zone resources.



**Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, EOs, regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.

**Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.

**Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for fisheries and aquatic species management.

**Project No. 1 – Biological Inventory**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 7 – Habitat Management and Restoration**

**Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to protection of fisheries and aquatic species at the Installation include the following.

1. Minimize impacts of construction activities at the Installation. All ground-disturbing activities conducted will incorporate appropriate stormwater and erosion and sediment controls and will coordinate the timing of land-disturbing activities and implementation of erosion and sedimentation control measures to reduce NPS pollution that could result from those activities. To ensure that such controls are applied consistently, an ESCP will be developed for all land-disturbing activities, as needed in accordance with state regulations.
2. Maintain routine water quality monitoring in accordance with specifications outlined in the existing NPDES Stormwater Permit.
3. Minimize the impacts of fertilizers and pesticides on water quality using management practices that balance the desire to have aesthetically pleasing grounds while protecting

---

water quality. Consider non-pesticide removal methods or removal using pesticides with lower toxicity applied at reduced rates.

4. Maintain proper function of stormwater control and conveyance structures by frequently removing debris. Litter and yard wastes can clog inlets, catch basins and outlets, lead to overflows, erosion, and unintended flooding, and make these devices ineffective for stormwater pollutant removal.
5. Continue to ensure that all ponds and wetlands have a minimum of a 100-ft (30 m) vegetative buffer, where a minimum amount of disturbance is allowed, to protect water quality.
6. Continue to monitoring and manage point and NPS stormwater consistent with BMPs described in the SW3P (AHEC 2013).

### ***Long-term Management***

Specific long-term management considerations for fisheries and aquatic species include water quality management, aquatic vegetation management, and control of invasive aquatic weeds.

### ***Integration with Other Natural Resources Management Activities***

- Watershed and floodplains management, Section 3.2.1.1.1 – maintain healthy watersheds and manage floodplains to support survival of fish and other aquatic species.
- Wetlands management, Section 3.2.1.1.2 – manage fish and aquatic species that are associated with wetland habitats.
- Water quality management, Section 3.2.1.1.3 – maintain water quality by minimizing sedimentation and stormwater runoff into surface waters to provide quality habitat for fish and aquatic species.
- Riparian areas management, Section 3.2.1.3.1 – maintain intact riparian areas to protect water quality within adjacent surface waters that function as fish and aquatic species habitat.
- Coastal zone management, Section 3.2.1.2 – maintain healthy aquatic habitats within the coastal zone to support fish and other aquatic species, including those that are associated with the coastal zone.
- BASH reduction, Section 3.2.2.4 – manage and enhance fish and aquatic species habitats in consideration of BASH Program requirements, and to reduce BASH potential.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to monitor fisheries and aquatic species resources.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – enter into conservation partnerships with federal, state, and local agencies, universities, and NGOs to conduct fish and wildlife surveys, improve habitat, and allow for wildlife research.

### ***Ecosystems Management***

Proper management of fisheries and aquatic species will improve water quality and could provide additional recreational resources and educational and interpretive opportunities.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Migratory Bird Management***

- OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.
- MSA, 16 USC 1801 et seq., Establishes policies for the sustainable management of fishery resources and the protection of essential fish habitats.
- Federal Water Pollution Control Act, as amended by the CWA of 1977, 33 USC 1251, describes guidelines for the control of NPS pollution.
- Fish and Wildlife Coordination Act, 16 USC 661-666c, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.
- CZMA Section 6217, Coastal Nonpoint Pollution Control Program, 16 USC 1451 et seq., requires states with Coastal Zone Management Programs to develop Nonpoint Pollution Control Programs with approval from NOAA and EPA.
- EO 12088 (13 October 1978), *Federal Compliance with Pollution Control Standards*, as amended, ensures that all necessary actions are taken to prevent, control, and abate environmental pollution with respect to federal facilities and activities under control of the agency.
- EO 12962 (9 June 1995), *Recreational Fisheries*, requires federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities.

### ***Additional Sources of Information***

- NOAA NMFS, Essential Fish Habitat (<https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat>)
- NOAA NMFS, Essential Fish Mapper (<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>)
- National Centers for Coastal Ocean Science, Gulf of Mexico Essential Fish Habitat ([https://sero.nmfs.noaa.gov/maps\\_gis\\_data/habitat\\_conservation/efh\\_gom/](https://sero.nmfs.noaa.gov/maps_gis_data/habitat_conservation/efh_gom/))
- EFH Regulatory Guidelines (<https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat>)
- TPWD, Aquatic Species (<http://www.tpwd.state.tx.us/landwater/water/aquaticspecies/>)
- TPWD, Fishing (<http://www.tpwd.state.tx.us/fishboat/fish/>)

### 3.2.2.4 BASH Reduction

Each year military aircraft experience hundreds of collisions with birds and animals, causing millions of dollars in damages, injuries, and hundreds of aborted or delayed missions. The objective of the BASH Program is to decrease animal populations and attractants in the vicinity of the airfields in an effort to reduce the potential for collisions. The conditions that attract birds and other wildlife, and the potential for bird/wildlife strikes vary at each site. Birds may flock to airfields or cause hazards en route; hazards may be seasonal or year round; bird/wildlife activity may change as area crop production changes, as sanitary landfills are opened or expanded, or as wildlife refuges are established or expanded.

The Installation updated its BASH Instruction in 2013 to include activities at all of the Installation airfields, including NOLF Goliad (Appendix B). Due to the different bird and wildlife species and ecosystems that are associated with the NOLF Goliad parcel, separate depredation permits are obtained from USFWS (migratory birds) and TPWD (wildlife) for that airfield (Appendix B). The Navy also developed a Wildlife Hazard Management Plan (Appendix B). The BASH Instruction describes the aircrew notification and bird hazard warning system, wildlife hazard



*Training flight, NOLF Waldron*

Source: L. Rivard

reporting protocols, wildlife detection and dispersal team procedures, BASH dispersal equipment, land management procedures, and guidance for managing off-base land use. The 2013 NASCC BASH Instruction identifies the most common avian species that pose a threat to flight operations at NASCC airfields as gulls (Family Laridae); waterfowl (ducks, geese, and swans [Family Anatidae]); long-legged wading birds (herons and egrets [Family Areidae]); raptors (hawks, falcons, kites, eagles, and vultures [Family Accipitriformes]); wild turkey, quail, and pheasants (Family Phasianidae); sandpipers and shorebirds (Family Scolopacidae); terns (Laridae); owls (Family Strigidae); goatsuckers (nighthawks), whippoorwills, and other species (Family Caprimulgidae); woodpeckers (Family Picidae); flycatchers (Family Tyrannidae); horned larks (Family Alaudidae); swallows and swifts (Family Hirundinidae); crows and ravens (Family Corvidae); blackbirds, grackles, cowbirds, and starlings (Family Sturnidae); meadowlarks (*Sturnella* spp.); and house sparrows (Family Emberizidae). Mammalian species identified in the BASH Instruction with the most potential to pose a threat to flight operations at these airfields include coyote, rabbit (Order Lagomorpha), rodents (Order Rodentia), deer (Family Cervidae), javelina, and wild hogs.

#### *Issue*

BASH is the primary management issue related to fish and wildlife management at the Installation. The Installation has a large wildlife population (Navy 2006b). Daily animal

movements in the vicinity of the airport create various hazards to aircraft. The potential for a bird strike in the vicinity of the Installation is high due to the proximity of these parcels to the Gulf of Mexico, their location in the Coastal Bend Region, and their location within the Central Flyway. When combined, these factors contribute to the area's exceptionally abundant and diverse avifauna. Rappole and Blacklock (1985) called this region "...the richest bird country in North America north of the tropics..." and cite a total of 495 bird species as occurring in the nine-county area. The many resident species that occur are joined by large numbers of spring and fall migrants concentrated here by their unwillingness to traverse the waters of the Gulf of Mexico. Larger game species such as white-tailed deer and javelina (also known as peccary) also pose a BASH concern at the Main Station, NOLF Cabaniss, NOLF Waldron and NOLF Goliad. Control of these species in the vicinity of the airfields is conducted by the USDA Wildlife Biologists contracted by the Navy to ensure flight safety under authorized wildlife depredation permits issued by TPWD.

BASH hazards at NOLF Cabaniss used to stem from the Elliott Landfill operated by the City of Corpus Christi. The landfill is located approximately 1,500 ft (457 m) west of NOLF Cabaniss. Although the City has covered the exposed garbage and moved operations to the far west end of the landfill, decreasing the BASH hazard, NOLF Cabaniss has numerous bird attractants of its own, including sunflowers, wetlands, and scrub brush (Navy 2006b).

The Corpus Christi area hosts a large population of gulls year-round and large populations of waterfowl during winter months. Migrating hawks can pose a problem for aircraft during March and April, and again in September and October. Results from the most recent Corpus Christi (Flour Bluff) Christmas Bird Count conducted 16 December 2012 indicated 159 different bird species, including 127,520 individual bird sightings within the Count's 15-mi (24-km) diameter circle. The top three highest species counts were redheads (*Aythya americana*) (88,572 reported), followed by laughing gulls (*Leucophaeus atricilla*) (6,343) and northern pintails (*Anas acuta*) (4,140). Species of conservation interest that were identified include the federally- and state-threatened piping plover and red knot, and the state-threatened white-tailed hawk, reddish egret, and white-faced ibis. The state-threatened peregrine falcon, a federally-delisted species, was also identified in the count. A total of 18 USFWS Birds of Conservation Concern (BCC) species were identified in the count, including several that also have been identified at the Installation (National Audubon Society 2012). The high numbers of birds identified in the Corpus Christi (Flour Bluff) area are a clear indication of the attractiveness and importance of this area to bird populations. This also demonstrates the potential for conflict between aircraft and wildlife.

### ***Goals and Objectives***

The objective of the BASH Program is to reduce the potential for collisions, and encompass all actions that may identify, reduce or eliminate bird and animal hazards to aviation.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.5:** Maintain vegetation to reduce BASH potential.

**Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

***Projects and Management Strategies***

**Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for BASH reduction.

**Project No. 1 – Biological Inventories**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 6 – Neotropical Bird Survey**

**Project No. 7 – Habitat Management and Restoration**

**Management Strategies**

Management strategies related to BASH reduction at Installation include the following.

1. Discourage ponding of water within areas in proximity to the airfield to minimize attracting migratory birds and other wildlife, and to minimize the BASH potential for this parcel.
2. Implement habitat enhancement and maintain habitat diversity for migratory bird species, consistent with BASH Program requirements. Recommendations for habitat enhancement should be made to attract birds and other wildlife away from the flight operations areas.
3. Maintain Migratory Bird Depredation Permits from the USFWS to allow take or harm to migratory birds as part of BASH Program requirements, and to maintain airfield safety.
4. Map habitat types around the airfield using a GPS unit and enter information into the GIS database.
5. Review agricultural outleases and work with lessees to increase compliance with provisions to reduce BASH potential through crop selection; and to determine if crop restrictions should be included in agricultural outlease contracts.
6. Establish procedures for the BASH Program Wildlife Biologist to inform Navy personnel responsible for maintaining the BASH incident database for the Installation.
7. Procure and maintain BASH response equipment (i.e., propane cans, electronic scare devices, calls).
8. Conduct initial BASH training workshop for staff members with refresher training as needed.

***Long-term Management***

Agricultural practices have the potential to attract large numbers of birds and/or adversely impact wildlife habitat and degrade water quality. The current agricultural outleasing contracts at NOLF

---

Cabaniss, NOLF Waldron, and NOLF Goliad contain provisions for minimizing the potential environmental effectiveness of the lessee's use of the land. However, compliance with these provisions and the effectiveness of these measures is unknown. The types of row crops produced in the Clear Zone adjacent to each runway and clear zones at the Installation can vary and the leases do not include restrictions on what types of crops are permitted. Periodic reviews of the agricultural practices being carried out on the outleased lands at the Installation should be conducted to ensure the BASH potential from these practices is minimized, and that agricultural BMPs have been incorporated into the lease agreements that will result in the sustainable use of the land, with consideration of BASH minimization.

Migratory bird depredation permits from USFWS for management of birds and depredation permits from TPWD for management of wildlife to minimize BASH at NASCC airfields have been received for the BASH Program. The USFWS depredation permit is renewed annually to allow continuation of techniques that remove (through live-trapping or lethal measures), or scare birds away from these airfields. Depredation permits received from TPWD are renewed every five years. Appendix B contains a copy of the most current depredation permits received from USFWS and TPWD for NASCC.

A number of strategies may be employed to minimize BASH problems. However, modification of the habitat surrounding an airfield is the most effective long-term solution, since long-term results can be expected, resulting in a reduction in the need to implement additional habitat modification measures. Other techniques are available to be used in conjunction with habitat modification to remove the attractiveness of the airfields to birds and wildlife, such as encouraging use of habitats by birds and wildlife that are located away from the aerodrome portion of the Installation parcels. Navy environmental personnel and contractors are directly involved with the management of natural resources to ensure the safety of the airfields as required by the BASH Program, including the NRM, the Air Operations Officer responsible for implementing the BASH Program, and USDA Wildlife Biologists. These professionals are continually evaluating and implementing solutions to reduce the BASH potential. For projects that could potentially affect BASH Program requirements, the NRM will coordinate implementation of these with the Air Operations Officer who is responsible for implementing the BASH Program. The Draft BASH Reduction Plan that has been prepared for the Installation defines the major BASH issues and identify strategies and recommendations for long-term protection of operational capabilities of the Installation's airfields, as well as protecting the health, safety and welfare of civilians and military personnel. A Wildlife Hazard Assessment will be conducted for NASCC in 2013, and recommendations for reducing BASH identified from this assessment will be incorporated into the Final BASH Reduction Plan.

#### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – manage wetlands in airfield areas to reduce attraction of migratory birds and other wildlife, which pose a BASH risk.
- Riparian areas management, Section 3.2.1.3.1 – manage riparian habitat in airfield areas to reduce attraction of migratory birds and other wildlife, which pose a BASH risk.
- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – maintain vegetation and appropriate grass heights around airfields to reduce BASH risks.

- 
- Agricultural outleasements management, Section 3.2.1.4 – maintain grass heights and select appropriate crops to reduce BASH potential.
  - Wildlife management and habitat enhancement, Section 3.2.2.1 – finalize and implement the NASCC BASH Reduction Plan and manage habitat to reduce attractiveness to birds and wildlife to reduce BASH risks.
  - Migratory bird management, Section 3.2.2.2 – conduct appropriate bird surveys and implement bird deterrents and depredation methods as authorized by USFWS depredation permits.
  - Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management of fish and wildlife resources to reduce the BASH risk around Installation airfields.
  - Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on natural resources management to reduce the BASH risk around Installation airfields.
  - GIS, data integration, access, and reporting, Section 3.2.4.3 – use GIS as a tool to map habitat types around the airfields to assist in identifying areas appropriate for habitat improvements and areas that present a high BASH risk.
  - Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – partner with appropriate agencies to remain current on BASH reduction strategies and participate in BASH reduction workshops.

### ***Ecosystems Management***

The BASH potential will be reduced by managing wildlife on undeveloped, semi-developed, and developed areas around the airfields and within habitats of the Installation. By tracking BASH-related airfield incidents using a georeferenced data set, including information on habitat types at and near each incident's location, a more complete understanding of risks and potential causes of strikes can be developed, leading to more effective management actions.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to BASH Reduction***

- NAVFAC P-73, Real Estate Operations and Natural Resources Management Procedural Manual - Volumes 1 and II, addresses all CNO natural resources program requirements, guidelines, and standards.
- DoDI 4715.03, Natural Resources Conservation Program, implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.
- SAIA, 16 USC 670a-o, requires that, to the extent appropriate and applicable, military installations must provide for fish and wildlife management, fish and wildlife habitat enhancements and modifications, and wetland protection, enhancement, and restoration where necessary to support fish, wildlife, and plants.
- Commander, Navy Installations Command CNICINST 3700, Navy BASH Program Implementing Guidance, establishes policy and procedures for implementing the CNIC



---

BASH Program, establishes mandatory BASH event reporting and remains collection procedures, and establishes BASH program procedures.

- Commander, Navy Installations Command, BASH Manual, presents additional recommended policies, procedures, and instructional material to serve as an aid to CNIC shore aviation commands in developing local BASH policies and related personnel training programs; and identifies key BASH statutory and regulatory requirements, and provides advisory information for management of Navy airfields.
- NASCORPCINST 3750.16A, NAS Corpus Christi BASH Instruction, provides guidance that will minimize wildlife hazards on and around the airfield that pose a threat to aviation safety.
- OPNAVINST 3750.6R Ch. 4, Naval Aviation Safety Program, issues policies and provisions of the Naval Aviation Safety Program.
- OPNAVINST 5090.1D, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.
- FAA, Advisory Circular 150/5200-32A, Reporting Aircraft Wildlife Strikes, explains the importance of reporting collisions between aircraft and wildlife (i.e., wildlife strikes), and examines recent improvements in the FAA's BASH Reporting system; how to report a wildlife strike; what happens to the wildlife strike report data; how to access the FAA National Wildlife Aircraft Strike Database; and the FAA's Feather Identification program.
- FAA, Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.

#### ***Additional Sources of Information***

- FAA, Airport Safety and Operations Division ([https://www.faa.gov/about/office\\_org/headquarters\\_offices/arp/offices/aas/aas300/](https://www.faa.gov/about/office_org/headquarters_offices/arp/offices/aas/aas300/))
- FAA, Wildlife Strike Database (<https://wildlife.faa.gov/>)
- FAA, Wildlife Hazard Mitigation ([https://www.faa.gov/airports/airport\\_safety/wildlife/](https://www.faa.gov/airports/airport_safety/wildlife/))
- Air Force Safety Center (<https://www.safety.af.mil/Divisions/Aviation-Safety-Division/BASH/>)
- U.S. Naval Safety Center, Airfield Operations (<https://www.public.navy.mil/navsafecen/Pages/aviation/AirfieldOperations.aspx>)
- Commander, Navy Installations Command, NASCC ([https://www.cnic.navy.mil/regions/cnrse/installations/nas\\_corpus\\_christi.html](https://www.cnic.navy.mil/regions/cnrse/installations/nas_corpus_christi.html))

---

### 3.2.2.5 Invasive and Nuisance Wildlife Management

Invasive wildlife are defined as species of native and non-native animals that may move into or are introduced to an area and disturb the habitat of a similar native species or a non-similar species that depends upon the territory or food source claimed by the invasive species. Nuisance wildlife, which may be either native or non-native species, also can cause inconvenience, annoyance or irritation to the general human population or damage to property. The level of inconvenience or annoyance can range from relatively minor, such as reducing the aesthetic qualities of an area, to causing actual physical or economic damage to buildings, landscaped areas and other structures. Nuisance wildlife also may act as a vector for human disease. With some exceptions, species that may become a nuisance at the Installation usually do not create a major threat to human health or cause extensive damage to buildings or landscaping. The impact these species exert is usually on the aesthetic quality of life. The Installation addresses invasive and nuisance wildlife issues as needed.

#### *Issue*

Nuisance wildlife can increase the BASH potential, displace native species, cause an inconvenience to humans, threaten the health and safety of human populations, and have the potential to cause property damage. Nuisance wildlife at the Installation includes, but is not limited to, feral cats and dogs, rats, raccoons, opossums, skunks, white-tailed deer, and wild hogs (NAVFAC 2012).

Attempts have been made in the past to drive white-tailed deer off the property due to the potential hazard they pose to airfield activities, but these results were not successful (Navy 2006b). USDA Wildlife Biologists are responsible for control and removal of birds and wildlife that may pose a hazard to the BASH Program. In support of the BASH Program NASCC received a depredation permit from TPWD in 2007 for removal of wildlife on and around the airfields of the Main Station, NOLF Waldron and NOLF Cabaniss. A separate depredation permit has been received from TPWD for NOLF Goliad (Appendix B). These depredation permits authorize removal of white-tailed deer, javelina, and Rio Grande wild turkey (*Meleagris gallopavo intermedia*) that pose a problem. In 2007, 15 white-tailed deer were removed from NOLF Waldron during a three-day period.

Control of nuisance wildlife at the Installation is an important component of natural resources management, as many nuisance wildlife species can harbor and transmit a variety of fatal and non-fatal diseases to domestic pets and humans. These diseases include rabies, plague, parasitic worms, external parasites such as fleas and mites, feline immunodeficiency virus, feline leukemia virus, feline distemper or panleukopenia, feline infectious peritonitis, and various bacterial infections. Feral cats also can harbor and transmit fatal and non-fatal diseases to humans, including rabies, plague, ringworm, internal and external parasites, toxoplasmosis, bartonellosis (formerly known as cat scratch fever), allergies to cat hair, and secondary bacterial infections from cat scratches and bites.

Feral cats living in close association with humans also can damage buildings, contaminate food supplies, and kill birds and other wildlife. Parasites such as fleas are often a problem in areas inhabited by feral cats. Because feral cats adversely affect human and pet health and welfare,

they must be controlled. If there is a need for feral cat control on a military installation, a feral cat control plan should be developed and approved by the installation commander. Acceptable methods of control include live trapping, hand catching, repellants, tranquilizer dart guns, and shooting. Wild hogs are a nuisance species and are a BASH issue at NOLF Waldron. As a result, wild hogs are trapped and disposed of as needed at these airfields. The recently installed perimeter fence at NOLF Goliad will reduce the potential for wildlife entering the airfield area, thereby reducing the BASH potential (for mammals) at this parcel (see Management Strategies discussion below for fencing details).

A good example of an invasive species that is present at the Installation is the red imported fire ant, which occurs in Nueces and Goliad counties. This ant invades an area and immediately drives out other ant species, and also is a nuisance and potential health hazard for humans and animals (dogs, cats and wildlife) that may be involved in activities in the same area. During this invasion, the red imported fire ant removes the food source for other animals in the habitat that depended on the presence of the species displaced. An example of this is the loss of harvester ants due to fire ant invasion, causing the Texas horned lizard, a Texas threatened species, to lose its food source.

Wildlife species considered invasive for the Installation are listed in Appendix G, Table G-1.

### *Goals and Objectives*

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

**Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for invasive and nuisance wildlife management.

#### **Project No. 1 – Biological Inventories**

#### **Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 8 – Natural Resources Outreach**

**Management Strategies**

Management strategies related to control of invasive and nuisance wildlife at the Installation include the following.

1. Use of fencing to keep nuisance species and other large mammals out of and clear of runways. Fencing helps exclude white-tailed deer at NOLF Cabaniss. The new chain link fence at NOLF Goliad is 10 mi (16 km) long and is installed 20 ft (6 m) inside of the property perimeter, 2 ft (0.6) below ground and 10 ft (3 m) above ground to keep out wildlife. Management of nuisance species, including trapping as needed, will continue at NOLF Waldron.
2. Control and removal of nuisance species by live trapping, hand catching, repellants, tranquilizer darts guns, and shooting.

***Long-term Management***

The Installation NRM will use an adaptive approach to manage nuisance and invasive wildlife and will explore alternative ways to meet management objectives, predict the outcomes of each alternative based on the current state of knowledge, implement one or more of these alternatives, and use the results to increase knowledge and adjust management actions. In cases where resources such as time, money, and staff are limited, management planning will ensure that the Installation uses resources wisely to manage nuisance and invasive wildlife for the long term.

The CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property states installations must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations. Additionally, installations must ensure the humane capture and removal of feral cats and dogs, and efforts should be made to find homes for adoptable animals (Navy 2002). The Armed Forces Pest Management Board Technical Guide No. 37, Integrated Management of Stray Animals on Military Installations (DoD, Armed Forces Pest Management Board 2012) provides additional guidance for installations in addressing feral cat control issues. The NRM is responsible for providing pet and wildlife information to Installation personnel. As a proactive measure for reducing the number of feral animals at the Installation, the Installation also encourages responsible pet ownership and limiting feral pet access to food and shelter. Vaccinations, registrations, and tags are required for every pet that resides at the Main Station (no residences are associated with other Installation parcels, and as such no pets should be present on these parcels) (DoD, Armed Forces Pest Management Board 2012). Spay and neuter programs are promoted and all pets must be kept under strict supervision and control. Feeding of stray animals is prohibited and all dumpsters are required to be secured to prevent scavenging.

---

The Installation IPM Plan (NAVFAC 2012) provides a comprehensive document that captures all pest management operations and pesticide-related activities conducted at the Installation. The plan incorporates relevant BMPs and local, state, federal, and DoD regulations. Nuisance wildlife management and recommendations includes measures to eliminate available food that can attract wildlife by securing garbage cans and dumpsters and prohibiting feeding of stray pets. Pet owners are encouraged to microchip their pets to improve pet identification. The pest control contract for the Installation, which is monitored by the Facilities Engineering and Acquisition Division, provides for unscheduled miscellaneous pest control, as appropriate. Removal of wild and feral animals at the Installation includes skunks, opossums, snakes, cats, and dogs. Non-lethal methods of removal are recommended (i.e., cage-type live traps, Snake Guard® glue traps) and maintenance of the traps includes replacement of bait as required and timely removal of all trapped animals to prevent death by starvation or dehydration. Leg-hold traps are not permitted. Cats and dogs captured at Main Station are to be transported to local animal shelters. Skunks are to be destroyed humanely and disposed of off Installation property.

Birds nesting, roosting, or loafing on exterior and interior surfaces of all buildings and structures are generally considered nuisance birds. Generally, this includes such species as pigeons, starlings, house sparrows, and gulls. These species are known to be attracted to habitat near airstrips including ephemeral pools of water and low-cut grasses. Bird management programs may include trapping, harassment, lethal removal, non-lethal repellents, physical barriers, and toxic baits or perches. A Migratory Bird Depredation Permit from the USFWS is needed to take or harm most birds. Whereas the Installation has obtained Migratory Bird Depredation Permits from USFWS, these permits are only applicable to removal of birds that cause a safety issue on or around the airfields. A listing of birds not protected by the MBTA can be found in the FR (70 FR 12710-12716).

Medium to large mammals can increase the BASH potential when entering runway or taxiway areas. Other than birds, deer pose the biggest wildlife hazard, but other species such as wild hogs, coyotes, and javelina also are of BASH concern. Continued removal of deer at the Installation by USDA Wildlife Biologists will help to reduce the potential for animal/aircraft mishaps. Depredation Permits received from TPWD allowing for the removal of white-tailed deer and javelina have been obtained as required to conduct such activities.

#### ***Integration with Other Natural Resources Management Activities***

- BASH reduction, Section 3.2.2.4 – properly manage invasive and nuisance wildlife populations that pose a BASH risk.
- Zoonosis prevention, Section 3.2.2.6 – control and/or remove invasive and nuisance wildlife to prevent spread of zoonosis.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and enhancement of control of invasive and nuisance wildlife.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on management and control/removal of invasive and nuisance wildlife.
- Natural resources law enforcement, Section 3.2.4.2 – coordinate with local law enforcement personnel to control and/or remove invasive and nuisance wildlife as

needed. GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map problem areas for invasive and nuisance wildlife, and to identify control and removal activities.

### ***Ecosystems Management***

Control and reduction of invasive and nuisance wildlife will help to restore wildlife habitat and ground cover at the Installation, limit the spread of these species to areas in the region, limit the possibility of human infection, and reduce the BASH potential at Installation airfields.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Invasive and Nuisance Wildlife Species Management***

- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- Texas Penal Code 42.09, Animal Cruelty, makes it a Class A Misdemeanor to abandon a pet dog or cat, punishable with up to a \$4,000 fine and/or a year in jail.
- Texas Health and Safety Code, Chapter 821, Treatment and Disposition of Animals, Subchapter C, requires all animals in animal shelters be euthanized in a humane manner with only one of two methods by a licensed veterinarian or certified technician: administering sodium pentobarbital or commercially compressed carbon monoxide.
- Armed Forces Pest Management Board Technical Guide No. 37, Integrated Management of Stray Animals on Military Installations, provides guidance for installations in addressing feral cats.
- CNO Policy Letter of January 2002 on Preventing Feral Cat and Dog Populations on Navy Property, provides recommendations for pet management procedures to prevent the establishment of free-roaming cat and dog populations
- OPNAVINST 5090.1D, 12-3.10, prohibits the introduction of exotic species into natural ecosystems and requires control or eradication of exotic species and noxious weeds on federal lands.

### ***Additional Sources of Information***

- TPWD, Exotic and Invasive Species  
(<https://tpwd.texas.gov/huntwild/wild/species/exotic/>)
- TPWD, Nuisance Aquatic Vegetation  
([https://tpwd.texas.gov/landwater/water/environconcerns/nuisance\\_plants/](https://tpwd.texas.gov/landwater/water/environconcerns/nuisance_plants/))
- Texas Invasives (<https://www.texasinvasives.org/>)
- TNC, Protecting Native Plants and Animals  
(<https://www.nature.org/en-us/what-we-do/our-priorities/protect-water-and-land/>)

---

### 3.2.2.6 Zoonosis Prevention

The Texas Department of State Health Services Zoonosis Control division monitors zoonosis, which are diseases communicable from animals to humans under natural conditions. Appendix H contains information on the main zoonosis concerns for the Installation and includes preventative measures to reduce their spread and transmission. To help prevent the spread of these diseases the Naval Health Clinic is responsible for posting notices of disease outbreaks that may affect Installation personnel, and promoting preventative measures to limit their spread and transmission.

#### *Issue*

The main zoonosis concerns for Installation properties are rabies, lyme borreliosis, Rocky Mountain spotted fever, human ehrlichiosis, murine typhus, plague, mosquito-borne encephalitis, brucellosis, salmonellosis, and anthrax (Texas Department of State Health Services, Zoonosis Control Division 2003). Although not state-listed, salmonella also has been identified by the Texas Department of State Health Services, Zoonosis Control Division as a continuing concern. None of these diseases are of epidemic proportions, however, there are a number of preventive measures that can, and should, be taken to minimize the possibility of disease transmission.

#### *Goals and Objectives*

Ensure public awareness of public health concerns related to zoonosis through distribution of public health alerts and posting of best practices for avoiding incidents.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.12:** Prevent and control invasive and nuisance wildlife species, and wildlife diseases that may adversely affect human health and welfare, the health of the ecosystem, and the military mission.

#### *Projects and Management Strategies*

##### **Projects (detailed in Appendix K)**

There are no INRMP projects directly related to zoonosis prevention; however, the Naval Health Clinic should look for educational outreach opportunities to disseminate information on preventing the spread of the zoonosis diseases of concern in Texas, and alerting Installation residents and employees of any public health alerts as they arise. The information provided in Appendix H can be used to develop a pamphlet or fact sheet for zoonosis prevention at the Installation.

##### **Management Strategies**

Management strategies related to zoonosis prevention at the Installation include the following.

1. Develop a system for alerting Installation residents and employees of any public health alerts as they arise.

2. Develop an informational pamphlet or fact sheet on the zoonosis diseases of concern for Texas and highlighting measures to prevent their spread.
3. Maintain up-to-date information on the zoonosis diseases of concern for the area, including the specific times of year and conditions that present the greatest risk of exposure.
4. Maintain knowledge of, and recognition of, early symptoms of diseases and the condition of exposure.
5. Disseminate information regarding the dangers associated with approaching and/or handling wild animals, especially those that appear sick or act abnormally.
6. Disseminate information on the use of measures that provide protection from contracting fungal diseases associated with the accumulation of feces (e.g., under bird and bat roosts).
7. Disseminate information on the use of measures that provide protection from vector-borne diseases in high-risk areas, such as use of mosquito or tick repellent and protective clothing.
8. Disseminate information on the measures that can reduce host populations and their ectoparasites.

### ***Long-term Management***

There have been no reports of diseases affecting wildlife or humans at the Installation. However, the Installation should have a long-term management policy for promoting public awareness regarding the issues of concern associated with zoonosis prevention. Management would focus on, but not be limited to, the management strategies identified above.

### ***Integration with Other Natural Resources Management Activities***

- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – educate grounds maintenance and landscaping personnel on the dangers associated with wildlife that can carry diseases, and other zoonosis prevention measures associated with grounds maintenance and landscaping activities.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – manage habitat to eliminate attractive habitats for invasive and nuisance wildlife that may pose a risk for spread of infections and diseases.
- Invasive and nuisance wildlife species management, Section 3.2.2.5 – control and/or remove invasive and nuisance wildlife species that pose a zoonosis risk.
- Integrated ecosystems management and partnering, Section 3.2.4 – promote collaborative management and prevention of zoonoses of concern.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on zoonosis prevention measures.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to identify and manage areas where zoonosis risks are elevated or confirm locations of outbreaks.



---

### ***Ecosystems Management***

By controlling wildlife pests and diseases, the Installation is protecting the healthy sustainable population of humans and wildlife at the Installation, and within the region.

#### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Zoonosis Prevention***

- Texas Administrative Code, Chapter 169, Subchapter A, Rabies Control and Eradication, provides details on vaccine requirements and protocols as mandated by the state of Texas, and requires that all dogs and cats be vaccinated against rabies by four months of age and on a 1-year or 3-year basis thereafter.
- Texas Administrative Code, 169.121, Reptile-Associated Salmonellosis; and Texas Health and Safety Code, Sections 81.351-353, Subchapter I, Animal-Borne Diseases; requires retail stores that sell reptiles to post warning signs and distribute written warnings regarding reptile-associated salmonellosis to purchasers in accordance with the form and content designated by the Texas Department of State Health Services.
- Texas Administrative Code, Chapter 97, Communicable Diseases, provides details on control of communicable diseases.

#### ***Additional Sources of Information***

- Center for Disease Control (<https://www.cdc.gov/>)
- USDA APHIS, National Wildlife Disease Program ([https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc/sa\\_nwdp](https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc/sa_nwdp))
- USGS National Wildlife Health Center (<https://www.usgs.gov/centers/nwhc>)
- Texas Department of State Health Services Zoonosis Control Division (<https://www.dshs.state.tx.us/idcu/health/zoonosis/>)

### **3.2.2.7 Rare, Threatened, and Endangered Wildlife Species Management**

This subsection describes the management of rare, threatened and endangered wildlife species identified on the Installation. The management of rare, threatened and endangered plant species at NASCC is described in Section 3.2.1.7 of this INRMP. Table 3-2 provides a cross-walk of how INRMP projects and management areas described in this document will benefit all of the rare, threatened, and endangered wildlife (and plants) known or with the potential to occur at the Installation. More information on the rare, threatened, and endangered plants and wildlife associated with the Installation are provided in Appendix E, Table E-13.

The federal ESA was enacted to conserve endangered and threatened species and the ecosystems on which these species depend, and provides conservation programs for endangered and threatened species. Federal agencies are required to ensure that no actions undertaken by the agency will likely jeopardize the continued existence of any threatened or endangered species, except as provided within the ESA. Whenever there is a possibility that an endangered species may be present in an area affected by an action of a federal agency, that agency is required to conduct a biological assessment within the affected area to document the presence or absence of threatened or endangered species. If such species are found, the federal agency must make

reasonable efforts to avoid actions that would have a detrimental impact on the threatened or endangered species.

The Texas ESA protects threatened and endangered wildlife species in Texas, as described in TPWD Code, Title 5, Subtitle B (Hunting and Fishing), Chapters 61-68 and Sections 65.171-176 of Title 31 of the Texas Administrative Code. The Navy protects federally-listed wildlife species which benefits state-listed wildlife species protected by the Texas ESA.

A list of state-listed wildlife species known or with the potential to occur at NASCC is provided in Appendix E, Table E-13.

This section describes the management recommendations and benefits of this INRMP for federally listed wildlife species that are known to occur at the Installation. Currently the only known federally-listed wildlife species known to occur at the Installation are the piping plover and red knot (Texas A&M 2018a; Withers 2014; Woodin et al. 2010). Updates to the federal ESA listings, such as the listing or removal of a species under the ESA or a change in species presence at the Installation, may require changes in management practices to address these changes.

Several species considered rare in Texas are known to occur at the Installation, and these are described in this section and covered by management activities associated with this INRMP.

**Table 3-2. Crosswalk of Rare, Threatened, and Endangered Plants and Wildlife with Management Areas and INRMP Projects.**

Species <sup>3</sup>	Status	Cross-reference to Text	Management Activities that Benefit the Species and its Habitat <sup>1</sup>																		INRMP Projects that Benefit the Species and its Habitat <sup>2</sup>							
			Land Management						Fish and Wildlife Management						Outdoor Recreation Management		Integrated Ecosystems Management and Partnering											
			Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleas	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs	Biological Inventories	Rare, Threatened, and Endangered Species Habitat Management	Invasive Species Control	NASCC INRMP Updates	Prescribed Fire Management	Neotropical Bird Survey
<b>PLANTS</b>																												
South Texas ambrosia ( <i>Ambrosia cheiranthifolia</i> )	FE,SE	2.2.10			M			M	M	M									M		P	P		P			P	P
Slender rushpea ( <i>Hoffmannseggia tenella</i> )	FE,SE	2.2.10			M			M	M	M									M		P	P		P			P	P
<b>MOLLUSKS</b>																												
Golden orb ( <i>Quadrula aurea</i> )	FC,ST	3.2.2.7	M								M								M		P	P		P			P	P
False spike mussel ( <i>Quadrula mitchelli</i> )	ST	3.2.2.7	M								M								M		P	P		P			P	P
Texas pimpleback ( <i>Quadrula petrina</i> )	FC,ST	3.2.2.7	M								M								M		P	P		P			P	P
<b>FISHES</b>																												
Opossum pipefish ( <i>Microphis brachyurus</i> )	ST	3.2.2.7	M	M				M		M		M							M		P	P		P			P	P
Smalltooth sawfish ( <i>Pristis pectinata</i> )	FE,SE	3.2.2.7	M	M				M		M		M							M		P	P		P			P	P
<b>AMPHIBIANS</b>																												
Sheep frog ( <i>Hypopachus variolosus</i> )	ST	2.3.6	M							M		M							M		P	P		P			P	P
Black-spotted newt ( <i>Notophthalmus meridionalis</i> )	ST	2.3.6	M							M		M							M		P	P		P			P	P
<b>MARINE REPTILES</b>																												
Loggerhead sea turtle ( <i>Caretta caretta</i> )	FT,ST	2.3.6, 3.2.2.7	M	M						M		M				M		M	M	M	P	P		P			P	P

Species <sup>3</sup>	Status	Cross-reference to Text	Management Activities that Benefit the Species and its Habitat <sup>1</sup>																		INRMP Projects that Benefit the Species and its Habitat <sup>2</sup>									
			Land Management							Fish and Wildlife Management							Outdoor Recreation Management		Integrated Ecosystems Management and Partnering											
			Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleas	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs	Biological Inventories	Rare, Threatened, and Endangered Species Habitat Management	Invasive Species Control	NASCC INRMP Updates	Prescribed Fire Management	Neotropical Bird Survey	Habitat Management and Restoration	Natural Resources Outreach
Green sea turtle ( <i>Chelonia mydas</i> )	FT,ST	2.3.6, 3.2.2.7	M	M						M		M				M		M		M	M	M	P	P		P			P	P
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	FE,SE	2.3.6, 3.2.2.7	M	M						M		M				M		M		M	M	M	P	P		P			P	P
Hawksbill sea turtle ( <i>Eretmochelys imbricate</i> )	FE,SE	2.3.6, 3.2.2.7	M	M						M		M				M		M		M	M	M	P	P		P			P	P
Kemp's ridley sea turtle ( <i>Lepidochelys kempii</i> )	FE,SE	2.3.6, 3.2.2.7	M	M						M		M				M		M		M	M	M	P	P		P			P	P
<b>TERRESTRIAL REPTILES</b>																														
Texas scarlet snake ( <i>Cemophora coccinea</i> ssp. <i>lineri</i> )	ST	3.2.2.7			M					M						M		M			M		P	P		P			P	P
Timber rattlesnake ( <i>Crotalus horridus</i> )	ST	3.2.2.7			M					M						M		M			M		P	P		P			P	P
Texas indigo snake ( <i>Drymarchon melanurus</i> ssp. <i>erebennus</i> )	ST	2.3.6			M					M						M		M			M		P	P		P			P	P
Texas tortoise ( <i>Gopherus berlandieri</i> )	ST	2.3.6			M					M						M		M			M		P	P		P			P	P
<b>BIRDS</b>																														
Sprague's pipit ( <i>Anthus spragueii</i> )	NL	2.3.6, 3.2.2.7			M					M	M		M			M					M	M	P	P		P		P	P	P
White-tailed hawk ( <i>Buteo albicaudatus</i> )	ST	2.3.6			M					M	M		M			M					M		P	P		P		P	P	P
Red knot ( <i>Calidris canutus</i> )	FT	2.3.6, 3.2.2.7			M					M	M		M			M					M	M	P	P		P		P	P	P
Piping plover ( <i>Charadrius melodus</i> )	FT,ST	2.3.6, 3.2.2.7			M					M	M		M			M					M	M	P	P		P		P	P	P

Species <sup>3</sup>	Status	Cross-reference to Text	Management Activities that Benefit the Species and its Habitat <sup>1</sup>																		INRMP Projects that Benefit the Species and its Habitat <sup>2</sup>							
			Land Management							Fish and Wildlife Management							Outdoor Recreation Management		Integrated Ecosystems Management and Partnering									
			Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleas	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs	Biological Inventories	Rare, Threatened, and Endangered Species Habitat Management	Invasive Species Control	NASCC INRMP Updates	Prescribed Fire Management	Neotropical Bird Survey
Reddish egret ( <i>Egretta rufescens</i> )	ST	2.3.6			M					M	M		M			M			M		P	P		P		P	P	P
Swallow-tailed kite ( <i>Elanoides forficatus</i> )	ST	3.2.2.7			M					M	M		M			M			M		P	P		P		P	P	P
Northern aplomado falcon ( <i>Falco femoralis</i> ssp. <i>septentrionalis</i> )	FE,SE	2.3.6			M					M	M		M			M		M	M		P	P		P		P	P	P
Peregrine falcon ( <i>Falco peregrinus</i> ssp. <i>anatum</i> )	ST	2.3.6, 3.2.2.7			M					M	M		M			M			M		P	P		P		P	P	P
Whooping crane ( <i>Grus Americana</i> )	FE,SE	2.3.6			M					M	M		M			M			M		P	P		P		P	P	P
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	BGE, ST	3.2.2.2			M					M	M		M			M			M	M	P	P		P		P	P	P
Wood stork ( <i>Mycteria Americana</i> )	ST	3.2.2.7			M					M	M		M			M			M		P	P		P		P	P	P
Eskimo curlew ( <i>Numenius borealis</i> )	FE,SE	2.3.6			M					M	M		M			M			M		P	P		P		P	P	P
Brown pelican ( <i>Pelecanus occidentalis</i> )	SE	2.3.6, 3.2.2.7			M					M	M		M			M			M	M	P	P		P		P	P	P
Texas Botteri's sparrow ( <i>Peucaea (Aimophila) botterii texana</i> )	ST	3.2.2.7			M					M	M		M			M			M		P	P		P		P	P	P
White-faced ibis ( <i>Plegadis chihi</i> )	ST	2.3.6			M					M	M		M			M			M		P	P		P		P	P	P
Least tern ( <i>Sterna antillarum</i> )	NL	2.3.6			M					M			M			M			M		P	P		P		P	P	P
Interior least tern ( <i>Sterna antillarum</i> ssp. <i>athalassos</i> )	FE,SE	2.3.6			M					M			M			M			M		P	P		P		P	P	P
Sooty tern ( <i>Sterna fuscata</i> )	ST	3.2.2.7			M					M			M			M			M		P	P		P		P	P	P

Species <sup>3</sup>	Status	Cross-reference to Text	Management Activities that Benefit the Species and its Habitat <sup>1</sup>																		INRMP Projects that Benefit the Species and its Habitat <sup>2</sup>									
			Land Management						Fish and Wildlife Management						Outdoor Recreation Management		Integrated Ecosystems Management and Partnering													
			Water Resources	Coastal Zone	Vegetation and Habitat	Agricultural Outleasings	Wildland Fire	Rare and Sensitive Ecosystems	Rare, Threatened, and Endangered Plant Species	Wildlife Management and Habitat Enhancement	Migratory Bird	Fisheries and Aquatic Species	BASH Reduction	Invasive and Nuisance Wildlife	Zoonosis Prevention	Rare, Threatened, and Endangered Wildlife Species	Public Access	Educational Outreach	Training of Natural Resources Personnel	Natural Resources Law Enforcement	GIS, Data Integration, Access, and Reporting	Partnering with Federal and State Agencies, Universities, and NGOs	Biological Inventories	Rare, Threatened, and Endangered Species Habitat Management	Invasive Species Control	NASCC INRMP Updates	Prescribed Fire Management	Neotropical Bird Survey	Habitat Management and Restoration	Natural Resources Outreach
Attwater's greater prairie-chicken ( <i>Tympanuchus cupido ssp. attwateri</i> )	FE,SE	2.3.6			M					M					M				M			P	P		P		P	P	P	
<b>MARINE MAMMALS</b>																														
West Indian manatee ( <i>Trichechus manatus</i> )	FT,SE	2.3.6	M	M						M		M				M		M		M			P		P			P		
<b>TERRESTRIAL MAMMALS</b>																														
Red wolf ( <i>Canis rufus</i> )	FE,FE	2.3.6			M					M									M			P	P		P			P	P	
Maritime pocket gopher ( <i>Geomys personatus ssp. maritimus</i> )	NL	2.3.6, 3.2.2.7		M	M					M									M	M		P	P		P			P	P	
Gulf Coast jaguarundi ( <i>Puma yagouaroundi ssp. cacomitli</i> )	FE,SE	2.3.6	M	M	M					M									M	M		P	P		P			P	P	
Southern yellow bat ( <i>Lasiurus ega</i> )	ST	2.3.6, 3.2.2.7			M					M					M	M				M	M		P	P		P			P	P
Ocelot ( <i>Leopardus pardalis</i> )	FE,SE	2.3.6			M					M									M			P	P		P			P	P	
White-nosed coati ( <i>Nasua narica</i> )	ST	3.2.2.7			M					M									M			P	P		P			P	P	

<sup>1</sup>M = denoted management activity benefits the denoted species and its habitat

<sup>2</sup>P = denoted project benefits the denoted species and its habitat

<sup>3</sup>Common and scientific plant names follow the USDA PLANTS Database nomenclature; names used by TPWD are included in parentheses as relevant

<sup>4</sup>Federal and State Status: BCC = USFWS Birds of Conservation Concern (USFWS 2008), C = Candidate species for listing, DL = Delisted, E = Endangered, MMPA = Marine Mammal Protection Act, NL = Not Listed, T = Threatened, (c) = BCC status is for the non-listed subspecies or population of threatened and endangered species, (nb) = BCC status is for non-breeding population. State Ranking information was obtained from TPWD 2012d: NL = Not Listed, S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, ? = Questionable taxonomy, B = breeding, N = Nonbreeding, S#S# = Range Rank, SNR = Unranked, SU = Unrankable, SX = Presumed extirpated, SH = Possible extirpated (historical)

Sources: TPWD 2013, Cornell University 2012, National Oceanic and Atmospheric Administration Fisheries 2012, Texas A&M University – Corpus Christi 2012, TPWD 2012c, TPWD 2012d, USFWS 2012c, USFWS 2012d, Henke et al. 2010, Woodin et al. 2010, Sullivan et al. 2009, Navy 2009a, USFWS 2008, Hickman et al. 2007, Navy 2006b, Wolfe et al. 1998, National Audubon Society n.d., TPWD n.d. g, and USFWS n.d. a

---

***Federally-Listed Wildlife Species Known or with the Potential to occur at the Installation***

**Piping Plover (*Charadrius melodus*)**

*Federal Status: Threatened (wintering); Endangered (breeding)*

*State Status: Threatened*

The piping plover is listed by the USFWS as threatened throughout its wintering range and endangered within its breeding range (65 FR 41782). This stocky shorebird has a wingspan of 15 in (38 cm) and is generally 7 in (18 cm) from bill to tail. The adults are light sand colored with a white underside and orange legs. During breeding season, adults have a dark, narrow breast band and dark forehead stripe with a black-tipped orange bill. During winter these birds lose the black bands, their legs fade to pale yellow, and their bills become mostly black.



*Piping plover (Charadrius melodus)*  
Source: Navy 2006b

This species was historically common in certain habitats along the Atlantic and Gulf Coasts, along river systems and lakes of the northern Great Plains, the Great Lakes, and in the Bahamas and West Indies (65 FR 41782). Today only remnant populations occur throughout the historic range. Piping plovers spend 60 to 70 percent of the year wintering primarily along the Gulf Coast and Atlantic Coast from North Carolina to Florida. The preferred wintering habitats of piping plover includes beaches, sandflats, mudflats, algal mats, washover passes, and spoil islands along the Gulf Intracoastal Waterway. Approximately 35 percent of the known population of piping plovers winter in Texas. Piping plovers can generally be found on the Texas coast from

mid-July through mid-April and sometimes until mid-May. Threats to winter habitat along the Gulf Coast include industrial and urban expansion and maintenance activities for commercial waterways and increasing recreational use of Gulf beaches (Campbell 1995).

All wintering populations of the piping plover are federally-threatened and as such receive full legal protection under the ESA. USFWS designated 142 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas as Critical Habitat for wintering populations of the piping plover on 10 July 2001 (66 FR 36038). One unit of this critical habitat, Unit 12-TX (6 ac [2 ha]) is located adjacent to and within the boundaries of the Main Station. A second unit, Unit TX-11 (58 ac [23 ha]), is along Oso Bay, adjacent to Ward Island near the Texas A&M University – Corpus Christi campus. Due to the dynamic nature of coastal habitat (i.e., hurricanes, storm surges, erosion), the definitive determination of critical habitat boundaries is the USFWS’s textual description of each unit, rather than a static mapped boundary. The approximate locations of Unit TX-11 and Unit TX-12 are presented in Figure 2-23. Federal agencies are required to consult with USFWS on actions they carry out, fund, or authorize to ensure that their actions will not destroy or adversely modify Critical Habitat. In this way, a Critical Habitat designation protects areas that are necessary for the conservation of the species.

Piping plovers were most recently observed during a 2016-17 avian survey at the Installation and Critical Habitat is designated at the Main Station (Texas A&M 2018). INRMP projects that will directly benefit wintering populations of piping plover include biological inventory (Project No. 1), conducting rare, threatened, and endangered species habitat management (Project No. 2); NASCC INRMP updates (Project No. 4); neotropical bird survey (Project No. 6); habitat management and restoration (Project No. 7); and natural resources outreach (Project No. 8). Other management actions that will benefit piping plover include conducting internal and agency consultation during project planning as required for projects that may impact federally listed species, and conducting regular monitoring surveys of migratory birds as part of the BASH Program. Management actions that may indirectly impact piping plover are related to bird control measures conducted in support of the BASH Program. Educational outreach should be conducted to showcase the measures the Navy has adopted for protection of this species and other migratory birds at the Installation. Routine monitoring of migratory birds as part of the BASH Program will provide valuable information on the population and habitat preferences of piping plover at the installation. These measures will ensure proper management of this species, and will allow for improved management measures to be implemented, as needed.

**Sprague’s pipit (*Anthus spragueii*)**

*Federal Status: USFWS Bird of Conservation Concern*

*State Status: Not Applicable*

Sprague’s pipit is a USFWS BCC species (non-breeding), and protected by the MBTA. There is no state listing associated with this species.

The Sprague’s pipit is a relatively small passerine bird that is endemic to the North American grasslands. This species is a ground nester that breeds and winters on open grasslands, feeding mostly on insects and spiders and some seeds. Sprague’s pipit is dependent upon native prairie habitat and breeds in the north-central U.S. in Minnesota, Montana, North Dakota and South Dakota as well as south-central Canada. Its wintering habitat is located in southern states, including Arizona, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and New Mexico (USFWS 2011).



*Sprague’s pipit (Anthus spragueii)*

Source: AvianWeb 2011

A conservation plan has been developed by USFWS for Sprague’s pipit, which identifies habitat loss, degradation, and fragmentation; inappropriate management; nest predation and parasitism; energy development; climate change; and drought as the primary threats that currently or potentially effect populations of this species throughout their range (Jones 2010). Sprague’s pipit has been documented in grasslands habitat at the Main Station and NOLF Waldron (Appendix E) (Woodin et al. 2010). Protection, conservation and management of Sprague’s pipit is provided for in this INRMP. INRMP projects that will directly benefit the wintering Sprague’s pipit population include conducting biological inventories (Project No. 1); rare, threatened, and



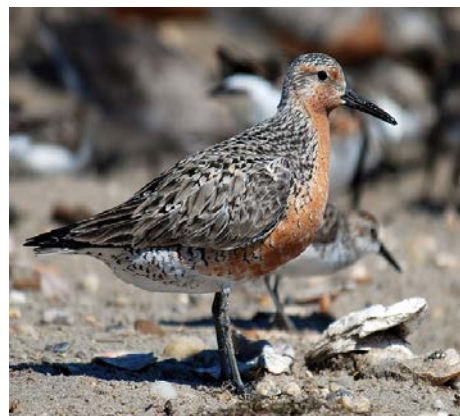
endangered species habitat management (Project No. 2); NASCC INRMP updates (Project No. 4); prescribed fire management (Project No. 5); neotropical bird survey (Project No. 6); habitat management and restoration (Project No. 7); and natural resources outreach (Project No. 8). Other management actions that will benefit Sprague's pipit include conducting internal and agency consultation during project planning as required for projects that may impact federally listed species, and conducting regular monitoring surveys of migratory birds as part of the BASH Program. Management actions that may indirectly impact Sprague's pipit are related to vegetation management and bird control measures conducted in support of the BASH Program. Because grounds maintenance and landscaping activities have the potential to impact grassland habitat that supports this species, the NRM will coordinate with the PWD and other personnel involved with grounds maintenance and landscaping activities to identify practices that can be implemented to preserve grassland habitat in the urban environment. Educational outreach should be conducted to showcase the measures the Navy has adopted for protection of this species and other migratory birds at the Installation. Routine monitoring of migratory birds as part of the BASH Program will provide valuable information on the population and habitat preferences of Sprague's pipit at the Installation. These measures will ensure proper management of this species at the Main Station and NOLF Waldron, and will allow for improved management measures to be implemented, as needed.

**Red knot (*Calidris canutus* spp. *rufa*)**

*Federal Status: Threatened and USFWS Bird of Conservation Concern*

*State Status: Not Applicable*

The red knot is a medium-sized shorebird that inhabits intertidal habitats, particularly those located near coastal inlets and bays. Individuals occurring at the Installation may be fall or spring migrants of the *rufa* subspecies stopping to rest or forage on one of the longest yearly migrations of any bird – 9,300 miles (15,000 km) from the Arctic Circle to Tierra del Fuego at the southern-most tip of South America. The occurrence of red knot has been confirmed for the Main Station (Woodin et al. 2010), and has the potential to occur at NALF Cabaniss and NALF Waldron (Coastal Bend Audubon Society 2000). A spotlight species action plan has been developed by USFWS for red knot, which identifies destruction and modification of red knot habitat and forage, particularly the decline of key food resources resulting from reductions in horseshoe crabs; beach erosion, shoreline protection and stabilization projects; human disturbance; and competition with other species for limited food resources as the primary threats that currently or potentially effect populations of this species throughout their range (USFWS 2010b).



*Red knot (Calidris canutus)*

Source: Wikimedia Commons 2008

Conservation and management measures identified in this INRMP will provide benefits to the migrating population of red knot, including preservation of coastal habitat. INRMP projects that will directly benefit the fall or spring migrant red knot population include conducting biological inventories (Project No. 1); rare, threatened, and endangered species habitat management

(Project No. 2); invasive species control (Project No. 3); NASCC INRMP updates (Project No. 4); prescribed fire management (Project No. 5); neotropical bird survey (Project No. 6); habitat management and restoration (Project No. 7); and natural resources outreach (Project No. 8). Other INRMP projects and management actions that will benefit red knot include educating NASCC staff and the general public about natural resources at the Installation, conducting internal and agency consultation during project planning for actions as required for projects that may impact federally listed species, and conducting regular monitoring surveys of neotropical migratory birds. Routine monitoring of neotropical migratory birds also will provide valuable information on the population of red knot at the Installation and its preferred habitat locations. Management actions that may indirectly impact red knot are related to habitat management and bird control measures conducted in support of the BASH Program.

### ***State-Listed or Rare Wildlife Species Known to occur at the Installation***

#### **Maritime Pocket Gopher (*Geomys personatus maritimus*)**

*Federal Status: Not Applicable*

*State Status: S4 (Apparently Secure)*

Maritime pocket gopher is a state-ranked S4 (Apparently Secure) species and a Species of Greatest Conservation Need in Texas (TPWD 2011), known only to occur in Nueces and Kleberg counties Texas. At the Installation this species occurs at the Main Station and NOLF Waldron. Three subspecies of maritime pocket gopher occur in southern coastal Texas but only *Geomys personatus maritimus* is considered rare. This subspecies is found in the Flour Bluff region of Corpus Christi, Texas, in the region where the Main Station and NOLF Waldron parcels are located.



*Maritime pocket gopher*  
(*Geomys personatus maritimus*)

Source: Navv 2006b

Through their extensive system of burrows, pocket gophers can have a considerable impact on the local ecosystem and largely direct the floral community observed (Wickliffe and Bickham 1997). By their dietary preferences, excavation activity, hydrodynamic influences, and surface geology influences such as mixing and aerating the soil, pocket gophers are quite important in maintaining regional floral dynamics (Thorne and Andersen 1990, Williams and Cameron 1986, Williams et al. 1986, and Reichman and Smith 1985).

The maritime pocket gopher, despite its limited distribution, does occasionally come into conflict with humans. The numerous burrows constructed by these gophers are often considered damaging to lawn areas and the greens and fairways of the Gulf Winds Golf Course at the Main Station, they may occasionally chew through underground wires, and their burrow systems may act as conduits for water (Reichman and Smith 1985). The Installation MWR Department handles pest control for the recreational facilities, including pest control and landscaping required for the Gulf Winds Golf Course. MWR has received permission from the state to

perform gopher removal as needed, in accordance with authorized techniques and certified personnel (Mitton 2013d). Removal of maritime pocket gopher is conducted only from the golf course area of the Installation to improve human safety.

Active management for maritime pocket gopher populations at the Installation will provide for the conservation of this species range-wide. TPWD has established a monitoring project for the pocket gopher through its Texas Nature Trackers program that includes monitoring the Main Station population (Navy 2006b). INRMP projects that will directly benefit maritime pocket gopher include biological inventory (Project No. 1), rare, threatened, and endangered species habitat management (Project No. 2); NASCC INRMP updates (Project No. 4); habitat management and restoration (Project No. 7); and natural resources outreach (Project No. 8). Management actions that may indirectly impact maritime pocket gopher are related to vegetation management conducted in support of the BASH Program. Educational outreach should be conducted to showcase the measures the Navy has adopted for protection of this species at the Installation. These measures will ensure proper management of this species at the Main Station and NOLF Waldron, and will allow for improved management measures to be implemented, as needed.

In the event that habitat alterations are needed at the Main Station or NOLF Waldron to support the military mission, research is needed to determine if this subspecies can tolerate relocation. A genetics study of maritime pocket gopher subspecies in Nueces and Kleberg counties, Texas determined the *Geomys personatus maritimus* subspecies is well distributed throughout the sandy soils of southern Nueces County, and the populations that occur at the Installation may be less susceptible to impacts from development activities than previously thought (Henke et al. 2010). If research determines that the potential exists for successful relocation of this subspecies, then habitat alterations at the Main Station and NOLF Waldron would be less critical to the survival of the subspecies.

### **Southern Yellow Bat (*Lasiurus ega*)**

*Federal Status: Not Applicable*

*State Status: Threatened*

The state-threatened southern yellow bat is known to roost and raise young in palm trees on the Main Station. The present grounds maintenance policy requires annual pruning of palms. Most tree-trimming companies in the Corpus Christi area know bats roost in palm trees, and know enough about their life cycle to recommend against trimming trees before July when young bats are able to fly (Mirowsky 1997). TPWD and Bat Conservation International recommends extending the pruning restriction to August to prevent impacts to young pups that are unable to fly.



*Southern yellow bat  
(Lasiurus ega)*

INRMP projects that will directly benefit southern yellow bat include biological inventory (Project No. 1), rare, threatened, and endangered species habitat management (Project No. 2); NASCC INRMP updates (Project No. 4); habitat management and

---

restoration (Project No. 7); and natural resources outreach (Project No. 8). Delaying pruning of palms until August each year to allow enough time for young pups to fly away from the nest. Roosting-site management for the southern yellow bat provides an opportunity for public education about the importance of maintaining habitat for nocturnal insectivores and the role they play in insect control. The NRM will work with grounds maintenance personnel, TPWD, Bat Conservation International, and Installation public relations staff to educate military and DoD personnel about the significance of this species and the benefit of maintaining its habitat. These measures will ensure proper management of this species at the Main Station, and will allow for improved management measures to be implemented, as needed.

### *Other Species*

Highly migratory or mobile threatened and endangered species are known to occur in Corpus Christi Bay and the Gulf of Mexico. Some of these species use, or have the potential to use habitats on the Installation. Brown pelican and sea turtles have the potential to use the offshore bay system of the Main Station for foraging. Brown pelicans are found within Corpus Christi Bay, and in proximity to Installation properties, but are not known to nest on the Main Station. Because these birds are not commonly found on or near Installation properties, and because the normal activities of the military mission do not affect the normal feeding and nesting habitats of this bird, the presence of brown pelicans is a minor concern.

Loggerhead, hawksbill, green, and Kemp's ridley sea turtles are documented from the Corpus Christi-Nueces Bay system (Raymond 1989). Loggerhead sea turtles inhabit offshore waters as well as bays, lagoons, salt marshes, ship channels, and river mouths. Hawksbill sea turtles inhabit rocky areas, reefs, shallow coastal areas, and lagoons of oceanic islands in waters less than 60 ft (18.29 m) deep. Green sea turtles are generally found in shallow waters inside reefs, bays, estuaries and inlets, and seagrass beds. Kemp's ridley sea turtles are inhabitants of shallow coastal and estuarine waters in which crabs are found. Leatherback sea turtles inhabit open seas as adults, and are not likely to be found in waters offshore of the Main Station. Open beaches are required for nesting by all species. Because all species, with the exception of the leatherback sea turtle, can be found in estuaries and bays, these threatened and endangered species present issues related to compliance with the ESA and conservation of each species. The TNC inventory of rare, threatened and endangered species on Installation properties in 1998 (Wolfe et al. 1998) estimated the likelihood of occurrence of any sea turtles at the Main Station as very low. However, because of the possibility that these species may occur within waters adjacent to the Main Station, the possible permanent or temporary presence of sea turtles on the Installation will be given consideration. The Main Station does not provide nesting habitat for sea turtles. Additional rare, threatened, or endangered terrestrial species of potential occurrence on the Installation are identified in Appendix E, Table E-13 and E-14.

The global decline of amphibian populations is of increasing concern to the scientific community. TPWD, in cooperation with the National Amphibian Monitoring Program, has developed a voluntary program to track amphibian populations. The Navy could easily adopt the Texas Amphibian Watch program (TPWD 2001) or develop a partnership with Partners in Amphibian and Reptile Conservation. Future INRMP updates will include investigating implementation of Texas Amphibian Watch at the Installation, and/or establishing a partnership

---

with Partners in Amphibian and Reptile Conservation to conduct herpetofauna monitoring at the Installation.

Desert massasauga (*Sistrurus catenatus* ssp. *edwardsii*) is a rattlesnake species that is currently being reviewed by USFWS for listing under the ESA (77 FR 47583-47587). Desert massasauga is not known to occur at NASCC; however, due to the identified range for the subspecies and the presence of suitable habitat, this species has the potential to occur. Conservation and management measures identified in this INRMP will provide benefits to this species, including preservation of grassland habitats. Other INRMP projects and management actions that will directly benefit desert massasauga include conducting biological resources surveys and inventories (Project No. 1), rare, threatened, and endangered species habitat management (Project No. 2), NASCC INRMP updates (Project No. 4), habitat management and restoration (Project No. 7), and natural resources outreach (Project No. 8). Routine monitoring of the biological resources, including habitat assessments at the Installation will provide valuable information on the presence of desert massasauga and habitats to support this species, which could result in the development of more species-specific management measures directed towards conservation of desert massasauga.

### ***Issue***

Biological surveys have been conducted on and around the Installation in an effort to determine the presence of rare, threatened, and endangered wildlife species, or habitat that supports these species. The piping plover and red knot, both federally-listed threatened species, have been observed at the Installation (Texas A&M 2018a; Withers 2014; Woodin et al. 2010). Additionally, designated Critical Habitat for wintering populations of piping plover is present at the Main Station. Other state listed and rare species also are known to occur at the Installation.

### ***Goals and Objectives***

The ESA requires federal agencies to review their actions to determine whether they are likely to jeopardize the continued existence of any rare, threatened or endangered species; or result in the destruction or adverse modification of federally designated critical habitat. If such review reveals the potential for effects, the federal agency must consult with the USFWS (freshwater fish and terrestrial wildlife), NOAA NMFS (marine mammals, fish and fisheries), and/or the appropriate state agency, which in this case is TPWD.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Objective 1.9:** Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.

- Objective 1.10:** Ensure that land management and land use decisions, including agricultural outleases, comply with all applicable laws, EOs, regulations, directives, and instructions; and that adverse impacts to the natural environment are minimized.
- Objective 1.11:** Protect, conserve, and promote habitat for native terrestrial and aquatic fauna, consistent with BASH Program requirements.
- Objective 1.13:** Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

- Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.
- Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.
- Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

***Projects and Management Strategies***

**Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for rare, threatened, and endangered wildlife species management.

**Project No. 1 – Biological Inventories**

**Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

**Project No. 3 – Invasive Species Control**

**Project No. 4 – NASCC INRMP Updates**

**Project No. 5 – Prescribed Fire Management**

**Project No. 6 – Neotropical Bird Survey**

**Project No. 7 – Habitat Management and Restoration**

**Project No. 8 – Natural Resources Outreach**

**Management Strategies**

Management strategies related to protection of rare, threatened, and endangered wildlife species at the Installation include the following.

1. Continue to evaluate management practices and their effects on ecosystems and wildlife habitat, and continue programs to protect rare, threatened, and endangered wildlife species and their habitats known to occur at the Installation.
2. Review management recommendations identified in wildlife survey reports to determine if additional management measures should be implemented for protection of rare, threatened, and endangered wildlife species known to occur at the Installation.
3. Seek additional management guidance and recommendations from federal, state, and Navy wildlife biologists for protection of rare, threatened, and endangered wildlife species and their habitats known to occur at the Installation.
4. Continue to conduct monitoring programs for wildlife and natural communities at the Installation, to keep these inventories up-to-date.
5. Coordinate with the Environmental Section of the PWD during the planning process for all construction projects at the Installation. Review the location and footprint of the project and an analysis of the project against known occurrences of rare, threatened, and endangered species.
6. Comply with requirements of the BASH Program, BASH Instruction, and depredation permits for protection of rare, threatened, and endangered species known to occur at the Installation.
7. Coordinate with the USFWS and/or TPWD as appropriate to determine if actions conducted at the Installation are likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat of such species.

***Long-term Management***

Management of the federally listed species known to occur at the Installation is an important component of ecosystems management. The Installation will continue to update species inventories as necessary to manage for these species and their habitats, and will implement programs and activities for the protection and enhancement of all plant and wildlife habitats that

---

occur at the Installation, including designated Critical Habitat for wintering piping plover that is present at the Main Station.

***Integration with Other Natural Resources Management Activities***

- Management of vegetation to reduce BASH potential, Section 3.2.1.3.2 – manage vegetation to reduce the risk of BASH incidents, and the need to implement activities authorized by depredation permits that would result in take of rare, threatened, or endangered wildlife species.
- Grounds maintenance and landscaping management, Section 3.2.1.3.4 – educate grounds maintenance and landscaping personnel on the requirements for protection and conservation of rare, threatened, and endangered wildlife species habitats; and use environmentally beneficial landscaping practices to enhance rare, threatened, and endangered wildlife species habitats, consistent with BASH Program requirements.
- Wildland fire management, Section 3.2.1.5 – use controlled burns as necessary to improve habitat used by rare, threatened, and endangered wildlife species known to occur at the Installation.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – maintain and enhance wildlife habitats to improve habitat used by rare, threatened, and endangered wildlife species known to occur at the Installation.
- Migratory bird management, Section 3.2.2.2 – conduct biological surveys and ensure the protection of migratory birds known to occur at the Installation.
- BASH reduction, Section 3.2.2.4 – manage habitats that support rare, threatened, and endangered species to reduce the risk of BASH incidents, and the need to implement activities authorized by depredation permits that would result in take of rare, threatened, or endangered wildlife species.
- Educational outreach, Section 3.2.3.2 – provide educational outreach related to the protection and conservation of rare, threatened, and endangered wildlife species known to occur at the Installation.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on management of rare, threatened, and endangered wildlife, to include compliance with the ESA and required consultation requirements and permitting.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to map and manage rare, threatened, and endangered wildlife species populations and their habitats known to occur at the Installation.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – enter into conservation partnerships with federal, state, and local agencies, universities, and NGOs to conduct surveys for rare, threatened, and endangered wildlife species, improve habitat for these species, and allow for research associated with rare, threatened, and endangered wildlife species known to occur at the Installation.



---

### ***Ecosystems Management***

Ecosystems management is a holistic, adaptive management concept that transcends human-made boundaries, both internal and external to the Installation. Management of rare, threatened, and endangered species known to occur at the Installation will promote sustainable ecosystems, and includes monitoring, maintaining habitat requirements for these species, and educational outreach. Furthering knowledge of federally listed wildlife species that occur at the Installation through research projects will promote conservation of these species beyond the Installation boundaries and ensure Navy's stewardship requirements and compliance with the ESA. Participation in proper management actions for protection of rare, threatened, and endangered wildlife species of the Installation is the responsibility of all individuals potentially affecting these species. Ecosystems management for protection of listed wildlife species requires periodic adjustments in management principles and practices to respond to new knowledge and dynamic conditions. To participate in adaptive ecosystems management, the Installation will implement measures to preserve habitats that support federally listed wildlife species and designated Critical Habitat that are known to occur, as afforded with meeting the military mission. Management strategies and INRMP projects identified above will ensure ecosystems management principles are applied to management of rare, threatened, and endangered wildlife species and designated Critical Habitat that occurs at the Installation.

To participate in adaptive ecosystems management, the Installation will implement the Maritime Pocket Gopher Management Plan and other INRMP projects identified in this document to ensure ecosystems management principles are applied to management of rare, threatened, and endangered plant species that occur at the Installation.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Rare, Threatened, and Endangered Wildlife Species Management***

- ESA, 16 USC 1531 et seq., as amended, provides for the identification and protection of threatened and endangered species of plants and their critical habitats and requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.
- MBTA, 16 USC 703-712, prohibits the taking or harming of a migratory bird, its eggs, nests, or young without the appropriate permit.
- Marine Mammal Protection Act, 16 USC 1361-1407, 1972, prohibits the taking or harming of marine mammals without the appropriate permit.
- Fish and Wildlife Conservation Act, 16 USC 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.
- Fish and Wildlife Coordination Act, 16 USC 661-666c, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.

- NDAA, Public Law 107-314, 2004, exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.
- 50 CFR 17, Endangered and Threatened Wildlife and Plants, prescribes policies for the conservation and restoration of endangered and threatened wildlife and plants.
- EO 13112 (3 February 1999), *Invasive Species*, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- EO 13186 (10 January 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.
- Texas Administrative Code, Sections 65.171-176, contains laws and regulations pertaining to threatened or endangered animal species, and prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as threatened or endangered without the issuance of a permit.
- SAIA, 16 USC 670a-0, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency, to provide its personnel with professional training in fish and wildlife management.
- OPNAVINST 5090.1D, 12-3.5, discusses natural resources management relative to the protection and management of fish and wildlife resources.

#### ***Additional Sources of Information***

- USFWS, Critical Habitat Portal (<https://ecos.fws.gov/ecp/report/table/critical-habitat.html>)
- USFWS, Endangered Species Program (<https://www.fws.gov/endangered/laws-policies/index.html>)
- TPWD, Texas Natural Diversity Database ([https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/txnnd/](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/txnnd/))
- Gulf Coast Joint Venture (<http://www.gcjv.org/>)
- USFWS, Species Profile for maritime pocket gopher (<https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=7647>)
- Smithsonian National Museum of Natural History, Texas Pocket Gopher ([https://naturalhistory.si.edu/mna/image\\_info.cfm?species\\_id=103](https://naturalhistory.si.edu/mna/image_info.cfm?species_id=103))
- TPWD, Rare, Threatened, and Endangered Species of Texas (<https://tpwd.texas.gov/gis/rtest/>)
- Partners in Amphibian and Reptile Conservation (<http://www.parcplace.org/>)
- Keeping Texas First; Tracking the Economic Impact of Federal Action on Endangered Species, Air and Water (<https://texashistory.unt.edu/ark:/67531/metaph640938/>)

---

### **3.2.3 Outdoor Recreation Management**

One of the goals and purpose of this INRMP is to provide for effective stewardship and management of the Installation's natural resources, which includes promoting outdoor recreation and education under the requirements of SAIA, while meeting military mission requirements.

This section addresses the development and implementation of techniques and programs for managing outdoor recreation resources at the Installation and providing educational outreach. Outdoor recreation management at the Installation is described in the following sections:

#### **3.2.3 Outdoor Recreation Management**

##### **3.2.3.1 Public Access**

##### **3.2.3.2 Educational Outreach**

Fishing is allowed at the Installation; no fee is required, nor does the Installation issue fishing permits for this activity. Fishing activities primarily occur along the shoreline of the Main Station. Fishery resources at the Installation are primarily associated with the coastal areas surrounding the Main Station. Saltwater fishing may occur off the shore or docks of the Main Station; however, the Installation does not manage this activity, as the marine waters are not included within Main Station boundary, and as such are not within the management responsibility of the Installation. It is incumbent on fishers to comply with the state and federal recreational fishing laws. Although there are freshwater resources associated with golf hazard ponds at the Gulf Winds Golf Course, Oso Creek at NOLF Cabaniss, and the fire pond located at NOLF Goliad, these are not used for fishing activities, and the Navy has no intention to stock fish in these waterbodies. Due to the military mission and the limited fishery resources located within the Installation boundaries, no plans are in place to implement a fishing or stocking program, since these activities would conflict with BASH Program requirements.

The Installation does not have an official hunting program nor does it allow hunting at any of its parcels. Prior to the Navy reacquiring NOLF Goliad, hunting by the public had been allowed at this parcel.

Outdoor recreation opportunities within the Installation parcels are limited; however, there are several state parks located within a 50 mi (81 km) radius of the Installation, including Padre Island National Seashore, Goose Island State Park, Mustang Island State Park, and Lake Corpus Christi State Park. These parks offer a variety of outdoor recreation opportunities, including camping, fishing, swimming, hiking, boating, surfing, kayaking, birding, and wildlife observation.

#### **3.2.3.1 Public Access**

Navy policy is to permit access to outdoor recreation resources to the greatest degree possible, consistent with an installation's safety and security requirements and its available manpower and natural resources to support such activities without degradation or impairment of environmental qualities. The degree of public access for recreational purposes will be dependent on which of the Installation properties is being considered. Any limitation or regulation required will be based on mission, security and safety requirements. The military mission limits public access to

most areas of the Installation; however, controlled public access is allowed on a case-by-case basis.

Opportunities for public access on the Main Station are limited by the relatively small size of the Main Station, and current and future land uses. Public access for participation in outdoor recreation activities is limited to authorized DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors. Hunting is not feasible, and although fishing is allowed at the Installation, no fee is required, nor does the Installation issue fishing permits for this activity. Fishing activities primarily occur along the shoreline of the Main Station and within the public access area located between the North Gate and Texas A&M University – Corpus Christi. Nonetheless, Shields Park (the point of land where the Laguna Madre Estuary meets Corpus Christi Bay) offers recreational vehicle and tent camping, swimming and fishing for visiting or vacationing soldiers, veterans, and their families. At the Main Station marina kayaks, camping gear, boats, and fishing gear can be rented from Outdoor Adventures, and the Sunfish Beach Pavilion can be used for picnicking. In addition, the Gulf Winds Golf Course can be used by military personnel (CNIC n.d.).

Due to the nature of the military mission at NOLF Cabaniss to support airfield operations, public access to this site limited to authorized military personnel, with access granted to members of the public through special requests to NASCC Airfield Operations. This parcel does not contain any outdoor recreational facilities or significant natural communities that would support the need to provide public access.

Due to the nature of the military mission at NOLF Waldron to support airfield operations, public access to a majority of this site is limited to authorized military personnel, with access granted to members of the public through special requests to NASCC Airfield Operations. However, this parcel does contain a designated outdoor recreational area, including athletic fields and a playground that are accessible to the public. Under a cooperative agreement between a private organization and the Navy, the private organization is responsible for managing and maintaining the outdoor recreation portion of the site, including the electricity for field lighting, trash removal, and mowing.

Due to the nature of the military mission at NOLF Goliad to support airfield operations, public access to this site limited to authorized military personnel, with access granted to members of the public through special requests to NASCC Airfield Operations. This parcel does not contain any outdoor recreational facilities or significant natural communities that would support the need to provide public access.

### ***Issue***

Controlled public access is permitted at the Installation as part of the outdoor recreation and educational outreach programs.

### ***Goals and Objectives***

Navy policy is to permit access to outdoor recreation resources to the greatest degree possible, consistent with an installation's safety and security requirements and its available manpower and

---

natural resources to support such activities without degradation or impairment of environmental qualities. The degree of public access for recreational purposes will be dependent on which of the Installation properties is being considered. Any limitation or regulation required will be based on mission, security and safety requirements.

**Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.**

**Objective 2.1:** Evaluate additional opportunities for natural resources-related outdoor recreation.

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

**Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for public access.

#### **Project No. 4 – NASCC INRMP Updates**

#### **Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to public access at the Installation include the following.

1. Provide for public access for use of natural resources consistent with SAIA requirements, subject to safety and military security considerations.
2. Review issues that currently affect public access to outdoor recreational resources, and modify access to provide for greater recreational opportunities to the extent possible based on security and mission requirements.

### ***Long-term Management***

In accordance with the SAIA, an INRMP shall, to the extent appropriate and applicable, provide for public access to an installation for use of natural resources, including outdoor recreation, subject to safety, military security considerations, and the military mission. Additionally, public access for the use of the natural resources for outdoor recreation should not result in degradation of installation natural resources. In addition to traditional outdoor recreation activities such as hiking and wildlife watching, outdoor recreation activities can include educational programs that foster a sense of responsible stewardship for military personnel and the general public who are authorized access to an installation for these recreational purposes.

The military mission of Installation restricts public access, and therefore long-term management of public access issues is concentrated on providing public access in relation to education and stewardship purposes.

### ***Integration with Other Natural Resources Management Activities***

- Rare, threatened, and endangered plant species management, Section 3.2.1.7 – provide for public access to showcase the Navy’s stewardship associated with conservation and protection of rare, threatened, and endangered plant species, and to allow for research projects to be conducted, in consideration of the military mission and security requirements.
- Rare, threatened, and endangered wildlife species management, Section 3.2.2.7 – provide for public access to showcase the Navy’s stewardship associated with conservation and protection of rare, threatened, and endangered wildlife species, and to allow for research projects to be conducted, in consideration of the military mission and security requirements.
- Educational outreach, Section 3.2.3.2 – provide educational outreach to showcase the Navy’ stewardship of natural resources, including protection and management of rare, threatened, and endangered plant and wildlife species known to occur at the Installation.
- Natural resources law enforcement, Section 3.2.4.2 – Installation security officers will enforce federal, state, and local laws and regulations related to public access for educational and outdoor recreation purposes, in consideration of the military mission and security requirements.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – partner with federal and state agencies, universities, and NGOs to allow public access to the Installation for outdoor recreation, educational outreach, and research opportunities, in consideration of the military mission and security requirements.

### ***Ecosystems Management***

Ecosystems management practices are enhanced by environmental stewardship and by educating the general public about environmental conservation issues, problems, and solutions. By providing outdoor recreational and educational opportunities onsite, the Installation can help promote public awareness of vital environmental resource issues, including federally protected resources, thus providing a regionally limited educational resource. In addition, the Installation

will provide opportunities for educating the public on the values and characteristics of a healthy environment, identify some of the problems and solutions associated with human use of the environment, and showcase the measures the Navy has adopted for protection of natural resources under their jurisdiction, including federally listed plant and animals species, and designated Critical Habitat areas known to occur at the Installation.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Public Access***

- SAIA of 1997, 16 USC 670a(b)(1)(G), requires public access to a military installation for the necessary, appropriate, and sustainable use of natural resources by the public to the extent that the use is consistent with the needs of the fish and wildlife resources or with safety and military security.
- SAIA of 1997, 16 USC 460 P-3, defines a program for developing facilities for outdoor recreation in cooperation with federal and state agencies.
- OPNAVINST 5090.1D, 12-3.11, discusses natural resources management relating to the protection and management of outdoor recreational resources.

### ***Additional Sources of Information***

- U.S. National Park Service, Find a National Park (<https://www.nps.gov/findapark/index.htm>)
- TPWD, Activities (<https://tpwd.texas.gov/state-parks/parks/things-to-do/>)
- TPWD, Find a State Park (<https://tpwd.texas.gov/state-parks/nearby/all-parks>)
- Texas A&M University – Corpus Christi (<http://www.tamucc.edu/about/contactus.html>)
- City of Corpus Christi, Parks and Recreation (<https://www.cctexas.com/parks>)
- Nueces County Beach Parks (<http://www.nuecesbeachparks.com/>)

### **3.2.3.2 Educational Outreach**

An active outdoor education program is important in fostering an appreciation and a sense of stewardship for the plants, animals, and ecosystems of a region by the general public. Outdoor education and recreation are complementary activities that create or enhance both recreational opportunities and educational opportunities, such as a nature trail, fishing, and wildlife viewing areas. Such opportunities may be available for development in a way that does not interfere with the mission of the Installation. An outdoor education program has been implemented at the



*Educational signage at Shields Park, Main Station*

Source: L. Rivard

---

Installation to showcase the Navy’s stewardship of natural resources, and to emphasize that this stewardship is important to the military mission and habitat conservation. The Installation has developed facilities including signage along the shoreline at Shields Park and the marina located at the Main Station—installed in celebration of Earth Day 2007—to foster an understanding and appreciation of the natural features of the Installation and the Navy’s stewardship work by those people who visit the shoreline and park.

NASCC properties provide unique opportunities for scientific study. Cooperative agreements with local or regional fish and wildlife agencies, conservation organizations, and education organizations have been initiated in the past to develop materials for self-guided educational programs, nature trails, and wildlife viewing areas. Although no formal cooperative agreements are in currently place, NASCC has an ongoing informal partnership with USFWS and TPWD. As part of this informal agreement, the USFWS and TPWD provide technical advice and assistance for fish and wildlife management at the Installation. In addition, several areas of the Installation are available on a temporary basis for use by “Scouts and Explorers for primitive camping, nature studies, and outdoor learning experiences.” These informal partnerships will continue to be supported.

***Issue***

Outdoor education and recreation are complementary activities that create or enhance both recreational opportunities and educational opportunities.

***Goals and Objectives***

One of the goals and purpose of this INRMP is to provide for effective stewardship and management of the Installation’s natural resources, which includes promoting outdoor recreation and education under the requirements of SAIA, while meeting military mission requirements.

**Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.**

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.



**Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following project will support the goals and objectives established for educational outreach.

#### **Project No. 8 – Natural Resources Outreach**

##### **Management Strategies**

Management strategies related to educational outreach at the Installation include the following.

1. Continue to coordinate the development and implementation of the outdoor recreation and educational program covered by this INRMP with the MWR Department.
2. Develop an outdoor education program to showcase the Navy's stewardship of natural resources, and to emphasize that this stewardship is important to the military mission and habitat conservation.
3. Seek out partnerships with USFWS, TPWD, USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, and other local agencies and organizations, to provide educational opportunities at the Installation.

### *Long-term Management*

Educational programs foster a sense of responsible stewardship in military personnel and other authorized personnel who participate in outdoor recreation and educational outreach opportunities at the Installation. Educational outreach may include coordination with local, regional, state, national, or international organizations or public groups. The MWR Department is responsible for developing and coordinating the outdoor recreation and educational programs as part of implementation of this INRMP in coordination with the NRM.

#### ***Integration with Other Natural Resources Management Activities***

- Wetlands management, Section 3.2.1.1.2 – provide educational outreach on wetlands management, and stress the importance of wetlands ecosystems as it relates to integrated natural resources management.
- Rare, threatened, and endangered plant species, Section 3.2.1.7 – provide educational outreach on management of rare, threatened, and endangered plant species.
- Wildlife management and habitat enhancement, Section 3.2.2.1 – provide educational outreach on wildlife management and habitat enhancement, and consider development of an outdoor education program that showcases wildlife and habitat management activities.
- Zoonosis prevention, Section 3.2.2.6 – provide educational outreach on zoonosis prevention, continue to educate Navy personnel and the public about the threats of zoonosis infection, and disseminate any information related to outbreaks.

- 
- Rare, threatened, and endangered wildlife species, Section 3.2.2.7 – provide educational outreach and informational signage on management of rare, threatened, and endangered wildlife species.
  - Public access, Section 3.2.3.1 – provide educational outreach and public access as appropriate and authorized in consideration of military readiness and security requirements.
  - Natural resources law enforcement, Section 3.2.4.2 – provide educational outreach regarding enforcement of federal, state, and local laws and regulations.
  - Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – develop partnerships with federal and state agencies, universities, and NGOs to provide and promote educational opportunities at the Installation, in consideration of the military mission and security requirements.

### ***Ecosystems Management***

Ecosystems management practices are enhanced by environmental stewardship and by educating the general public about environmental conservation issues, problems, and solutions. By providing outdoor recreational and educational opportunities, the Installation can help promote public awareness of vital environmental resource issues, including protection and conservation measures in place at the Installation for federal and state listed species, and rare species known to occur. In addition, the Installation will promote activities that teach the values and characteristics of a healthy environment and responsible use of the environment.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Educational Outreach***

- SAIA of 1997, 16 USC 670a(b)(1)(G), requires public access to a military installation for the necessary, appropriate, and sustainable use of natural resources by the public to the extent that the use is consistent with the needs of the fish and wildlife resources or with safety and military security.
- SAIA of 1997, 16 USC 460 P-3 defines a program for developing facilities for outdoor recreation in cooperation with federal and state agencies.
- OPNAVINST 5090.1D, 12-3.11, discusses natural resources management relating to the protection and management of outdoor recreational resources.

### ***Additional Sources of Information***

- USFWS Southwest Region, Educational Outreach ([https://www.fws.gov/southwest/es/arlingtontexas/education\\_outreach.htm](https://www.fws.gov/southwest/es/arlingtontexas/education_outreach.htm))
- TPWD, Community Education Outreach Programs (<https://tpwd.texas.gov/business/grants/other/>)
- Texas Ornithological Society (<http://www.texasbirds.org/>)

---

### **3.2.4 Integrated Ecosystems Management and Partnering**

This section addresses the development and implementation of integrated ecosystems management and partnering. The integrated ecosystems management and partnering activities of this INRMP are described in the following sections:

#### 3.2.4 Integrated Ecosystems Management and Partnering

##### 3.2.4.1 Training of Natural Resources Personnel

##### 3.2.4.2 Natural Resources Law Enforcement

##### 3.2.4.3 GIS, Data Integration, Access, and Reporting

##### 3.2.4.4 Partnering with federal and state agencies, universities, and NGOs

#### **3.2.4.1 Training of Natural Resources Personnel**

Navy regulations require that natural resources program personnel receive comprehensive natural resources training specific to their job assignment and maintain continued professional training needed for the work (OPNAVINST 5090.1D, 12-3.15). Furthermore, the SAIA, as amended, requires that a sufficient number of professionally trained natural resources managers are available to implement this INRMP for the Installation. Natural resources personnel on the Installation should receive training in all areas of environmental management. Management of water resources, coastal zone, soil, vegetation, landscaping, forests, wildlife, outdoor recreation, and GIS are all interrelated. Specific training needs for natural resources personnel at the Installation include:

- Erosion and sediment control, water quality protection, and use of effective BMPs (AHEC 2013);
- Identification of wetlands and other sensitive habitats and species;
- Vegetation and wildlife management related to BASH;
- Pesticide applicator certification training;
- Field techniques for invasive plant management;
- Techniques for grounds maintenance, landscape, and agricultural outlease management;
- Prescribed burning for wildland fire management;
- Conservation biology; and
- GPS and GIS training.

#### ***Issue***

Successful ecosystems management at the Installation requires a coordinated effort among all programs, tenant command personnel, outside partners, and regulators to protect the interdependent components that define an ecosystem. This coordinated effort provides the NRM with the ability to address consequences of actions on interrelated resources, and improves conflict resolution between competing programs and plans for use of the Installation's natural resources. Receipt of adequate natural resources training that covers the broad range of natural resources issues associated with the Installation will improve coordination and ensure natural

resources conflicts can be resolved within the confines of regulatory requirements and the military mission.

NASCC currently funds the NRM position to provide for oversight of natural resources management at the Installation. Currently limited GIS management, data integration, and reporting are performed by the NRM and other environmental personnel. However, the ability of the NRM to perform collection of natural resources GIS data, and maintenance of the natural resources database would allow for more direct in-house management of natural resources to take place. The NAVFAC Southeast GeoReadiness Center performs GIS management and data integration. Although the NRM is not responsible for maintaining the GIS data for the Installation, they are very familiar with and trained in GIS applications and software.

### *Goals and Objectives*

Provide the NRM with the training, tools, and knowledge necessary to protect, maintain, and restore the natural resources at the Installation in support of the military mission and within the confines of regulatory requirements.

### **Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

- Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRM at the Installation to ensure proper implementation of this INRMP.
- Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.
- Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.
- Objective 3.5:** Promote educational awareness of Installation natural resources and the importance of natural resources stewardship.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

There are no INRMP projects directly related to training of natural resources personnel; however, participation of the NRM and other natural resources staff with implementation of all of the natural resources projects identified in this INRMP, will provide additional training benefits to these personnel. Funding for training opportunities is provided separately from implementation of this INRMP.

#### **Management Strategies**

Management strategies related to training of natural resources personnel include:

1. Provide adequate staffing, equipment, technology, and training for the NRM to ensure proper implementation of this INRMP.

### ***Long-term Management***

The NRM and other natural resources personnel are encouraged to attend local classes, workshops, and seminars as appropriate, especially as new regulations and BMPs are developed for natural resources management.

### ***Integration with Other Natural Resources Management Activities***

Natural resources training is applicable to most of the management activities and resources identified in this INRMP, as described in the Integration with other Natural Resources Management Activities discussions throughout Section 3.0. Training opportunities are relevant to wetlands; water quality; wildlife; habitat; BASH; invasive species; zoonosis; rare, threatened, and endangered species management; and natural resources law enforcement.

### ***Ecosystems Management***

Ecosystems management is a holistic, adaptive-management concept that transcends man-made boundaries. Management for sustainable ecosystems requires awareness, education, training, and responsible participation of individuals potentially affecting the ecosystem, as well as adjustments in management principles and practices to respond to new knowledge and dynamic conditions.

Plans and programs for maintaining and managing natural resources at the Installation need to fully consider the interrelationships among these resources to assure no net loss in mission capability. The input and cooperation of regulatory agencies and other experts will best facilitate the success of these plans and programs.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Training of Natural Resources Personnel***

- SAIA, 16 USC 670a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency and to provide its personnel with professional training in fish and wildlife management.
- DoD 4700.4, Natural Resources Management Program, prescribes policies and procedures for an integrated program for multiple-use management of natural resources on DoD property.
- OPNAVINST 5090.1D, 12-3.15, requires that every person in a natural resources program receive comprehensive natural resources training specific to their job assignment and maintain continued professional training needed for the work.

### ***Additional Sources of Information***

Table 3-3 provides an example of natural resources training opportunities that are offered by federal and state agencies, universities, and NGOs. This list is not meant to be all-inclusive, but offers a representative example of training opportunities available to natural resources personnel.

**Table 3-3. Natural Resources Training Opportunities.**

U.S. Government, DoD
Defense Environmental Network and Information Exchange (DENIX) Training and Education Website: <a href="https://www.denix.osd.mil/portal/page/portal/denix/conferences">https://www.denix.osd.mil/portal/page/portal/denix/conferences</a>
U.S. Navy Civil Engineer Corps Officers School (CECOS) Environmental Training Program 3502 Goodspeed Street, Suite 1 Port Hueneme, CA 93043-4336 Tel: 805-982-2895 DSN: 551-2895 Fax: 805-982-2918 Website: <a href="https://www.netc.navy.mil/centers/csfe/cecos/">https://www.netc.navy.mil/centers/csfe/cecos/</a>
Armed Forces Pest Management Board Training and Certification Website: <a href="http://www.afpmb.org/pubs/courses/courses.htm">http://www.afpmb.org/pubs/courses/courses.htm</a>
U.S. Army Corps of Engineers (USACE) Professional Development Support Center 550 Sparkman Drive Huntsville, AL 35816 Tel: 256-895-7401 Fax: 256-895-7465 Website: <a href="http://pdsc.usace.army.mil/">http://pdsc.usace.army.mil/</a>
U.S. Government, non-DoD
U.S. Fish and Wildlife Service National Conservation Training Center Route 1, Box 166 Shepherdstown, WV 25440 Division of Training Tel: 304-876-7472 Aquatic Resources Tel: 304-876-7445 Environmental Conservation Tel: 304-876-7475 Wildlife Tel: 304-876-7434 Sea Turtle Cold Stun Events Tel: 361-949-8068 Technical (e.g., GIS) Tel: 304-876-7456 Website: <a href="http://training.fws.gov/">http://training.fws.gov/</a>

NGOs
Wetland Training Institute, Inc. P. O. Box 31 Glennwood, NM 88039 Tel and Fax: 877-792-6482 Website: <a href="http://www.wetlandtraining.com/">http://www.wetlandtraining.com/</a>
The Shipley Group P. O. Box 908 Farmington, UT 84025 Tel: 888-270-2157 Website: <a href="http://www.shipleygroup.com">http://www.shipleygroup.com</a>
Universities
Duke University Nicholas School of the Environment and Earth Sciences Continuing Education Program Box 90328 Durham, NC 27708-0328 Tel: 919-613-8082 Fax: 919-684-8741 Website: <a href="http://www.env.duke.edu/cee/execed.html">http://www.env.duke.edu/cee/execed.html</a>
University of Wisconsin-Madison Gaylor Nelson Institute for Environmental Studies Science Hall, 550 North Park Street Madison, WI 53706-1491 Tel: 608-263-1796 Website: <a href="http://www.ies.wisc.edu/">http://www.ies.wisc.edu/</a>

### 3.2.4.2 Natural Resources Law Enforcement

Section 107 of the Sikes Act (16 USC 670e-2) requires sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel to be available and assigned responsibility to perform tasks necessary to carry out Title I of the Sikes Act, including the preparation and implementation of INRMPS.

The control of the use of available natural resources within Installation properties should be stringent enough to monitor and regulate their safe and judicious use, but not restrictive to the point of deviating from the designated use of the facilities.

The Installation does not have an established natural resources law enforcement position. Currently, there are no installation security officers trained in wildlife law enforcement, but state and federal hunting and fishing laws are enforceable by state and federal game wardens. All federal and state game wardens are allowed to enter any appropriate portion of Installation properties for inspection of compliance with appropriate hunting and fishing requirements; however, this is not expected to be necessary since hunting is not permitted at the Installation and fishing only occurs along the shoreline of the Main Station. On occasion when state and

federal game wardens visit the Installation, they are escorted throughout the property being visited.

### *Issue*

The Installation does not have designated natural resources law enforcement personnel. Installation security officers provide oversight of compliance with local, state, and federal laws and regulations at the Installation.

### *Goals and Objectives*

Protect, maintain, and restore the natural resources of the Installation in support of the military mission through enforcement of federal, state, and Installation laws and regulations pertaining to fish and wildlife.

**Goal 1: Provide for the conservation, management and enhancement of natural resources at the Installation by continuing to implement ecologically appropriate and beneficial land uses and management practices, while ensuring the continuation of the military mission.**

**Objective 1.1:** Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

**Goal 2: Provide quality, outdoor recreational and educational opportunities to improve the quality of life for DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors, if such opportunities are available and within DoD security standards.**

**Objective 2.1:** Evaluate additional opportunities for natural resources-related outdoor recreation.

**Objective 2.2:** Provide and promote outdoor recreation opportunities (e.g., wildlife observation) to DoD personnel and their guests, which is limited to active duty and their dependents, reservists, military retirees, DoD civilians and their dependents, and Installation contractors.

**Objective 2.3:** Provide and promote outdoor recreation opportunities to the public, subject to safety and security considerations.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.

**Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.



**Objective 4.3:** Coordinate natural resources activities with local community, conservation organizations, and private groups.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

There are no INRMP projects directly related to natural resources law enforcement; however, other projects that provide training for Installation natural resources personnel, also will improve natural resources law enforcement at the Installation.

#### **Management Strategies**

Management strategies related to natural resources law enforcement at the Installation include the following.

1. Enforce federal, state, and Installation laws and regulations pertaining to fish and wildlife.
2. Build interagency relationships with National Military Fish and Wildlife Association and USFWS to support the natural resources law enforcement program.
3. Identify staffing needs to manage GIS and natural resources management programs.

### *Long-term Management*

Certifying a designated organization at the Installation to instruct specific law enforcement training, as well as coordinating with the National Military Fish and Wildlife Association will enhance the long-term management of fish and wildlife resources at the Installation.

### *Integration with Other Natural Resources Management Activities*

- Wildlife management and habitat enhancement, Section 3.2.2.1 – enforce Navy policies, and local laws and regulations that pertain to hunting and fishing at the Installation.
- Public access, Section 3.2.3.1 – enforce Navy policies, and local laws and regulations that pertain to public access and subject to the military mission and security requirements.
- Educational outreach, Section 3.2.3.2 – enforce Navy policies, and local laws and regulations related to educational outreach and subject to the military mission and security requirements.
- Training of natural resources personnel, Section 3.2.4.1 – ensure personnel receive training on conservation law enforcement issues associated with natural resources management at the Installation.
- GIS, data integration, access, and reporting, Section 3.2.4.3 – utilize GIS tools to improve natural resources law enforcement.
- Partnering with federal and state agencies, universities, and NGOs, Section 3.2.4.4 – enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public, including local law enforcement groups.

### ***Ecosystems Management***

Enforcement of fish and wildlife laws and regulations is a necessary ecosystems management practice that enhances environmental stewardship and educates the general public about environmental conservation issues, problems, and solutions. By enforcing fish and wildlife laws and regulations, the Installation can help promote public awareness of vital environmental resource issues.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Natural Resources Law Enforcement***

- SAIA of 1997, 16 USC 460a(b)(1)(G), requires public access to a military installation for the necessary, appropriate, and sustainable use of natural resources by the public to the extent that the use is consistent with the needs of the fish and wildlife resources or with safety and military security.
- SAIA of 1997, 16 USC 460 P-3 defines a program for developing facilities for outdoor recreation in cooperation with federal and state agencies.
- OPNAVINST 5090.1D, 12-3.11, discusses natural resources management relative to the protection and management of outdoor recreational resources.

### ***Additional Sources of Information***

- National Military Fish and Wildlife Association (<https://www.nmfwa.org/>)
- USFWS, Law Enforcement (<https://www.fws.gov/southwest/lawenforcement/index.htm>)

### **3.2.4.3 GIS, Data Integration, Access, and Reporting**

GIS is an integral part of natural resources and environmental protection and planning. This powerful management tool provides natural resources managers with a comprehensive database that includes a spatial component. Information such as aerial photographs, survey and monitoring data, and various other natural resource information are all tied to a geographical coordinate system. Availability of this information enhances an installation's ability to effectively coordinate and ensure that current and planned mission activities do not adversely impact watersheds, wetlands, floodplains, natural landscapes, soils, forests, vegetation and wildlife, prime and unique farmland, and other natural resources that must be protected, conserved, and managed using an ecosystems approach. Additionally, efficient and effective land use planning supports readiness and sustainability, and protects and enhances the natural resources for multiple use, sustained yield, and biological integrity.

Examples of baseline environmental data layers include:

- Property boundaries
- Topography
- Soils
- Vegetation cover

- Forest stands
- Wetlands
- Floodplains
- Stormwater detention ponds
- Sensitive natural resources
- Hiking trails

The map figures presented in this INRMP were developed using existing digital data files provided by the Navy and from other GIS databases available to the public. An ESRI map service was used, which includes i-cubed Nationwide Prime high-resolution (approximately 3 ft [1 m] or greater) imagery for the contiguous U.S. The i-cubed Nationwide Prime service is a seamless, color mosaic of various commercial and government imagery sources, including Aerials Express 0.3–0.6 meter resolution imagery for metropolitan areas and the best available USDA National Agriculture Imagery Program imagery and enhanced versions of USGS Digital Ortho Quarter Quad imagery for other areas. The imagery is projected to Universal Transverse Mercator, Zone 14 North, North American Datum of 1983. All GIS data created or modified for use in this INRMP will be submitted to NAVFAC Southeast and the Installation upon completion of this project.

### *Issue*

In accordance with the OPNAVINST 5090.1D, 12-3.4(c), natural resources managers are encouraged to use GIS as the basis of their INRMP, and thus all data layers with a spatial component are provided in a GIS-compatible format. The Commander, NAVFAC Southeast GeoReadiness Center is the single, authoritative source and distribution point for all geospatial information within the area of responsibility of NAVFAC Southeast. The GeoReadiness Center houses the most current geospatial information (including aerial photography) for the entire NAVFAC Southeast region and provides access to the comprehensive dataset and analysis tools to regional and DoD decision-makers/managers, sponsored contractors, and other sponsored individuals via a secure government Internet site.

### *Goals and Objectives*

With appropriate GIS training, GIS management, data integration, access, and reporting may be used more frequently for natural resources management at the Installation.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.1:** Provide adequate staffing, equipment, technology, and training for the NRP at the Installation to ensure proper implementation of this INRMP.

**Objective 3.3:** Implement training, education, and stewardship initiatives for ecosystems management.

### ***Projects and Management Strategies***

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for GIS, data integration, access, and reporting.

#### **Project No. 1 – Biological Inventories**

#### **Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

#### **Project No. 3 – Invasive Species Control**

#### **Project No. 4 – NASCC INRMP Updates**

#### **Project No. 5 – Prescribed Fire Management**

#### **Project No. 6 – Neotropical Bird Survey**

#### **Project No. 7 – Habitat Management and Restoration**

#### **Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to GIS, data integration, access, and reporting at the Installation include the following.

1. Receive training on this integrated system to make use of this real-time technology and the benefits it offers, so that natural resources managers can fully implement a proactive natural resources management program that supports the mission and ecosystems integrity.
2. Provide adequate training to natural resources personnel in data collection using global GPS technology is another essential aspect of building and maintaining an up-to-date GIS database that meets natural resources planning needs.

#### ***Long-term Management***

GIS databases and mapping capabilities will be used for daily decisions as well as long-term planning of natural resources management and its integration with the military mission. This work is driven by laws such as the NEPA, ESA, and CWA. For NEPA compliance, all impacts on federal land from a proposed project must be considered before the project can be implemented. These impacts may affect natural resources such as water, vegetation, and fish and wildlife resources, including those that may be federally or state protected; detailed maps are required to assess the potential impacts on these resources.

#### ***Integration with Other Natural Resources Management Activities***

GIS, data integration, access, and reporting is applicable to most of the management activities and natural resources identified in this INRMP, as described in the Integration with other Natural Resources Management Activities discussions throughout Section 3.0.

---

### ***Ecosystems Management***

Ecosystems management requires the use of GIS, data integration, access, and reporting to ensure that appropriate decisions and strategies are adopted in the implementation of this INRMP. GIS data also can be used to evaluate regulatory compliance issues, such as a project impacts to wetlands, federally listed species and their habitats, and other natural resources.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to GIS, Data Integration, Access, and Reporting***

- OPNAVINST 5090.1D, 12-3.4(c), encourages natural resources managers to use GIS as the basis of INRMP implementation.

### ***Additional Sources of Information***

- EPA, Environmental Dataset Gateway (<https://edg.epa.gov/metadata/catalog/main/home.page>)
- USFWS, National GIS Datasets (<https://www.fws.gov/gis/data/national/index.html>)
- USDA NRCS Geospatial Data Gateway (<https://datagateway.nrcs.usda.gov/>)
- TPWD, GIS Lab Data Downloads (<https://tpwd.texas.gov/gis/>)
- NAVFAC GeoReadiness Center (<http://proceedings.esri.com/library/userconf/eucom-africom10/papers/georeadiness-program.pdf>)

#### **3.2.4.4 Partnering with Federal and State Agencies, Universities, and NGOs**

Cooperating federal and state agencies, universities, and NGOs can provide a beneficial exchange of technical information, services, and field assistance to accomplish natural resources objectives at the Installation. Technical assistance may be provided by USDA NRCS, USFWS, USGS, TPWD, Texas A&M University – Corpus Christi, and National Interagency Prescribed Fire Training Center. Future collaboration would occur with NGOs such as the TNC, other non-profit entities, and universities, to further protect and conserve natural resources, maintain environmental compliance, and enhance the Navy’s ability to meet its mission-critical objectives.

The Navy nominated the Installation as a candidate for the Joint Land Use Study (JLUS) program in 2006 to provide the City of Corpus Christi and Nueces County with the opportunity to prevent urban development from adversely impacting operational missions at the base. The JLUS was adopted by the City Council in 2013. The City of Corpus Christi and Nueces County also enacted the NASCC Compatible Land Use and Hazard Zoning Regulations in 2010. These regulations mirror the Navy’s Clear Zone recommendations (OPNAV 11010.36C) and provide the Installation with protection from incompatible development.

The objective of the JLUS is to reduce potential conflicts between the military installation and surrounding areas while accommodating new growth and economic development, sustaining economic vitality, and protecting the general public health and safety, and without compromising the operational missions of the installation (City of Corpus Christi 2013). Installation personnel should continue to participate in public workshops related to the JLUS to reduce potential

---

compatibility issues between mission-related activities at the Installation and the surrounding community (Planning Department Corpus Christi Texas 2012).

The annual reviews and five-year reviews required by the SAIA offer opportunities to strengthen existing partnerships and develop additional partnerships that support implementation of this INRMP. The use of cooperative agreements and partnerships is discussed in Section 5.8.

### *Issue*

The implementation and continuing management of this INRMP will be dependent upon the continued assignment of a full time NRM. This is primarily attributed to the large amount of acreage that is associated with the Installation properties, as well as the diverse nature of the terrestrial and aquatic habitats requiring management attention on Installation parcels.

To broaden the scope of the Installation natural resources program and encourage participation in planned activities, the Installation should seek out development of partnerships with the TPWD, USFWS, USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Partners in Amphibian and Reptile Conservation, and other local agencies and organizations.

The Navy solicits input during the development and update of this INRMP from cooperating federal and state agencies, the USFWS and TPWD (Appendix A). Although no formal cooperative agreements are in place, NASCC has an ongoing informal partnership with USFWS and TPWD. Cooperative agreements with local or regional fish and wildlife agencies, conservation organizations, and education organizations have been initiated in the past and will continue to be supported.

### *Goals and Objectives*

Partnering with federal and state agencies, universities, NGOs, contractors, other installations, local residents, conservation organizations, and the Navy command increases the natural resources management capacity at the Installation.

**Goal 3: Integrate the various activities conducted under this INRMP by fostering knowledge of, and participation in, adaptive ecosystems management.**

**Objective 3.2:** Incorporate the concept of ecosystems management into all planning and management processes.

**Objective 3.4:** Establish a planning team to review and update the INRMP in accordance with OPNAVINST 5090.1D-12-3.4.

**Goal 4: Protect, conserve, and enhance the ecological value and diversity of natural resources by building productive relationships with regulatory agencies and the public in support of the military mission.**

**Objective 4.1:** Maintain interagency cooperation with USFWS and TPWD.

**Objective 4.2:** Develop partnerships with USDA NRCS, TCEQ, Texas A&M University – Corpus Christi, Texas Ornithological Society, Coastal Bend Audubon Society, DoD PIF, Nueces and Goliad

counties (encroachment partnering), and other local agencies and organizations to implement wildlife monitoring and protection programs.

### *Projects and Management Strategies*

#### **Projects (detailed in Appendix K)**

Participation in the following projects will support the goals and objectives established for partnering with federal and state agencies, universities, and NGOs.

#### **Project No. 1 – Biological Inventories**

#### **Project No. 2 – Rare, Threatened, and Endangered Species Habitat Management**

#### **Project No. 3 – Invasive Species Control**

#### **Project No. 4 – NASCC INRMP Updates**

#### **Project No. 5 – Prescribed Fire Management**

#### **Project No. 6 – Neotropical Bird Survey**

#### **Project No. 7 – Habitat Management and Restoration**

#### **Project No. 8 – Natural Resources Outreach**

#### **Management Strategies**

Management strategies related to partnering with federal and state agencies, universities, and NGOs at the Installation include the following.

1. Develop partnerships with federal, state, and local agencies, NGOs, and universities to implement natural resources monitoring and protection programs.
2. Participate in discussions with Nueces and Goliad counties to reduce conflicts between development and the military mission.

### *Long-term Management*

The Installation will continue to seek out cooperative agreements, memoranda, and other agreements between the Installation and federal and state agencies that oversee and regulate natural resources protection. The NRM is responsible for ensuring that the Installation has up-to-date agreements in place. The NRM also will consult federal, state, university, NGO, and Navy experts as needed to ensure regulatory compliance and adequate management measures are in place for rare, threatened, and endangered flora and fauna, designated Critical Habitat and BASH issues associated with the Installation. Although no formal cooperative agreements are in place, the Installation has an ongoing informal partnership with USFWS and TPWD, and will continue to foster these relationships as part of implementation of the INRMP.

### *Integration with Other Natural Resources Management Activities*

Partnering with federal and state agencies, universities, and NGOs is applicable to most of the management activities and natural resources identified in this INRMP, as described in the

---

Integration with other Natural Resources Management Activities discussions throughout Section 3.0.

### ***Ecosystems Management***

Plans and programs for maintaining and managing natural resources on the Installation need to fully consider the interrelationships among these resources to assure no net loss in mission capability. The input and cooperation of regulatory agencies and other experts will best facilitate the success of these plans and program, including protection of federally listed species known to occur, as well as designated Critical Habitat that is present at the Installation.

### ***Laws, EOs, Regulations, Directives, and Memoranda Relevant to Partnering with Federal and State Agencies, Universities, and NGOs***

- EO 13352 (26 August 2004), *Facilitation of Cooperative Conservation*, directs that the Secretaries of the Interior, Agriculture, Commerce, and Defense; and the Administrator of the EPA shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate:
  - carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that facilitates cooperative conservation;
  - take appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources;
  - properly accommodate local participation in federal decision making; and
  - provides that the programs, projects, and activities are consistent with protecting public health and safety.
- 32 CFR 190, establishes DoD policies for the development of integrated natural resources management plans.

### ***Additional Sources of Information***

- DoD, Natural Resource Programs and INRMP Implementation: Partnering Tools ([https://www.dodworkshops.org/files/Training/SikesModules/Mod8\\_PartnerTools\\_FINAL\\_july09.pdf](https://www.dodworkshops.org/files/Training/SikesModules/Mod8_PartnerTools_FINAL_july09.pdf))
- Natural Resources Funding Manual (September 2009), ([https://www.dodnaturalresources.net/files/AEC\\_EcoFunding\\_Manual\\_082010\\_FINAL\\_VERSION.pdf](https://www.dodnaturalresources.net/files/AEC_EcoFunding_Manual_082010_FINAL_VERSION.pdf))
- USFWS, South Texas Natural Resources Partnering Team (<https://www.fws.gov/fieldnotes/regmap.cfm?arskey=18800>)



---

## 4.0 NATURAL RESOURCES MANAGEMENT FOCUSES

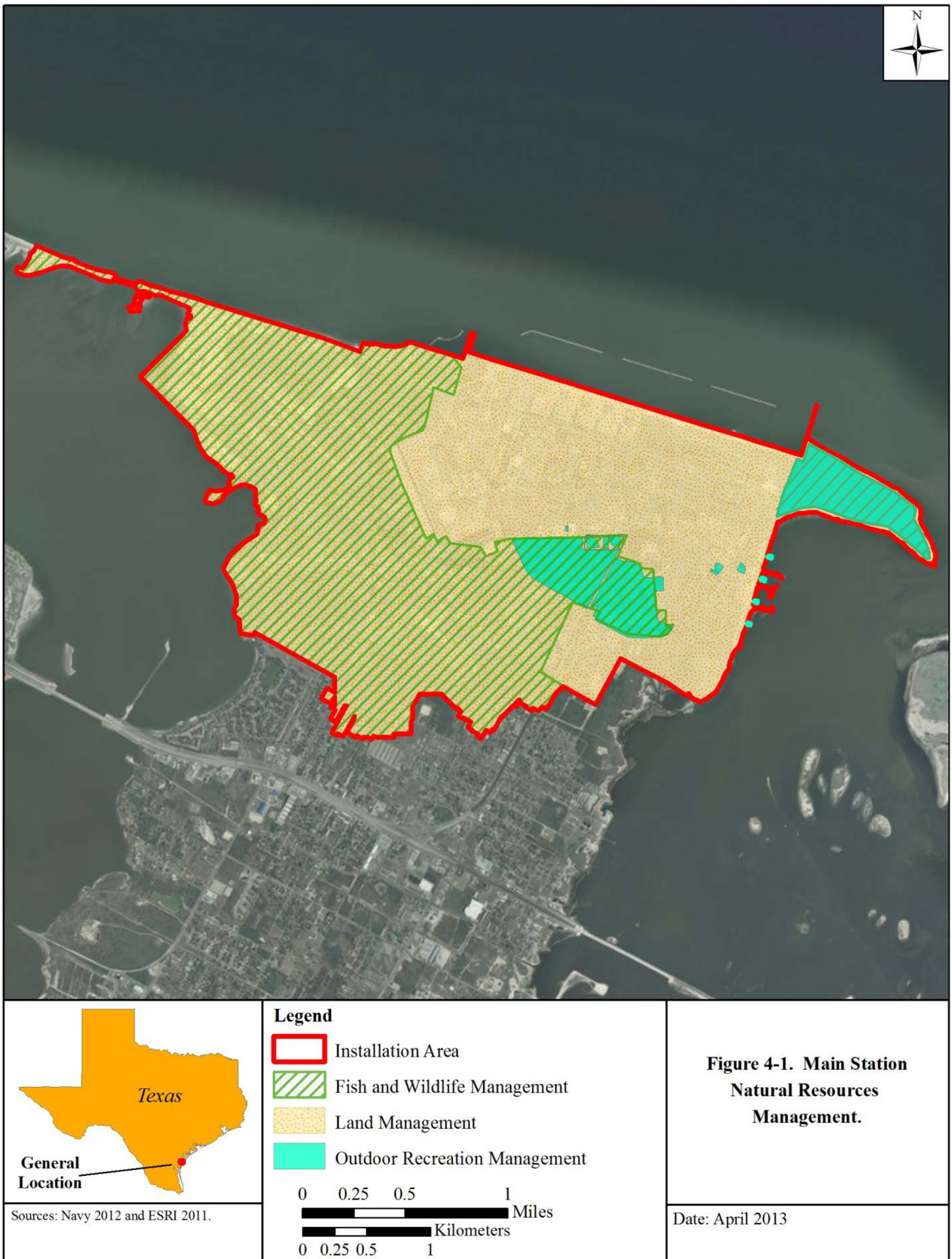
The SAIA requires integration of, and consistency among, the various activities conducted under the INRMP developed for each military installation. This requirement of SAIA is met using an ecosystems management approach. The basic concept of ecosystems management is to address management issues within the context of the entire ecosystem and the interrelationships among individual components of the ecosystem, while meeting the mission requirements of the installation. Addressing interrelated issues is a complex undertaking, and at times the management goals are at odds with each other or with the mission requirements. Through the integration of the management programs that traditionally have been separate, many of the issues can be more effectively addressed, and the conflicts between management actions and military mission reduced. To help identify opportunities and potential conflicts in natural resources management, the primary natural resources issues for the Installation are identified and discussed within the context of compliance and stewardship requirements.

As described previously, Installation properties total 5,827 ac (2,358 ha) in five separate functional areas or parcels. Presently, the management of the natural resources at the Installation is the responsibility of the Installation NRM.

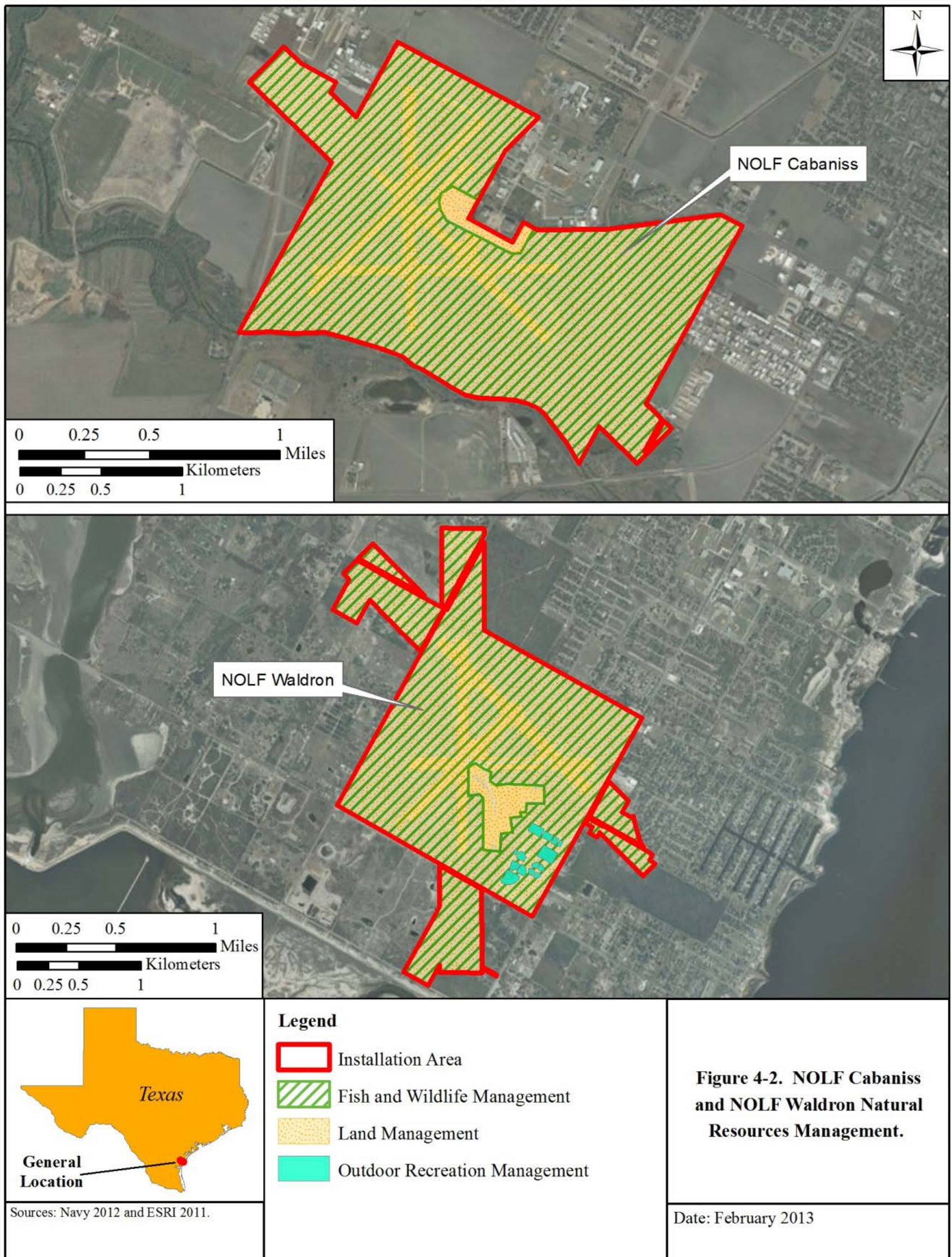
To facilitate effective management of Installation natural resources and to achieve the installation-wide goals and objectives that have been established, natural resources management is considered for four of the five functional areas or parcels, excluding Peary Place Transmitter Site. The parcels reflect the spatial separation, the use of each parcel for its military purpose, and the potential for natural resources management. Within each functional area, natural resources management focuses are identified. The natural resources management focus for an area may include any or some combination of the three management focuses: Land Management, Fish and Wildlife Management, and Outdoor Recreation Management. The fourth natural resources management focus—integrated ecosystems management and partnering—is applied more broadly across the installation and is not identified specifically on natural resources management maps for the Installation. Figure 4-1, Figure 4-2, and Figure 4-3 identify the management focuses for each Installation parcel. A brief description of the extent of the management focus areas at each of the Installation parcels is provided below.

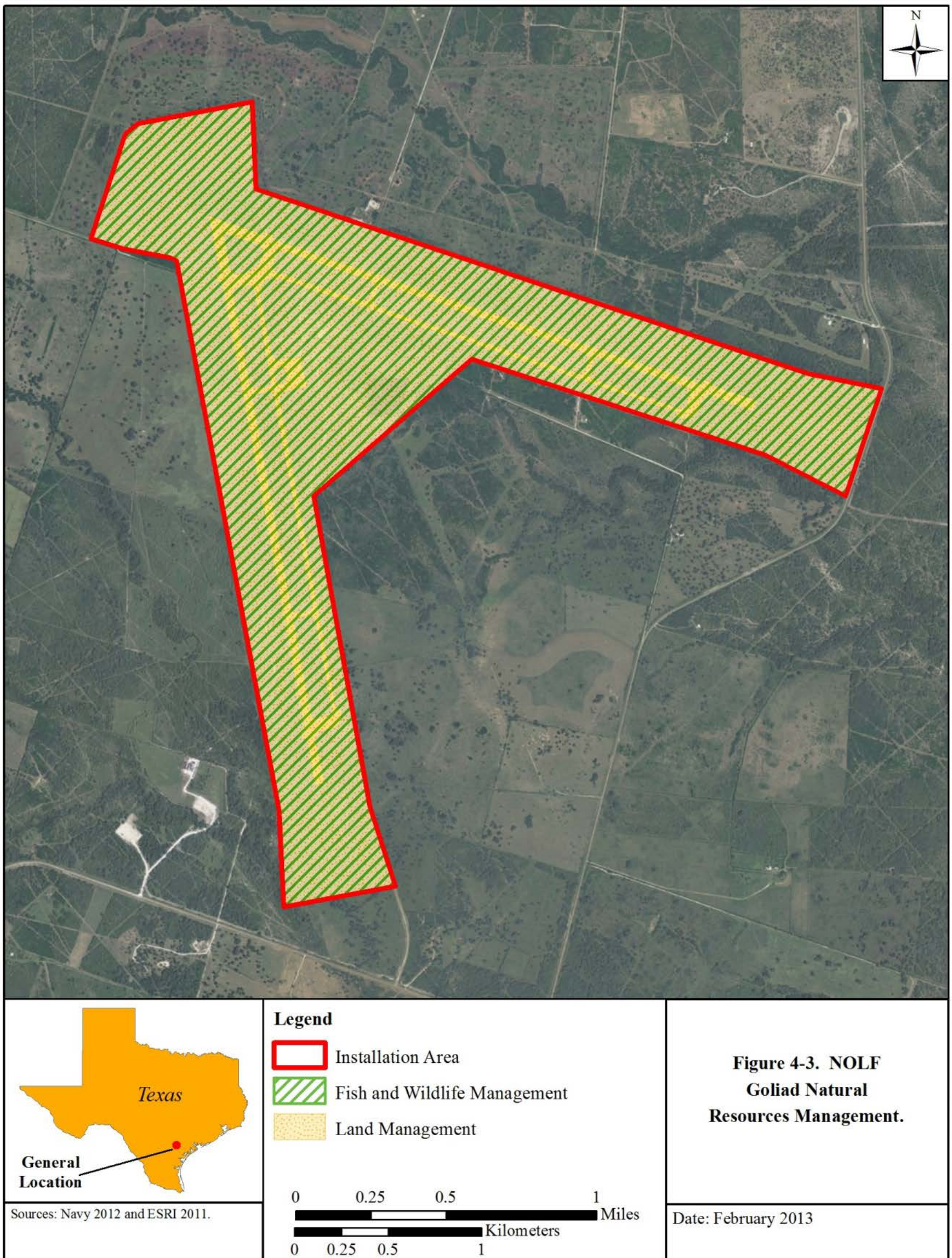
- **Land Management** encompasses all of the land area of the Installation. All Installation properties contain active airfields and airfield support facilities, and land management is an important component of natural resources management at these sites (Figure 4-1, Figure 4-2, and Figure 4-3). Aside from the airfield areas of NOLF Cabaniss, NOLF Waldron, and NOLF Goliad, these parcels contain little development, and primarily consist of agricultural outlease, mowed, and natural areas (Figure 4-2 and Figure 4-3).
- **Fish and Wildlife Management** encompasses a significant portion of the Installation. Approximately half of the Main Station, almost the entirety of NOLF Cabaniss and NOLF Waldron, and all of the land area of NOLF Goliad are managed for fish and wildlife, primarily in support of the BASH Program (Figure 4-1, Figure 4-2, and Figure 4-3).

- **Outdoor Recreation Management** covers a minor portion of the Installation. At the Main Station outdoor recreation management is focused in the area of the Gulf Winds Golf Course, athletic fields, and docks located within the eastern half of the parcel (Figure 4-1). At NOLF Waldron outdoor recreation management is associated with the athletic and recreation facilities located in the southern corner of the parcel (Figure 4-2). There are no outdoor recreation management focus areas associated with NOLF Cabaniss or NOLF Goliad. Outdoor recreation is managed to support the goals and objectives of the NASCC MWR Program.



Z:\project\NAVFAC\100\_NRS\_T23370\_NRS\_T23370\_REVISIONS\TTP\_T23370-DM03\_Fig4-1\_CC.mxd, SMH





This page intentionally left blank

---

## **5.0 INRMP IMPLEMENTATION**

Implementation of this INRMP will follow an annual strategy that addresses legal requirements, DoD and Navy directive or policy requirements, funding, implementation responsibilities, technical assistance, labor resources, and technological enhancements. In order for this INRMP to be considered implemented, the following actions will need to be completed.

1. Funding is secured for completion of all “must fund” environmental compliance projects.
2. The Installation is staffed with a sufficient number of professionally trained environmental staff needed to perform the tasks required by the INRMP.
3. Annual coordination with all cooperating offices is performed.
4. Specific INRMP action accomplishments that are undertaken are documented each year.

The following sections provide an overview of the role that implementation of this INRMP would play in supporting sustainability of the military mission and the natural environment, meeting natural resources consultation requirements, achieving no net loss in mission capability, attaining NEPA compliance, understanding project development and classification, identifying funding sources, establishing commitment, and endorsing the use of cooperative agreements. The INRMP projects identified in Section 3.0 are summarized in Appendix K and include information on the implementation schedule, prime legal driver, funding priority, environmental readiness level, EPRWeb Guidebook Number, funding source, and NEPA requirement for each of the projects proposed in this INRMP. Details for each of the INRMP projects, including project details, project purpose, goals and objectives, baseline, and monitoring requirements also are provided in Appendix K.

### **5.1 SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT**

#### **5.1.1 Integration of the Military Mission and Land Use**

The Navy has taken a proactive approach towards integrating the military mission with concepts of sustainable land use by recognizing that efficient and effective land use planning supports military readiness and sustainability, while protecting and enhancing the natural resources for multiple use, sustained yield, and biological integrity. Development and human use are inherently limited on military lands that are kept in their natural condition to support the military mission, often resulting in lands that have extremely high ecological value. These areas may include large tracts of undisturbed habitats and diverse flora communities that are often used as retreat areas, migration stopover points, or foraging areas for threatened and endangered, and special concern fauna species. Recognizing that military mission requirements have the highest priority, Navy understands the role INRMPs play in identifying potential conflicts between a facility’s mission and natural resources, and identifying actions necessary to maintain the availability of mission-essential properties and acreage. An INRMP balances the management of natural resources unique to the installation with the military mission requirements and other land use activities affecting an installation’s natural resources (DoD and USFWS 2002). The

Installation understands the importance of integrating the military mission and land use to meet the mission of military training and readiness while managing the valuable natural resources to ensure long-term environmental sustainability.

### **5.1.2 Impacts to the Military Mission**

The use and management of lands that support military training and readiness, and the decision-making associated with such land use, directly affect the sustainability of the ecosystem. Specific components of integrated natural resources management at the Installation include consideration of land, fish and wildlife, outdoor recreation, and integrated ecosystems management and partnering. To protect and maintain natural resources while ensuring the continuation of the military mission, the Installation has implemented an ecosystems management approach for environmental stewardship of natural resources under their jurisdiction. The management strategy maximizes land use that supports military training while minimizing impacts to natural resources.

The major environmental constraints on the military mission and development at the Installation are:

- limitation on vegetation growth and/or development within designated aircraft overrun areas or clear zones at Installation airfields (Main Station, NOLF Cabaniss, NOLF Waldron, and NOLF Goliad);
- control of air pollution, water pollution, and erosion through use of BMPs and careful planning to maintain natural resources that support the various aspects of the military mission;
- limitations on agricultural outleasing, habitat enhancement, and bird and wildlife monitoring and control to prevent and reduce the potential for BASH at Installation airfields as required by OPNAVINST 3750.6P and OPNAVINST 4790.2D, and procedures established by NASCORPCINST 3750.16A; and
- Conservation and protection of federally listed species known to occur at the Installation, including management and protection of habitats that support these species.

### **5.1.3 Relationship of Range Management Plan or Other Operation Area Plan**

NASCC does not currently have any range management or other operational plans in place that would need to be coordinated with natural resources management at NASCC.



## 5.2 NATURAL RESOURCES CONSULTATION REQUIREMENTS

Section 7 of the ESA requires federal agencies to formally consult with USFWS (freshwater fish and terrestrial wildlife) or NOAA NMFS (marine mammals, fish and fisheries) when any proposed activity authorized, carried out, or conducted by that agency may significantly affect a listed species or designated critical habitat, except when the USFWS or NOAA NMFS concurs, in writing, that a proposed action “is not likely to adversely affect” listed species or designated critical habitat (50 CFR §402.02, 50 CFR §402.14). Formal consultation under Section 7 of the ESA: (1) determines whether a proposed federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with the federal agency's written request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement by the federal agency. If, as a result of consultation, the USFWS or NOAA NMFS issues a biological opinion, it will include actions that the federal agency must complete in order to conduct the proposed activity. If critical habitat is located on federal property and adequate protection and management of the critical habitat has been included in the installation INRMP, the ESA allows USFWS to preclude this habitat from the biological opinion. However, in order for the critical habitat to be excluded, the qualifying INRMP must address the maintenance and improvement of the primary constituent elements important to the species, and must manage for the long-term conservation of the species. For minor or less than significant impacts to ESA-listed species or designated critical habitat, informal consultation with USFWS and NOAA NMFS may be appropriate. Section 7 consultation (formal or informal) may be required if any activities proposed at the Installation, including natural resources management actions identified in this INRMP, have the potential to impact the federally listed species and/or designated critical habitat for federally listed species.

Information on Section 7 of the ESA is available from USFWS at: <https://www.fws.gov/endangered/laws-policies/section-7.html>

Information on Section 9 of the ESA (prohibited activities to protect species from being harassed or killed, and having their habitat destroyed or disturbed) is available from USFWS at: <https://www.fws.gov/endangered/laws-policies/section-9.html>

Information on Section 10 of the ESA (exceptions for activities otherwise prohibited by Section 9) and Section 10(a)(1)(A) of the ESA (USFWS permits for scientific purposes or to enhance the propagation or survival of listed species) is available from USFWS at: [https://www.fws.gov/endangered/esa-library/pdf/HCP\\_Incidental\\_Take.pdf](https://www.fws.gov/endangered/esa-library/pdf/HCP_Incidental_Take.pdf)

USFWS has designated several Critical Habitat areas for wintering populations of the federally threatened piping plover in Texas (see Section 2.3.6 and Figure 2-23). Critical Habitat Unit TX-12 is a located adjacent to and within the boundaries of the Main Station. In addition to TX-12, several other designated Critical Habitat areas for wintering populations of piping plover are located in the vicinity of the Main Station, including Unit TX-11. Both of these units are located within Oso Bay and adjacent to the portion of Texas Spur 3 that connects Ward Island and the Main Station. Although habitat that would support wintering populations of piping plover is located at the Main Station, including sandy beaches and areas of shell hash along the western boundary, this

Maps of designated Critical Habitat for piping plover can be viewed at the USFWS website for this species: <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B079>

---

species has not been identified at the Main Station. Plans to conduct a focused piping plover survey, including a habitat assessment, are recommended, and could be implemented as part of INRMP Project No. 1, Biological Inventories (see Appendix K, Project No. 1).

Two federally-listed threatened species, piping plover and red knot, are known to occur at the Installation (Texas A&M 2018a; Withers 2014; Woodin et al. 2010) (see Section 2.3.6). Federally protected species that are known to occur at the Installation require protection and conservation measures to protect them and their associated habitats as required by the ESA. In addition to the piping plover and red knot, other federally- and state-protected species have the potential to occur at the Installation, including a number of amphibian, reptile, mammal, and bird species (see Appendix E, Table E-13 and Table E-14), due to the presence of suitable habitat and/or county records. An updated threatened and endangered species survey is recommended for the Main Station, NOLF Cabaniss, and NOLF Waldron as part of implementation of this INRMP, which could be conducted as part of INRMP Project No. 1, Biological Inventories (see Appendix K, Project No. 1).

### **5.3 ACHIEVING NO NET LOSS**

Section 101(b)(1)(I) of the Sikes Act states that each INRMP shall, to the extent appropriate and applicable, and consistent with the use of the installation to ensure the preparedness of the Armed Forces, provide for “no net loss in the capability of military installation lands to support the military mission of the installation.” It is DoD policy that appropriate management objectives to protect mission capabilities of installation lands (from which annual projects are developed) be clearly articulated, and receive high priority in the INRMP planning process (Navy 2006a).

The effectiveness of this INRMP in preventing “net loss” will be evaluated annually. Mission requirements and priorities identified in this INRMP will, where applicable, be integrated into other environmental programs and policies. It is not the intent that natural resources are to be consumed by mission requirements, but rather are sustained for the use of mission requirements. In order to achieve this, the goal of this INRMP is to conserve the environment for the purpose of the military mission. There may be instances in which a “net loss” may be unavoidable in order to fulfill regulatory requirements other than the Sikes Act, such as complying with a biological opinion under the provisions of the ESA, or from the protection of wetlands under the provisions of the CWA. However, both the USFWS and USACE are required to adhere to the Sikes Act provision of no net loss in mission capability. Loss of mission capability in these instances will be identified in the annual updates of this INRMP and will include a discussion of measures being undertaken to recapture any net loss in mission capability.

### **5.4 NEPA COMPLIANCE**

Prior to passage of Sikes Act legislation, the extent of natural resources management on military lands was largely discretionary. Although installations with applicable natural resources were required to prepare natural resources plans, it was not a legal requirement. The only legal natural resources requirements for installations were related to compliance with ESA, CWA, and other statutory requirements, or DoD directives. Passage of the SAIA brought into effect the requirement for “the Secretary of each military department to prepare and implement an integrated natural resources management plan for each military installation in the U.S. under the

jurisdiction of the Secretary” (Navy 2006a). The Council on Environmental Quality (CEQ) defines an INRMP as a major Federal action requiring NEPA analysis, and as a result the Navy Office of General Counsel (Installations and Environment) has established that implementation of an INRMP per SAIA requirements, necessitates the preparation of NEPA documentation prior to approval of the INRMP. The preparation of an Environmental Assessment (EA) is usually sufficient to satisfy the NEPA review requirement for most installation INRMPs; however, in cases where implementation of the INRMP would have significant impact on the environment, the preparation of an Environmental Impact Statement (EIS) is required. Annual updates and revisions are covered by the original NEPA documentation unless a major change in installation mission or programmatic objectives occurs.

Decisions that affect future land or resource use that are associated with an INRMP require NEPA analysis. The NRM should refer to Secretary of the Navy Instruction 5090.6A and Chapter 10 of OPNAVINST 5090.1D for basic guidance on the preparation of NEPA documents. The INRMP and associated NEPA documentation should be prepared as individual documents to ensure that the viability, integrity, and intent of each are maintained. The intent of the INRMP is to outline projects that would fulfill Navy compliance and stewardship obligations, while the intent of the NEPA documentation is to analyze the impacts of the programmatic objectives outlined within the INRMP. While each of these are prepared as separate documents, they should be prepared simultaneously, as it is important for installation natural resource managers to coordinate the two documents at the earliest possible stage to ensure that decisions reflect current environmental values, and avoid potential conflicts.

Further information on NEPA compliance can be found online:

*CEQ – Regulations for Implementing NEPA.*  
Available at: [https://ceq.doe.gov/laws-regulations/agency\\_implementing\\_procedures.html](https://ceq.doe.gov/laws-regulations/agency_implementing_procedures.html)

*NEPA’s Forty Most Asked Questions.*  
Available at:  
<https://www.energy.gov/sites/prod/files/G-CEQ-40Questions.pdf>

Preparation of the NEPA documentation should be completed early to accommodate Navy decision-makers. If a comment period or public notice is required for NEPA process, public notice and comment periods should be coordinated and integrated with the INRMP. A finding of no significant impact must be achieved before an INRMP may be approved. If a finding of no significant impact is not achievable, the NEPA process must proceed to an EIS. One of the first steps in the NEPA process is to define the proposed action and explain its purpose and need. The proposed action is to develop and implement an INRMP that integrates natural resources management with the installation’s military use in a manner that ensures military readiness and provides for sustainable multipurpose uses and conservation of natural resources (Navy 2006a). The purpose and need for the INRMP is to meet statutory requirements imposed by the SAIA as well as the requirements of various DoD and Navy instructions. The purpose and need section of the NEPA document can be further clarified with a brief discussion of the required plan elements (as outlined in the SAIA) applicable to the installation.

The majority of the NEPA document should focus on the discussion of relevant environmental issues and reasonable alternatives. Alternatives that are not feasible because they are inconsistent with the installation mission, unreasonably expensive, too technically or logistically complex

---

should not be included in the analysis. Additionally, any alternatives that are associated with significant environmental impacts cannot be analyzed in an EA, and would require preparation of an EIS. The CEQ defines reasonable alternatives as those that are economically and technically feasible and utilize common sense. Feasibility is a measure of whether the alternative makes sense and is achievable. The analysis should focus on the alternatives and methodologies proposed for implementing the programmatic objectives that have been established for natural resources management. The 2006 Navy INRMP Guidance document recommends that the NEPA analysis for INRMP documents adopt a “programmatic” approach that provides opportunities for the installation to accommodate unforeseen projects that meet pre-established criteria for significance evaluation, as well as changes to the projects, as long as impacts are covered within the overall scope and analysis for the selected alternative (Navy 2006a). Analysis in the NEPA document would focus on evaluation and comparison of alternative plans in association with the four natural resources management focuses established for the Installation: land management, fish and wildlife management, outdoor recreation management, and integrated ecosystems management and partnering. Analysis should not focus on the individual projects or practices except in the cases of controversial projects or projects considered outside the scope of, or a major deviation from, a previously existing INRMP. The projects and recommendations outlined in an INRMP should provide a framework for reviewing on-going activities, and also will assist in reviewing changes for unforeseen projects or modifications in the future. It is important to distinguish that the NEPA analysis for evaluating the natural resources management focuses is different from the project level of analysis used for project specific actions.

The No Action/Status Quo alternative should always be included as an alternative to implementation of the INRMP. The No Action/Status Quo alternative describes impacts that would occur if the installation did not implement the INRMP, and the installation continued to operate without a plan or the existing plan if one is in place. The No Action/Status Quo alternative serves as a baseline to which all other alternatives are compared. Each alternative should describe the general geographical extent applicable to each of the natural resources management focuses. Each of the reasonable alternatives may only represent variable intensities of one or more of the natural resources management focuses; however, differences in funding levels for each alternative would not constitute a valid range of alternatives. For example, it is not acceptable for all required compliance projects to represent an alternative. A brief summary of all alternatives considered for the INRMP should be included to provide the review agencies and the local community the range of management scenarios that were analyzed.

Although specific projects are not required to be analyzed in the NEPA document, a complete list of projects, including description, cost estimate, funding priority designations, and implementation schedule must be included to provide the basis of the proposed action. If agency stakeholders and the Navy determine that potential projects are controversial, sufficient project details must be provided in the INRMP so that a decision can be made regarding significance as part of the NEPA analysis. Additionally, controversial projects, or projects outside the scope may require a tiered or amended NEPA document for that specific project. All projects must be consistent with the methodologies analyzed in the NEPA document, and the installation should ensure that the NEPA documentation for the INRMP is prepared such that it would accommodate for unforeseen projects, and changes to original projects. Appendix F of the Navy

INRMP Guidance document (Navy 2006a) includes more information on preparing NEPA documents for INRMPs.

The final EA prepared for this INRMP was prepared upon completion of the environmental review and public comment process in 2001.

## **5.5 PROJECT DEVELOPMENT AND CLASSIFICATION**

This INRMP is a public document that requires the mutual agreement of the Installation, USFWS, and TPWD. It is crucial therefore, that these entities reach a common understanding as to which projects are most likely to be funded through the sources identified in Section 5.6. An annual strategy must be adopted for INRMP funding that addresses the installation's legal requirements.

## **5.6 FUNDING SOURCES**

Once INRMP projects have been validated, and entered into Environmental Program Requirements (EPR)-web, sources of funding should be sought for these projects. EPR-web project entries should include clear justification of funds being requested so that: (1) natural resource funds are distributed wisely, and (2) funding levels are not threatened by the use of funds in ways that are inconsistent with funding program rules (Navy 2006a). The primary sources for funding Navy natural resource projects are:

- Operations and Maintenance, Navy (O&MN) Funds
- Legacy Resource Management Program (Legacy Program) Funds
- Forestry Revenues
- Agricultural Outleasing
- Fish and Wildlife Fees
- Recycling Funds
- Strategic Environmental Research and Development Program (SERDP) Funds
- Other Non-DoD Funds

### **5.6.1 O&MN Funds**

A majority of natural resource projects are funded with O&MN funds, and are primarily restricted to support “must-fund” environmental compliance projects. Other limitations for the use of O&MN funds include the following.

- Only the initial procurement, construction, and modification of a facility or project are considered valid environmental funding requirements. The subsequent operation, modification due to mission requirements, maintenance, repair, and eventual replacement is considered a Real Property Maintenance funding requirement.

- When natural resource requirements are tied to a specific construction project or other action, funds for the natural resource requirements should be included in the overall project costs.

O&MN Funds are expected to be the primary source of funding for Installation INRMP Environmental Compliance projects.

### 5.6.2 The Legacy Resource Management Program

The Legacy Program was part of a special Congressional mandated initiative for funding military conservation projects. Although the Legacy Program was originally funded from 1991 to 1996 only, funds for new projects have continued to be available through this program (Navy 2006a). Legacy Program funds can be used for a variety of conservation projects, such as regional ecosystems management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, monitoring and predicting migratory patterns of birds and animals, and National partnerships and initiatives, such as National Public Lands Day.

More information on requirements for Legacy Program applications can be found at:  
<https://www.denix.osd.mil/legacy/home/>.

Requests for Legacy funds should consider the following:

- The availability of Legacy Program funds is generally uncertain early in the year.
- Pre-proposals for Legacy Program projects are due in March and submitted using the Legacy Program Tracker Website: <https://www.denix.osd.mil/legacy/home/>.
- Project proposals are reviewed by the Navy chain of command before being submitted to the DoD Legacy Resources Management Office for final project selection.
- The Legacy Program website provides further guidance on the proposal process and types of projects requested.

Legacy Program funds should be considered as a potential funding source for Installation INRMP projects.

### 5.6.3 Forestry Revenues

Forestry Revenues originate from the sale of forest products on Navy lands, and can be used to fund forestry and potentially other natural resources management programs. Forestry revenues are given preference for funding the Annual Navy Forestry Funds and the DoD Forestry Reserve Account. Annual Navy Forestry Funds are used to support commercial forestry operations at installations. Forestry revenues are first used to reimburse commercial forestry expenses, then, as directed by DoD Financial Management Regulation 7000.14-R Volume 11A, 40% of net proceeds for the fiscal year for the installation are distributed to the state in which the installation resides. The state usually uses these funds to support road systems and schools. Once the commercial forestry expenses are reimbursed, and proceeds are distributed among the state counties, any remaining amount is transferred to a holding account known as the DoD Forestry Reserve Account.

---

Forestry Revenues also can be used to fund the improvement of forested lands; fund unanticipated contingencies associated with administration of forested lands and production of forest products, for which other sources of funds are not available; and natural resources management for implementation of approved plans and agreements. In order for a natural resources project to be eligible for funding from Forestry Revenues it must:

- 1) Be specifically included in an approved management plan, such as an INRMP; and
- 2) Provide for at least one of the following:
  - a. Fish and wildlife habitat improvements or modifications;
  - b. Range rehabilitation where necessary for support of wildlife;
  - c. Control of off-road vehicle traffic;
  - d. Specific habitat improvement projects and related activities; and
  - e. Adequate protection for species of fish, wildlife, and plants considered threatened or endangered.

The amount of funds available through Forestry Revenues varies from year to year. It is important to note that the amount of funds remaining for natural resources management is relatively small, and although installations are not required to have a timber harvesting plan to be eligible for funds from the DoD Forestry Reserve Account, Reserve Account funds cannot be used for “must fund” environmental compliance projects. DoD Forestry Reserve Account funds are a potential source of funding for Installation INRMP projects that are not classified as environmental compliance projects.

#### **5.6.4 Agricultural Outleasing**

Agricultural Outleasing funds are collected through the leasing of Navy-owned property for agricultural use. This money is directed back into Navy’s NRP by NAVFAC Headquarters. Agricultural Outleasing funds are primarily allocated for agricultural outlease improvements, but also may potentially be used for natural resources management and stewardship projects once the primary objective is met. In addition to projects related to agricultural outleasing, these funds can be used for implementation of INRMP stewardship projects. Although funds available through Agricultural Outleasing vary from year to year, this funding source can be used to implement INRMP projects that do not have environmental stewardship requirements. When available, Agricultural Outleasing funds should be considered as a potential funding source for Installation INRMP projects that are not classified as environmental compliance projects.

#### **5.6.5 Fish and Wildlife Fees**

Fish and Wildlife Fees are primarily collected as part of installation hunting, fishing or trapping programs. These fees are deposited and used in accordance with the Sikes Act and DoD financial management regulations. The Sikes Act specifies that user fees collected for hunting, fishing or trapping shall be used only on the installation where they are collected, and be used exclusively for fish and wildlife conservation and management at the installation where collected. Fishing is allowed at the Installation; no fee is required, nor does the Installation issue fishing permits for this activity. Since the Installation does not have a formal hunting or fishing program, no fees are collected that could be used to support natural resource management projects.

### **5.6.6 Recycling Funds**

Installations that have a Qualified Recycling Program (QRP) may use their proceeds for some types of natural resource projects. Any proceeds collected as part of the installation QRP must first be used to cover QRP costs, and then up to 50% of the net proceeds can be for pollution abatement, pollution prevention, composting, alternative fueled vehicle infrastructure support, vehicle conversion, energy conversion, or occupational safety and health projects, with first consideration given to projects included in the installation's pollution-prevention plans. Remaining funds may be transferred to the non-appropriated MWR account for approved programs, or retained to cover anticipated future program costs. The Installation does not currently include a QRP; therefore, Recycling Funds are not expected to be used to support any of the natural resource projects recommended in this INRMP.

### **5.6.7 Strategic Environmental Research and Development Program (SERDP) Funds**

SERDP is DoD's corporate environmental research and development program, planned and executing in full partnership with the U.S. Department of Energy and EPA, with participation by numerous other federal and non-federal organizations (Navy 2006a). SERDP funds are allocated for environmental and conservation project through a competitive process. The focus of SERDP is on Cleanup, Compliance, Conservation, and Pollution Preventions technologies. Due to the competitive process involved with allocation of SERDP Funds, the Installation is not expected to receive natural resource funds through this source.

### **5.6.8 Non-DoD Funds**

Non-DoD Funds, such as those received from grant programs, are available to fund natural resources management projects, such as watershed management and restoration, habitat restoration, and wetland and riparian area restoration. Federally funded grant programs typically require non-federal matching funds, however, installations can partner with other groups for preparing proposals for eligible projects. The Installation should consider grant funding and partnerships as a potential funding source for INRMP natural resources projects.

## **5.7 COMMITMENT**

This INRMP will require formal adoption by the Installation Commanding Officer to ensure commitment for pursuing funding, and to execute all "must-fund" environmental compliance projects, subject to the availability of funding. Funding of these projects should be pursued within the specific timeframes identified in the INRMP projects table provided in Appendix K.

## **5.8 USE OF COOPERATIVE AGREEMENTS AND PARTNERSHIPS**

A cooperative agreement is used to acquire goods or services, or stimulate an activity that will be implemented for the public good. Section 103a of the Sikes Act (16 USC 670c-1) provides the authority to enter into cooperative agreements with state and local governments, NGOs, and individuals to provide for the maintenance and improvement of natural resources on, or to benefit natural and historic research on DoD installations. In addition to a standard cooperative agreement, examples of other agreements include MOUs, and Cooperative Assistance Agreement. Funds appropriated for multiyear agreements during a fiscal year may be obligated to cover the cost of goods and services provided under a cooperative agreement entered into or



through an agency agreement during any 18-month period beginning in that fiscal year, without regard to whether the agreement crosses fiscal years (31 USC §1535). Cooperative agreements entered into are subject to the availability of funds.

EO 13352, *Facilitation of Cooperative Conservation* (26 August 2004) directs that the Secretaries of the Interior, Agriculture, Commerce, and Defense; and the Administrator of the EPA shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate:

- carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that facilitates cooperative conservation;
- take appropriate account of and respect the interests of persons with ownership or other legally recognized interests in land and other natural resources;
- properly accommodate local participation in federal decision making; and
- provide that the programs, projects, and activities are consistent with protecting public health and safety.

Although the Navy has no formal cooperative agreements in place for NASCC, NASCC has an ongoing informal partnership with USFWS and TPWD. Cooperative agreements with local or regional fish and wildlife agencies, conservation organizations, and education organizations have been initiated in the past and will continue to be supported. These agencies include, but are not limited to DoD PIF, USDA NRCS, TCEQ, Texas A&M University–Corpus Christi, Texas Ornithological Society, and Coastal Bend Audubon Society.

This page intentionally left blank.

---

## 6.0 REFERENCES

- AH Environmental Consultants, Inc. (AHEC). 2013. Storm Water Pollution Prevention Plan, Naval Air Station Corpus Christi, Corpus Christi, Texas. Prepared for Naval Facilities Engineering Command, Southeast.
- Arnold, K A. 1995. Barn Swallow, *Hirundo rustica*. Texas Breeding Bird Atlas, Texas A&M University. Available online at: <http://txtbba.tamu.edu/species-accounts/barn-swallow/> (Accessed 18 April 2012).
- Association of Fish and Wildlife Agencies. 2007. Fact Sheet: Eight Required Elements for Conservation Success. Available online at: <http://www.wildlifeactionplan.org/about/index.html> (Accessed 19 September 2012).
- AvianWeb. 2011. Sprague's Pipit (*Anthus Spragueii*). Photo courtesy of Greg Page Available online at: <http://www.flickr.com/photos/gregpage/4667310229/> (Accessed 11 March 2013).
- Barnes, V.E. 1974. Austin Sheet: The University of Texas – Austin, Bureau of Economic Geology, Geologic Atlas of Texas, Corpus Christi Sheet, scale 1:250,000.
- Benton, N., J. D. Ripley, and F. Powledge, eds. 2008. Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers. Arlington, Virginia: NatureServe. Available online at: <http://www.dodbiodiversity.org> (Accessed 26 September 2012).
- Boscamp, R. 2011. Navy plans to ready the Goliad County airfield for military use to be discussed Tuesday. Available online at: <http://www.caller.com/news/2011/nov/07/navy-plans-to-ready-the-goliad-county-airfield/?print=1> (Accessed 23 October 2012).
- Burst, T.L. 1994. Fish and Wildlife Section of the Natural Resources Plan for Naval Air Station Corpus Christi, Texas, Including OLF Waldron, OLF Cabaniss, and Peary Place, 1994–1999.
- Campbell, L. 1995. *Endangered and Threatened Animals of Texas*. Texas Parks and Wildlife Department. Austin, Texas.
- Castelle, A.J., A.W. Johnson, C. Conolly. 1994. Wetland and Stream Buffer Size Requirements – A Review. *J. Environ Qual.* Vol. 23(5):878-893.
- Casto, S. D. 2006. House Sparrow, *Passer domesticus*. Available online at: <http://txtbba.tamu.edu/species-accounts/house-sparrow/> (Accessed 05 February 2013).
- CBBEP (Coastal Bend Bays & Estuaries Program). n.d. a. About the Coastal Bend Bays & Estuary Program. Available online at: <http://www.cbbep.org/aboutCBBEP.html> (Accessed 28 January 2013).

- 
- \_\_\_\_\_. n.d. b. Seagrass! A Cornerstone of Bay Productivity. Available online at:  
<http://www.cbbep.org/publications/virtuallibrary/factsheet/FS204/factsheet4.HTM>  
(Accessed 28 January 2013).
- \_\_\_\_\_. 1998. Coastal Bend Bays Plan. August 1998. Available online at:  
<http://www.cbbep.org/publications/virtuallibrary/cbbin.pdf> (Accessed 28 January 2013).
- City of Corpus Christi. 2010. Future Land Use Plan. Available online at:  
<http://www.cctexas.com/Assets/Departments/PlanningEnvironmentalServices/Files/AdoptedFutureLandUseText3-9-2010.PDF> (Accessed 28 January 2013).
- \_\_\_\_\_. 2012. NAS Corpus Christi Joint Land Use Study, Fact Sheet #1A, JLUS Overview. Rev. 02 February 2012. Available online at: [http://www.ccjlus.com/downloads/documents-handouts/cat\\_view/2-meeting-handouts/4-public-meetings/5-april-2012-public-meetings.html](http://www.ccjlus.com/downloads/documents-handouts/cat_view/2-meeting-handouts/4-public-meetings/5-april-2012-public-meetings.html) (Accessed 05 February 2013).
- \_\_\_\_\_. 2013. NAS Corpus Christi Joint Land Use Study. [https://www.cctexas.com/sites/default/files/nas\\_corpus\\_christi\\_jlus.pdf](https://www.cctexas.com/sites/default/files/nas_corpus_christi_jlus.pdf). (Accessed 08 July 2019).
- CNIC (Commander, Navy Installations Command). n.d. Recreation at Naval Air Station Corpus Christi. Available online at:  
<https://www.cnic.navy.mil/corpuschristi/FleetAndFamilyReadiness/ThingsToDo/Recreation/index.htm>. Accessed 28 January 2013
- Coastal Bend Audubon Society. 2000. Checklist of Birds: Naval Air Station Corpus Christi. Corpus Christi Army Depot.
- Coastal Bend Audubon Society. 2000. Bird Checklist of NAS Corpus Christi.
- Collette, M. 2011. Navy prepares Goliad airfield for new fleet. Available online at:  
<http://www.caller.com/news/2011/oct/13/navy-prepares-goliad-airfield-for-new-fleet/>  
(Accessed 23 October 2012).
- \_\_\_\_\_. 2012. Navy flights begin at Goliad Airfield as property's price remains disputed. Available online at: <http://m.caller.com/news/2012/oct/03/navy-flights-begin-at-goliad-airfield-as-price/> (Accessed 23 October 2012).
- Cornell University. 2012. Cornell University Lab of Ornithology. Available online at:  
<http://www.birds.cornell.edu> (Accessed 5 November 2012).
- Cortez, J.D., S.E. Henke, T.E. Fulbright, E. Redeker, D. Wiemers. 2007. Study and Management Plan for the Maritime Pocket Gopher at Naval Air Station Corpus Christi. Caesar Kleberg Wildlife Research Institute at Texas A&M University – Kingsville.
- City of Corpus Christi Parks and Recreation. No date. Facilities.  
<http://www.cctexas.com/government/parks-recreation/programs-services/facilities/index>  
(Accessed 20 December 2013).
-

- 
- DoD (U.S. Department of Defense) and USFWS (U.S. Fish and Wildlife Service). 2002. Integrated Natural Resources Management Plans. Available online at: [library.fws.gov/Pubs9/es\\_integrated\\_nrplans02.pdf](http://library.fws.gov/Pubs9/es_integrated_nrplans02.pdf) (Accessed 8 September 2010).
- DoD (U.S. Department of Defense), Armed Forces Pest Management Board. 2012. Technical Guide No. 37: Integrated Management of Stray Animals on Military Installations. 25 May 2012.
- EPA (U.S. Environmental Protection Agency). 2012. National Estuary Program Mapper. Available online at: <http://gispub2.epa.gov/NEPMap/index.html> (Accessed 31 January 2013).
- ESRI. 2011. ESRI, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. Orthoimagery web mapping service.
- Everitt, J.H., and D.L. Drawe. 1993. Trees, Shrubs, and Cacti of South Texas. Texas Tech University Press. Lubbock, Texas.
- Federal Emergency Management Agency. 2011. The Importance of Floodplains to Functioning River Ecosystems. Available online at: [www.fema.gov/pdf/about/regions/regionx/The\\_importance\\_of\\_floodplains\\_to\\_functioning\\_river\\_ecosystems\\_feb\\_28\\_2011\\_final.pdf](http://www.fema.gov/pdf/about/regions/regionx/The_importance_of_floodplains_to_functioning_river_ecosystems_feb_28_2011_final.pdf) (Accessed 13 March 2013).
- Fields, S. 1993. Regulations and Policies Relating to the Use of Wetlands for Nonpoint Source Pollution Control. Pages 151-158. In: R.K. Olson (ed.), *Created and Natural Wetlands for Controlling Nonpoint Source Pollution*. C.K. Smoley, CRC Press, Boca Raton, FL.
- Franki, G.E., R.N. Garcia, B.J. Hajek, D. Arriaga, and J.C. Roberts. 1965. Soil survey of Nueces County, Texas. United States Department of Agriculture, Soil Conservation Service.
- Freeman, P. 2011a. Abandoned and Little-Known Airfields: Texas: Western Corpus Christi Area – Cabaniss Naval Auxiliary Air Station (NGW), Corpus Christi, TX. Available online at: [http://www.airfields-freeman.com/TX/Airfields\\_TX\\_CorpusW.html#cabaniss](http://www.airfields-freeman.com/TX/Airfields_TX_CorpusW.html#cabaniss) (Accessed 23 October 2012).
- \_\_\_\_\_. 2011b. Abandoned and Little-Known Airfields: Texas: Western Corpus Christi Area – Waldron Naval Outer Landing Field, Corpus Christi, TX. Available online at: [http://www.airfields-freeman.com/TX/Airfields\\_TX\\_CorpusW.html#waldron](http://www.airfields-freeman.com/TX/Airfields_TX_CorpusW.html#waldron) (Accessed 23 October 2012).
- \_\_\_\_\_. 2011c. Goliad Naval Outer Landing Field (7T3), Berclair, Texas. Available online at: [http://www.airfields-freeman.com/TX/Airfields\\_TX\\_Corpus\\_NW.htm#goliad](http://www.airfields-freeman.com/TX/Airfields_TX_Corpus_NW.htm#goliad) (Accessed 23 October 2012).

- 
- Galveston Bay Estuary Program. 2010. Brazilian peppertree. The Quiet Invasion: A Guide to Invasive Species of the Galveston Bay Area. Prepared by the Houston Advanced Research Center. Available online at:  
<http://www.galvbayinvasives.org/Guide/Species/SchinusTerebinthifolius> (Accessed 22 January 2013).
- Global Invasive Species Database. 2006a. *Melia azedarach* (tree, shrub). Invasive Species Specialist Group (ISSG), IUCN Species Survival Commission. Available online at:  
<http://www.issg.org/database/species/ecology.asp?si=636&fr=1&sts=sss&lang=EN> (Accessed 18 April 2012).
- \_\_\_\_\_. 2006b. *Urochloa maxima* (grass). Invasive Species Specialist Group (ISSG), IUCN Species Survival Commission. Available online at:  
<http://www.issg.org/database/species/ecology.asp?si=398&fr=1&sts=sss&lang=EN> (Accessed 18 April 2012).
- \_\_\_\_\_. 2008a. *Myocastor coypus* (mammal). Invasive Species Specialist Group (ISSG), IUCN Species Survival Commission. Available online at:  
<http://www.issg.org/database/species/ecology.asp?si=99&fr=1&sts=sss&lang=EN> (Accessed 18 April 2012).
- \_\_\_\_\_. 2008b. *Columba livia* (bird). Invasive Species Specialist Group (ISSG), IUCN Species Survival Commission. Available online at:  
<http://www.issg.org/database/species/ecology.asp?si=1052&fr=1&sts=sss&lang=EN> (Accessed 18 April 2012).
- \_\_\_\_\_. 2010. *Apis mellifera scutellata* (insect). Invasive Species Specialist Group (ISSG), IUCN Species Survival Commission. Available online at:  
<http://www.issg.org/database/species/ecology.asp?si=325&fr=1&sts=sss> (Accessed 18 April 2012).
- Gould, F.W. 1975. Texas Plants: A Checklist and Ecological Summary. Texas A&M University Agricultural Experiment Station. MP-585/Revised. College Station, Texas.
- Great Outdoors Recreation Pages. n.d. Aransas National Wildlife Refuge. Available online at:  
<http://www.gorp.com/parks-guide/arasansas-national-wildlife-refuge-outdoor-pp2-guide-cid357794.html> (Accessed 15 April 2013).
- Hatch, S.L., K.N. Gandhi, and L.E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agricultural Experiment Station, The Texas A&M University System, College Station.
- Henke, S.E., A. Lund, D. Williford, R. DeYoung, C. Wineberger, J. Trantham, and N. L. Mitton. 2010. Final Report: Genetic Structure and Phylogenetic Relationships Among Pocket Gophers (*Geomys*) in Southern Coastal Texas. Texas A&M University – Kingsville.

- 
- Hickman, G.C., Baxter, A.S., and Gallow, H.T. 2007. Species Inventory Update at NAS Corpus Christi, Texas, including NALF Waldron, NALF Cabaniss, and the Perry Place Transmitter Site. Texas A&M University – Corpus Christi.
- Hygnstrom, S. E., R. M. Timm, and G. E. Larson. 1994. *Swallows*. Prevention and Control of Wildlife Damage, Cooperative Extension Division Institute of Agriculture and Natural Resources University of Nebraska–Lincoln. Internet Center for Wildlife Damage Management. Available online at: <http://icwdm.org/handbook/birds/Swallows.asp> (Accessed 18 April 2012).
- Idcide. 2012. Goliad, TX Weather. Available online at: <http://www.idcide.com/weather/tx/goliad.htm>. (Accessed 4 October 2012).
- ITIS. 2012. Integrated Taxonomic Information System. Available online at: <http://www.itis.gov> (Accessed 31 October 2012).
- Jones, S.L. 2010. Sprague’s Pipit (*Anthus spragueii*) conservation plan. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Available online at: <http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/SpraguesJS2010r4.pdf> (Accessed 18 December 2012).
- LaBella, L. 2011. Survey for the Black-spotted Newt. NAS Kingsville, NAS Corpus Christi and NALF Orange Grove. Naval Facilities Engineering Command Southeast. 7 February 2011.
- Lady Bird Johnson Wildlife Center. 2013. Native Plant Database. The University of Texas – Austin. Available online at: <http://www.wildflower.org/plants/search.php?family=Anacardiaceae&newsearch=true> (Accessed 2 January 2013).
- Legaspi, R. 2013. Personal communication [13 March 2013 email] from Romulo Legaspi (Supervisory General Engineer, Public Works Department Corpus Christi) to Nathalie Schils (Tetra Tech, Inc.). Re: Peary Place Transmitter Site.
- Mirowsky, K-M. 1997 Bats in Palms: Precarious Habitats. BATS, Vol. 15, No. 2, Summer 1997.
- Mitton, N. 2013a. Personal communication [11 February 2013 email] from Nancy Mitton (NASCC Natural Resources Manager) to Linda Rivard (Tetra Tech, Inc.). Re: NOLF Goliad Grounds Maintenance Map.
- \_\_\_\_\_. 2013b. Personal communication [26 March 2013] from Nancy Mitton (NASCC Natural Resources Manager) to Linda Rivard (Tetra Tech, Inc.) Re: Amphibians and reptiles recorded at NOLF Goliad.
- \_\_\_\_\_. 2013c. Personal communication [11 February 2013 email] from Nancy Mitton (NASCC Natural Resources Manager) to Linda Rivard (Tetra Tech, Inc.) Re: Piping Plover Critical Habitat Units for the Main Station, Naval Air Station Corpus Christi.

- 
- \_\_\_\_\_. 2013d. Comments received by Tetra Tech, Inc. on 10 April 2013 from Nancy Mitton (NASCC Natural Resources Manager) for the Draft Integrated Natural Resources Management Plan prepared for Naval Air Station Corpus Christi (Draft dated March 2013).
- Montgomery, G. L. 1996. Riparian Areas: Reservoirs of Diversity. Working Paper No. 13. U.S. Department of Agriculture, Natural Resources Conservation Service, Northern Plains Regional Office. Lincoln, Nebraska. February 1996. Available online at: [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/?&cid=nrcs143\\_014206](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/?&cid=nrcs143_014206) (Accessed 5 February 2013).
- Muhlberg, G. A., and N. J. Moore. 1998. Streambank Revegetation and Protection; a guide for Alaska. Technical Report No. 98-3.
- NASCC (Naval Air Station Corpus Christi). 2010. Grounds Maintenance Service for Naval Air Station Corpus Christi, Texas. 18 June 2010.
- National Audubon Society. n. d. Prothonotary Warbler (*Protonotaria citrea*). <http://birds.audubon.org/birds/prothonotary-warbler> (Accessed 24 May 2013).
- \_\_\_\_\_. 2012. Christmas Bird Count – Corpus Christi (Flour Bluff). Available online at: <http://netapp.audubon.org/CBCObservation/CurrentYear/ResultsByCount.aspx> (Accessed 7 March 2013).
- National Park Service. 2013. Padre Island National Seashore. Available online at: <http://www.nps.gov/pais/index.htm> (Accessed 1 February 2013).
- National Weather Service Weather Forecast Office. 2010. Corpus Christi, TX. Synoptic Composite Maps of Non-Tropical Severe Surface Wind Events at Corpus Christi, Texas. <http://www.srh.noaa.gov/crp/?n=localresearch-windstudy> (Accessed 16 December 2013).
- NAVFAC (Naval Facilities Engineering Command) Atlantic. 2012. Integrated Pest Management Plan – Naval Air Station Corpus Christi, Texas.
- Navy (U.S. Department of the Navy). n.d. a. CNIC – Naval Air Station Corpus Christi Mission and Vision. Available online at: <https://www.cnic.navy.mil/corpuschristi/About/MissionAndVision/index.htm> (Accessed 23 October 2012).
- \_\_\_\_\_. n.d. b. CNIC – Naval Air Station Corpus Christi History. Available online at: <https://www.cnic.navy.mil/corpuschristi/About/History/index.htm> (Accessed 23 October 2012).
- \_\_\_\_\_. 1995. Establishment of the United States Navy Mine Warfare Center of Excellence in the Corpus Christi Bay Area, Texas. Charleston, South Carolina.
- \_\_\_\_\_. 2001. Environmental Assessment: Implementation of an Integrated Natural Resources Management Plan at Naval Air Station Corpus Christi, Texas.
-



- 
- \_\_\_\_\_. 2002. Chief of Naval Operations Policy Letter Preventing Feral Cat and Dog Populations on Navy Property. 10 January 2002.
- \_\_\_\_\_. 2006a. Integrated Natural Resources Management Plan Guidance for Navy Installations. How to Prepare, Implement, and Revise Integrated Natural Resource Management Plans (INRMP). April 2006.
- \_\_\_\_\_. 2006b. Integrated Natural Resources Management Plan, Naval Air Station Corpus Christi, Texas. 2006 (Five year update).
- \_\_\_\_\_. 2009. Final Environmental Assessment: Assessment of Naval Air Station Corpus Christi, Texas for Compatibility with the T-6 Joint Primary Aircraft Training System.
- \_\_\_\_\_. 2011. Bird/Animal Strike Hazard (BASH) Reduction Plan. Naval Air Station Corpus Christi, Naval Outlying Airfield Cabaniss, Naval Outlying Airfield Waldron, and Naval Outlying Airfield Goliad. Draft December 2011.
- \_\_\_\_\_. 2012. Navy GeoReadiness Center, NASCC dataset. Provided June 2012.
- Navy (U.S. Department of the Navy) Safety Center. 2009. Bird/Animal Hazard Strike (BASH) Division. (2009). BASH Hazard Data Summaries. Available online at: <http://www.safetycenter.navy.mil> (Accessed 31 January 2013).
- NOAA (National Oceanic and Atmospheric Administration). 1999. Coastal Zone Management Act Section 306A Guidance. Available online at: <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/grants-funding/cmp/index.html> (Accessed 28 September 2012).
- \_\_\_\_\_. 2010. Texas Coastal and Estuarine Land Conservation Program Plan. Available online at: <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/grants-funding/texas-celcp-plan.pdf> (Accessed 28 September 2012).
- \_\_\_\_\_. 2012. Historical Hurricane Tracks Database. Available online at: <http://www.csc.noaa.gov/digitalcoast/tools/hurricanes> (Accessed 30 October 2012).
- NOAA (National Oceanic and Atmospheric Administration) Fisheries, Office of Protected Resources. 2012. Marine Mammals. Available online at: <http://www.nmfs.noaa.gov/pr/species/mammals> (Accessed 12 November 2012).
- NOAA (National Oceanic and Atmospheric Administration), National Coastal Data Development Center. 1994. Coastal Ecosystem Maps, Gulf of Mexico, Texas seagrass data. Available online at: <http://www.ncddc.noaa.gov/website/CHP/viewer.htm> (Accessed 31 January 2013).
- NOAA (National Oceanic and Atmospheric Administration), Ocean and Coastal Resource Management 2013. Coastal Programs: Partnering with States to Manage Our Coastline. Available online at: <http://coastalmanagement.noaa.gov/programs/czm.html> (Accessed 31 January 2013).
-

- 
- Planning Department Corpus Christi Texas. 2012. NAS Corpus Christi Joint Land Use Study Project Overview. <http://www.ccjlus.com/project-overview/overview.html> (Accessed 31 January 2013).
- Rappole, J. H. and G. W. Blacklock. 1985. Birds of the Texas Coastal Bend, Abundance and Distribution. College Station: Texas A&M University Press.
- Raymond, P. W. 1989. The Corpus Christi Bay Landmass Project: An Example of NMFS' Role in Protecting Marine Turtles Via Section 7 of the Endangered Species Act. In Caillouet Jr., C. W., and A. M. Landry Jr. Proceedings of the First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management. TAMU-SG-89-105. Texas A&M University, Galveston, Texas.
- Reichman, O.J., and S.C. Smith. 1985. Impact of pocket gopher burrows on overlying vegetation. *J. Mamm* 66(4):720-725.
- Schwartz, C.W. and E.R. Schwartz. 1981. The Wild Mammals of Missouri. University of Missouri Press. Columbia, Missouri.
- State Energy Conservation Office. No date. "Energy Efficiency: Texas' Newest Energy Resource." Chapter Two: Texas Climate. <http://www.seco.cpa.state.tx.us/publications/renewenergy/texasclimate.php> (Accessed 16 December 2013).
- Stewart, R. 2009. Our Ocean Planet. Oceanography in the 21<sup>st</sup> Century – An Online Textbook. Coastal Zone. Texas A&M University, Department of Oceanography. <http://oceanworld.tamu.edu/resources/oceanography-book/coastalzone.htm> (Accessed 31 January 2013).
- Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142: 2282-2292. <http://ebird.org/ebird/map> (Accessed 24 May 2013).
- TCELCP (Texas Coastal and Estuarine Land Conservation Program). 2010. Texas Coastal and Estuarine Land Conservation Program Plan. Available online at: <http://coastalmanagement.noaa.gov/mystate/docs/celclplantx.pdf> (Accessed 28 January 2013) (Accessed 31 January 2013).
- TCEQ (Texas Council on Environmental Quality). 2010. 2010 Guidance for Assessing and Reporting Surface Water Quality in Texas. Prepared by Surface Water Quality Monitoring Program, Monitoring and Assessment Section, Water Quality Planning Division. Available online at: [http://www.tceq.texas.gov/waterquality/assessment/305\\_303.html](http://www.tceq.texas.gov/waterquality/assessment/305_303.html) (Accessed 31 January 2013).
- Tennant, A. 1985. A Field Guide to Texas Snakes. Gulf Publishing Company. Houston, Texas.

- 
- Texas A&M University. 2017. Invasive, Exotic Vegetation Survey and Management Recommendations, Naval Air Station Corpus Christi. Prepared for NAS Corpus Christi. Prepared by Texas A&M University Natural Resources Institute, San Antonio, Texas.
- \_\_\_\_\_. 2018a. Avian Survey, Naval Air Station Corpus Christi. Prepared for NAS Corpus Christi. Prepared by Texas A&M University Natural Resources Institute, San Antonio, Texas.
- \_\_\_\_\_. 2018b. Naval Air Station Corpus Christi Habitat Enhancement. Prepared for NAS Corpus Christi. Prepared by Texas A&M University Natural Resources Institute, San Antonio, Texas.
- Texas A&M University – Corpus Christi. 2012. Biological Survey for Naval Outlying Field (NOLF) Goliad, Goliad, Texas.
- Texas Climate Descriptions. n.d. Corpus Christi. Data obtained from National Climate Data Center. Available online at: [http://web2.airmail.net/danb1/texas\\_climate\\_descriptions.htm](http://web2.airmail.net/danb1/texas_climate_descriptions.htm) (Accessed 30 October 2012).
- Texas Department of State Health Services, Zoonosis Control Division. 2003. Zoonoses. Available online at: <http://www.dshs.state.tx.us/idcu/health/zoonosis/education/pamphlets/zoo207-27.pdf> (Accessed 10 October 2012).
- Texas General Land Office, CMP (Coastal Management Program). 2010. Coastal Zone Management Plan Annual Report. Available online at: <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/documents/grants-funding/cmp/2010-cmp-annual-report.pdf> (Accessed 4 October 2012).
- Texas Historical Association. 2012. Hurricanes. Available online at: <http://www.tshaonline.org/handbook/online/articles/ybh01> (Accessed 30 October 2012).
- Texas Native Plants Database. n.d. a. Eastern Baccharis, Groundsel, Sea Myrtle, Consumption Weed, Groundsel-bush, Seepwillow, *Baccharis halimifolia*. Texas AgriLife Extension Service, Texas A&M University. Available online at: <http://aggie-horticulture.tamu.edu/ornamentals/nativeshrubs/baccharisneglecta.htm> (Accessed 13 March 2013).
- \_\_\_\_\_. n.d. b. Roosevelt Weed, Poverty Weed, False-willow, New Deal Weed, Jara Dulce, *Baccharis neglecta*. Texas AgriLife Extension Service, Texas A&M University. Available online at: <http://aggie-horticulture.tamu.edu/ornamentals/nativeshrubs/baccharishalim.htm> (Accessed 18 April 2012).
- Texas Natural Resources Information System. 2012a. Federal Emergency Management Agency, Flood Insurance Rate Maps Q3 Flood Data, Map 355. Available online at: [http://www.tnris.org/get-data?quicktabs\\_maps\\_data=1](http://www.tnris.org/get-data?quicktabs_maps_data=1) (Accessed 24 April 2012).
-

- 
- \_\_\_\_\_. 2012b. Texas Strategic Mapping (StratMap) Program. Hypsography layer. Available online at: [http://www.tnris.org/get-data?quicktabs\\_maps\\_data=1](http://www.tnris.org/get-data?quicktabs_maps_data=1) (Accessed 5 May 2012).
- Texas State Historical Association. n.d. a. Texas Almanac: Physical Regions of Texas. Available online at: <http://www.texasalmanac.com/topics/environment/physical-regions-texas> (Accessed 30 October 2012).
- \_\_\_\_\_. n.d. b. Texas Almanac: Texas Plant Life. Available online at: <http://www.texasalmanac.com/topics/environment/texas-plant-life> (Accessed 30 October 2012).
- The Reptile Database. 2012. *Pantherophis emoryi* (Baird and Girard, 1853). Available online at: [http://reptile-database.reptarium.cz/species?genus=Pantherophis&species=emoryi&search\\_param=%28%28genus%3D%27Pantherophis%27%29%29](http://reptile-database.reptarium.cz/species?genus=Pantherophis&species=emoryi&search_param=%28%28genus%3D%27Pantherophis%27%29%29) (Accessed 1 October 2012).
- Thorne, D.H., and D.C. Andersen. 1990. Long-term soil-disturbance patterns by a pocket gopher, *Geomys bursarius*. *J. Mamm* 71(1):84-89.
- TIPPC (Texas Invasive Plant and Pest Council). 2004. *Sorghum Halepense*, Johnson Grass. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/plant\\_database/detail.php?symbol=SOHA](http://www.texasinvasives.org/plant_database/detail.php?symbol=SOHA) (Accessed 18 April 2012).
- \_\_\_\_\_. 2007a. *Pennisetum Ciliare*, Buffelgrass. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/plant\\_database/detail.php?symbol=PECI](http://www.texasinvasives.org/plant_database/detail.php?symbol=PECI) (Accessed 18 April 2012).
- \_\_\_\_\_. 2007b. *Triadica sebifera*, Chinese Tallow Tree. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/plant\\_database/detail.php?symbol=TRSE6](http://www.texasinvasives.org/plant_database/detail.php?symbol=TRSE6) (Accessed 18 April 2012).
- \_\_\_\_\_. 2007c. *Dichanthium Annulatum*, Kleberg Bluestem. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/plant\\_database/detail.php?symbol=DIAN](http://www.texasinvasives.org/plant_database/detail.php?symbol=DIAN) (Accessed 18 April 2012).
- \_\_\_\_\_. 2011a. *Myocastor Coypus*, Nutria. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/animal\\_database/detail.php?symbol=7](http://www.texasinvasives.org/animal_database/detail.php?symbol=7) (Accessed 18 April 2012).
- \_\_\_\_\_. 2011b. *Sus Scrofa*, Feral Pig. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/animal\\_database/detail.php?symbol=1](http://www.texasinvasives.org/animal_database/detail.php?symbol=1) (Accessed 18 April 2012).
-

- 
- \_\_\_\_\_. 2011c. *Sturnus Vulgaris*, European Starling. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/animal\\_database/detail.php?symbol=2](http://www.texasinvasives.org/animal_database/detail.php?symbol=2) (Accessed 18 April 2012).
- \_\_\_\_\_. 2011d. *Solenopsis Invicta*, Red Imported Fire Ant. Texas Invasive Plant and Pest Council. Available online at: [http://www.texasinvasives.org/pest\\_database/detail.php?symbol=11](http://www.texasinvasives.org/pest_database/detail.php?symbol=11) (Accessed 18 April 2012).
- TNRCC (Texas Natural Resource Conservation Commission). 1996. The State of Texas Water Quality Inventory, 1996. Surface Water Quality Monitoring Program. V. 4.
- Torres, R. 2013. Personal communication [12 March 2013 phone call] from Robert Torres (Public Affairs Officer at U.S. Navy) and Nathalie Schils (Tetra Tech, Inc.). Re: Population and tenant commands at NASCC.
- TPWD (Texas Parks and Wildlife Department). n.d. a. Redhead Pond (WMA). Available online at: [http://www.tpwd.state.tx.us/huntwild/hunt/wma/find\\_a\\_wma/list/?id=42](http://www.tpwd.state.tx.us/huntwild/hunt/wma/find_a_wma/list/?id=42) (Accessed 4 October 2012).
- \_\_\_\_\_. n.d. b. Mustang Island State Park. Available online at: <http://www.tpwd.state.tx.us/state-parks/mustang-island> (Accessed 4 October 2012).
- \_\_\_\_\_. n.d. c. Goose Island State Park. Available online at: <http://www.tpwd.state.tx.us/state-parks/goose-island> (Accessed 4 October 2012).
- \_\_\_\_\_. n.d. d. Lake Corpus Christi State Park. Available online at: <http://www.tpwd.state.tx.us/state-parks/lake-corpus-christi> (Accessed 4 October 2012).
- \_\_\_\_\_. n.d.e. James E. Daughtrey Wildlife Management Area. Available online at: [http://www.tpwd.state.tx.us/huntwild/hunt/wma/find\\_a\\_wma/list/?id=46](http://www.tpwd.state.tx.us/huntwild/hunt/wma/find_a_wma/list/?id=46) (Accessed 4 October 2012).
- \_\_\_\_\_. n.d. f. Guadalupe Delta Wildlife Management Area. Available online at: [http://www.tpwd.state.tx.us/huntwild/hunt/wma/find\\_a\\_wma/list/?id=37](http://www.tpwd.state.tx.us/huntwild/hunt/wma/find_a_wma/list/?id=37) (Accessed 4 October 2012).
- \_\_\_\_\_. n.d. g. Ornate Box Turtle (*Terrapene ornata*). <http://tpwd.state.tx.us/huntwild/wild/species/ornatebox/> (Accessed 24 May 2013).
- \_\_\_\_\_. 1992. Survey of Rare, Threatened and Endangered Plants, on U.S. Navy Property in South Texas. Final Report, September 1992.
- \_\_\_\_\_. 1999a. Annotated County Lists of Rare Species – Nueces County. Austin, Texas.
- \_\_\_\_\_. 1999b. Seagrass Conservation Plan for Texas. Available online at: <http://www.tpwd.state.tx.us/landwater/water/habitats/seagrass/conservation.phtml> (Accessed 31 January 2013).
-

- 
- \_\_\_\_\_. 2001. Texas Amphibian Watch homepage. April 14, 2011. Available online: [http://www.tpwd.state.tx.us/huntwild/wild/wildlife\\_diversity/texas\\_nature\\_trackers/amphibian\\_watch/](http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/texas_nature_trackers/amphibian_watch/) (Accessed 29 January 2013).
- \_\_\_\_\_. 2003. Texas Parks and Wildlife Department, The Vegetation Types of Texas. Available online at: [http://www.tpwd.state.tx.us/publications/pwdpubs/pwd\\_bn\\_w7000\\_0120/](http://www.tpwd.state.tx.us/publications/pwdpubs/pwd_bn_w7000_0120/) (Accessed July 2012).
- \_\_\_\_\_. 2005. Texas Wildlife Action Plan. Available online at: [http://www.tpwd.state.tx.us/publications/pwdpubs/pwd\\_pl\\_w7000\\_1187a/](http://www.tpwd.state.tx.us/publications/pwdpubs/pwd_pl_w7000_1187a/) (Accessed 19 September 2012).
- \_\_\_\_\_. 2010. Texas Plains Wildlife Management, Appendix R: Wildscapes Plant Lists. Available online at: <https://tpwd.texas.gov/...land/.../Appendix%20R%20Wildscapes%20Plant%20Lists.pdf>. (Accessed 4 October 2012).
- \_\_\_\_\_. 2011. Gulf Coast Prairies and Marshes, and the Gulf of Mexico, Species of Greatest Conservation Need. Available online at: [www.tpwd.state.tx.us/landwater/land/tcap/media/SGCN\\_2011.xls](http://www.tpwd.state.tx.us/landwater/land/tcap/media/SGCN_2011.xls) (Accessed 15 May 2013).
- \_\_\_\_\_. 2012a. Texas Conservation Action Plan 2012–2016: Editor, Wendy Connally, Texas Conservation Action Plan Coordinator. Austin, Texas. Available online at: <http://www.tpwd.state.tx.us/landwater/land/tcap/> (Accessed 31 January 2013).
- \_\_\_\_\_. 2012b. Nongame and Rare Species Program: Rare Plant Communities. Microsoft Excel file titled: Rare Plant Communities of Texas. Available online at: [https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/nongame/tcap/sgcn.phtml](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/tcap/sgcn.phtml) (Accessed 25 September 2012).
- \_\_\_\_\_. 2012c. Nongame and Rare Species Program: Species of Greatest Conservation Need. [https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/nongame/tcap/sgcn.phtml](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/tcap/sgcn.phtml) (Accessed 30 January 2013).
- \_\_\_\_\_. 2012d. TPWD Wildlife Diversity Tracked Animals. [https://tpwd.texas.gov/huntwild/wild/wildlife\\_diversity/txndd/documents/20171004\\_TX\\_NDD\\_tracked\\_animals.pdf](https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/txndd/documents/20171004_TX_NDD_tracked_animals.pdf) (Accessed 30 January 2013).
- \_\_\_\_\_. 2013. Rare, Threatened, and Endangered Species of Texas. Available online at: <https://tpwd.texas.gov/gis/rtest/> (Accessed 30 January 2013).
- Turner Collie & Braden Inc. 2004. NAS Corpus Christi Wetland Delineation Report.
- TWDB (Texas Water Development Board). 2010a. Regional Water Plan for Region N. Available online at: [http://www.texaswatermatters.org/region\\_n.htm](http://www.texaswatermatters.org/region_n.htm) (Accessed 26 October 2012).
-

- 
- \_\_\_\_\_. 2010b. Regional Water Plan for Region L. Available online at:  
[http://www.texaswatermatters.org/region\\_1.htm](http://www.texaswatermatters.org/region_1.htm) (Accessed 26 October 2012).
- University of Texas – Austin. 2011. Physiographic Map of Texas 1996: Information Sheet. University of Texas Libraries, The Walter Geology Library. Available online at:  
<http://www.lib.utexas.edu/geo/fieldguides/physiography.html> (Accessed 5 September 2012).
- University of Texas – Austin, Bureau of Economic Geology. 1996. Physiographic Map of Texas. Available online at:  
[www.beg.utexas.edu/UTopia/images/pagesizemaps/physiography.pdf](http://www.beg.utexas.edu/UTopia/images/pagesizemaps/physiography.pdf) (Accessed 5 September 2012).
- USDA (U.S. Department of Agriculture), National Invasive Species Information Center. 2012. NISIC: Gateway to invasive species information; covering Federal, State, local, and international sources. Available online at: <http://www.invasivespeciesinfo.gov/> (Accessed 18 April 2012).
- \_\_\_\_\_. 2012. Naval Air Station Corpus Christi Wildlife Hazard Assessment. Prepared for NAS Corpus Christi. Prepared by USDA, Animal and Plant Health Inspection Service.
- USDA NRCS (U.S. Department of Agriculture, Natural Resources Conservation Service). 2013. The PLANTS Database. National Plant Data Team, Greensboro, NC. Available online at: <http://plants.usda.gov> (Accessed 2 January 2013).
- USDA NRCS (U.S. Department of Agriculture, Natural Resources Conservation Service), Soil Data Mart. 2009a. Map Unit Description (Brief, Generated) for Nueces County, Texas. Available online at: <http://soildatamart.nrcs.usda.gov/> (Accessed 12 November 2012).
- \_\_\_\_\_. 2009b. Map Unit Description (Brief, Generated) for Goliad County, Texas. Available online at: <http://soildatamart.nrcs.usda.gov/> (Accessed 12 November 2012).
- \_\_\_\_\_. 2012. Soil Survey Geographic Database (SSURGO) datasets for Goliad and Nueces counties. Available online at: <http://soildatamart.nrcs.usda.gov/> (Accessed 9 July 2012).
- USFWS (U.S. Fish and Wildlife Service). n.d. a. Swallow-tailed Kite Action Plan. U.S. Fish and Wildlife Service, Southeast Region – Jacksonville, Florida Ecological Services Field Office. [http://ecos.fws.gov/docs/action\\_plans/doc2987.doc](http://ecos.fws.gov/docs/action_plans/doc2987.doc) (Accessed 24 May 2013).
- \_\_\_\_\_. n.d. b. Flyways.us Central Flyway. <http://central.flyways.us/> (Accessed 16 December 2013).
- \_\_\_\_\_. 2001. Critical Habitat for Piping Plover (*Charadrius melodus*). Available online at: <http://www.fws.gov/plover/> (Accessed 24 October 2012).

- 
- \_\_\_\_\_. 2007. Eight Required Elements of State Comprehensive Wildlife Conservation Strategies. Available online at: <http://wsfrprograms.fws.gov/subpages/toolkitfiles/NAATgde.pdf> (Accessed 31 January 2013).
- \_\_\_\_\_. 2008. Birds of Conservation Concern 2008. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. Available online at: <http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf> (Accessed 31 October 2012).
- \_\_\_\_\_. 2009. Final Critical Habitat for the Wintering Piping Plover (2009 redesignation). Available online at: <http://www.fws.gov/plover/#maps> (Accessed 31 January 2013).
- \_\_\_\_\_. 2010a. Species Profile: West Indian manatee (*Trichechus manatus*). Available online at: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=A007> (Accessed 22 May 2013).
- \_\_\_\_\_. 2010b. Red knot (*Calidris canutus rufa*) Spotlight Species Action Plan. Available online at: [http://ecos.fws.gov/docs/action\\_plans/doc3265.pdf](http://ecos.fws.gov/docs/action_plans/doc3265.pdf) (Accessed 7 March 2013).
- \_\_\_\_\_. 2011. Endangered Species: Sprague's Pipit. Available online at: <http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/index.html> (Accessed 19 December 2012).
- \_\_\_\_\_. 2012a. USFWS Fish Survey of Goliad County Industrial Park and Appendix C.
- \_\_\_\_\_. 2012b. USFWS Herpetofauna Survey of Goliad County Industrial Park and Appendix A.
- \_\_\_\_\_. 2012b. Species By County Report for Goliad, Texas. Available online at: [http://ecos.fws.gov/tess\\_public/countySearch!speciesByCountyReport.action?fips=4817](http://ecos.fws.gov/tess_public/countySearch!speciesByCountyReport.action?fips=4817) (Accessed 31 October 2012).
- \_\_\_\_\_. 2012c. Species By County Report for Nueces, Texas. Available online at: [http://ecos.fws.gov/tess\\_public/countySearch!speciesByCountyReport.action?fips=48355](http://ecos.fws.gov/tess_public/countySearch!speciesByCountyReport.action?fips=48355) (Accessed 31 October 2012).
- \_\_\_\_\_. 2013a. USFWS Birds of Conservation Concern Regions for Installation. Prepared upon request for Tetra Tech, Inc. February 2013.
- \_\_\_\_\_. 2013b. Migratory Bird Program. Important Information for Waterfowl and Sandhill Crane Hunters. <http://www.fws.gov/migratorybirds/currentbirdissues/SandhillCranes/SandhillCraneHunters.htm> (Accessed 16 December 2013).
- USFWS (U.S. Fish and Wildlife Services) National Wetlands Inventory. 2012. U.S. Fish and Wildlife Service, Division of Habitat and Resource Conservation. National Wetlands Inventory. Available online at: <http://www.fws.gov/wetlands/Data/Data-Download.html> (Accessed 9 July 2012).



- 
- USGS (U.S. Geological Survey). 1975. Topographic Map, 7.5-minute series, Oso Creek NE, Texas. 1968, photo revised 1975.
- \_\_\_\_\_. 2012a. Geologic units in Nueces County, Texas. Available online at: <http://mrdata.usgs.gov/geology/state/fips-unit.php?code=f48355> (Accessed 9 November 2012).
- \_\_\_\_\_. 2012b. Geologic units in Goliad County, Texas. Available online at: <http://mrdata.usgs.gov/geology/state/fips-unit.php?code=f48175> (Accessed 9 November 2012).
- USGS (U.S. Geological Survey), National Wetlands Research Center. 2012. The Coastal Prairie Region. NWRC Coastal Prairie Research Program. Available at: <http://www.nwrc.usgs.gov/prairie/tcpr.htm> (Accessed 6 September 2012).
- USGS (U.S. Geological Survey), Water Resources Division. 2012. National Hydrography Dataset, Texas. Available online at: <ftp://nhdftp.usgs.gov/DataSets/Staged/States/FileGDB/MediumResolution/> (Accessed 5 May 2012).
- Weakley, A.S., K.D. Patterson, S. Landaal, M. Gallyound and others (compilers). 1997. International classification of ecological communities: Terrestrial vegetation of the Southeastern United States. Working Draft of November 1997. The Nature Conservancy, Southeast Regional Office, Southern Conservation Science Dept., Community Ecology Group. Chapel Hill, NC.
- Weaver, F. 2013. Personal communication [5 February 2013 email] from Frank Weaver (USFWS Corpus Christi Regional Office) to Linda Rivard (Tetra Tech, Inc.). Re: the USFWS Bird Conservation Regions applicable to NASCC parcels.
- Wickliffe, J.K., and J.W. Bickham. 1997. A Taxonomic Review of the *Geomys personatus* Complex and Survey of *Geomys personatus maritimus*. Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX. Final Report for Texas Parks and Wildlife and The Department of the Navy.
- Wiemers, D., T.E. Fulbright, W. Kuvlesky, A. Ortega-S, and G.A. Rasmussen. 2007. Management Plan for Controlling Invasive Exotic Plants at Naval Air Station Corpus Christi. Caesar Kleberg Wildlife Research Institute at Texas A&M University – Kingsville.
- Wikimedia Commons. 2008. Red knot Delaware.jpg. Available online at: [http://commons.wikimedia.org/wiki/File:Red\\_knot\\_Delaware.jpg](http://commons.wikimedia.org/wiki/File:Red_knot_Delaware.jpg) (Accessed 11 March 2013).
- Williams, L.R. and G.N. Cameron. 1986. Food habits and dietary preferences of Attwater's pocket gopher, *Geomys attwateri*. *J. Mamm* 67(3):489-496.

- Williams, L.R., G.N. Cameron, S.R. Spencer, B.D. Eshelman, and M.J. Gregory. 1986. Experimental analysis of the effects of pocket gopher mounds on Texas coastal prairie. *J. Mamm* 67(4):672-679.
- Withers, K. 2014. Spatial and temporal abundance of non-breeding piping plovers within designated critical habitat associated with Naval Air Station Corpus Christi (Texas Units 11 and 12). Prepared for Naval Air Station Corpus Christi. Prepared by Texas A&M University-Corpus Christi, Corpus Christi, Texas.
- Wolfe, D., W. Carr, T. Ettel, T. Cook, and M. Goering. 1998. Survey of Rare, Threatened, and Endangered Plants and Animals at the Corpus Christi Naval Air Station. Final Report, December 1998. Texas Conservation Data Center, San Antonio, Texas. The Nature Conservancy.
- Woodin, M.C., M.K. Skoruppa, B.D. Pearce, A.J. Ruddy, and G.C. Hickman. 2010. Grassland Birds Wintering at U.S. Navy Facilities in Southern Texas. Department of Defense Legacy Resource Management Program.

## 7.0 LIST OF PREPARERS

Contributors: The Navy Project Team

Name	Role
Jered Jackson	Navy INRMP Lead, NAVFAC Southeast
Robby Smith	Regional Natural Resources Manager, NAVFAC Southeast
Diana Maimone	Environmental Program Director, NASCC
Tammy Ash	Natural Resources Manager, NASCC

Preparers: Tetra Tech, Inc.

Name	Role	Highest Degree	Years of Experience	Project Responsibility
Sarah Watts	Project Manager	M.E.M., Resource Ecology, Wetlands	14	INRMP Senior Review
Linda Rivard	Deputy Project Manager	B.S. Marine/ Freshwater Biology	12	INRMP Preparation
Margo Andrews	Technical Editor	Ph.D. Geography	9	INRMP Preparation and QA/QC
Kari Metcalf	GIS Analyst	M.S., Environmental Science	4	Revised INRMP and EA Figures
Nathalie Schils	Environmental Scientist	B.A. Environmental Studies, International Relations	1	INRMP Preparation

This page intentionally left blank.

# **APPENDIX A**

## Agency Correspondence

This page intentionally left blank.



**DEPARTMENT OF THE NAVY**  
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST  
JACKSONVILLE, FL 32212-0030

5090  
Ser EV22/0305  
August 5, 2013

United States Fish and Wildlife Service  
Corpus Christi ES Field Office  
Attn: Ms. Patricia Clements  
6300 Ocean Drive #5837  
Corpus Christi, TX 78412

Dear Ms. Clements:

SUBJECT: NAVAL AIR STATION CORPUS CHRISTI INTEGRATED NATURAL  
RESOURCES MANAGEMENT PLAN UPDATE

In accordance with the United States Department of Defense and the United States Department of the Navy (Navy) guidance for meeting Sikes Act Improvement Act requirements, Navy installations must update their Integrated Natural Resources Management Plans (INRMPs) every five years in cooperation with the United States Fish and Wildlife Service (USFWS) and appropriate state fish and wildlife agency. Under this guidance, the Pre-Final version of the five-year INRMP update was completed for Naval Air Station Corpus Christi in August 2013. A hard copy of the updated INRMP is enclosed for your review and comment. This INRMP identifies management strategies for natural resources under the Navy's jurisdiction, including benefits to threatened and endangered species known or with the potential to occur at the installation.

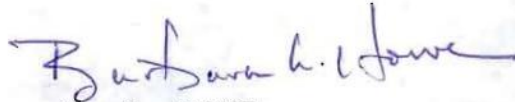
The Navy has not identified any significant changes to the Naval Air Station Corpus Christi mission requirements or its natural resources that would require major changes to the INRMP at this time. The Navy is requesting review of the INRMP from the United States Fish and Wildlife Service (USFWS) to satisfy coordination requirements with federal and state agencies.

At this time, the Navy is requesting your feedback on the INRMP and invites you to evaluate the management strategies and INRMP projects identified in the document. Please provide us with any questions, comments, or concerns on the INRMP within 30 days of receipt of this letter.

5090  
Ser EV22/0305  
August 5, 2013

Please address your comments or questions to Mr. George Kenny, Natural Resources Specialist, at (904) 542-6878 or email: george.kenny@navy.mil. Thank you for assistance in ensuring our country's military readiness and continued stewardship of natural resources.

Sincerely,



B. L. HOWE  
Planning and Conservation  
Branch Head  
By direction of the  
Commanding Officer

Enclosures: Pre-Final Integrated Natural Resources Management  
Plan for Naval Air Station Corpus Christi



U.S. Fish and Wildlife Service  
Comments on  
Pre-Final Integrated Natural Resources Management Plan Update  
For  
Naval Air Station Corpus Christi, Texas  
August 2013

The U. S. Fish and Wildlife Service (Service) appreciates and values the relationship that has been fostered between our agency and Naval Air Station, Corpus Christi TX (NASCC) since the formation of the South Texas Natural Resources Partnering Team in 2002. The Service looks forward to continued, open and direct communication with the Navy regarding resource issues, opportunities, and management.

GENERAL COMMENTS:

The Service acknowledges the need for using a template for the Integrated Natural Resource Management Plan (INRMP) in order to have general consistency across all facilities; however, the too-strict adherence to this template has, in the opinion of the Service, significantly affected practical usefulness of this document. As noted in Section 1.1.1 INRMP Purpose, the INRMP should “serve as a planning tool for natural resources managers (NRMs) to conserve and restore installation natural resources in a coordinated manner within the context of the operation military mission.” If the NASCC INRMP, as currently written, is envisioned to be more than a tasked accomplishment to meet the requirements mandated by the Sikes Act Improvement Act, then the Service recommends that editorial changes, and information additions to the document should be considered.

As written, it seems that neither the facility managers at NASCC nor the environmental staff will be able to use the INRMP to implement and track management of the environmental resources of the facility. If the current version is not able to be revised to make it a working document, then the Service recommends that a separate document be developed, a manager’s guide, that could be made then be made available to the station commander, the public works officer, the environmental staff, and others, which would outline in plain language, the environmental resources and issues of NASCC, how those resources interact with mission requirements, challenges and opportunities for resource protection and enhancement which would not conflict with mission requirements, and have a compendium of studies of research that has already been completed at NASCC. The Service would appreciate the opportunity to be a part of the development of this “manager’s guide” as it would be useful to our office and staff as well in providing comments and recommendations on proposed NASCC projects.

The Peary Place Transmitter Site is dismissed in the INRMP. As noted on Page 1-1 it is currently used by the Gulf Coast Soccer Club through a license agreement. The INRMP does not include any details of that agreement. The Service wonders if this site could host actions, beneficial to natural resources which might be precluded from occurring on the Main Station by other constraints such as bird animal strike hazard (BASH) program requirements.

In several sections of the INRMP document reference is made to Appendix K as the location of project summaries. The edition provided to the Service review has those project lists located in Appendix L.

SPECIFIC RECOMMENDATIONS:

Table ES-1: The Service recommends that this table be moved to an appendix.

ACRONYMS AND ABBREVIATIONS: This could be reproduced only once in the documents, either at the beginning of the document, or in an appendix.

SECTION 1.2.2, paragraph (pp) 1: The description of the installation does not reference when tenants that are housed on the main station began to be take up installation space. As noted in Section 1.2.3, the present accommodation of these tenants is integral to the mission of the installation. The Service recommends that these important users of the NASCC installation be noted in the history of the installation.

SECTION 1.2.3, pp 2, page (p) 1-13: The discussion of the effects of natural resources on the military mission at NASCC does not include some important aspects about this geographic area, particularly the climate and wind conditions. It would seem that mention of the mild climate, possibly allowing for many more flight hours than if the installation were located elsewhere in the US, as well as the effects of the typical on-shore winds could be incorporated into this paragraph. It is also important to note that the installation is located within one of the major North American bird flyways. This location affects decisions related to landscape management as well as to bird animal strike hazard (BASH) decisions.

SECTION 1.3 INRMP GOALS AND OBJECTIVES: The Service recommends that the complete listing of the goals and all the objectives be included in this section or in Section 3.1.2, not both places.

SECTION 2.1.1 Site Conditions: For management of natural resources, it would be useful to identify how many acres are occupied by physical structures, including the active airfield and airfield support facilities, as well as those occupied tenant organizations. Buildings and hard structures, such as runways, both limit and affect decisions related to natural resource management.

FIGURES 2-1, and 2-2: The Service recommends that a regional map be included showing the location of the four Nueces County facilities.

SECTION 2.1.2 Natural Resources Constraints and Opportunities: This list should also include the location of the installation in a major migratory bird flyway; the relative closeness of the Corpus Christi area components to the Gulf of Mexico and potential for tropical storms and hurricanes; affects of onshore Gulf winds for most of the year; proximity of the main station to nesting colonial waterbird islands; location of the main station, NOLF Waldron and NOLF Cabaniss within 20 miles of the city landfill and between the landfill and the islands used by a primary forager of the landfill, laughing gulls.

Regarding the NOLF Goliad facility, discussed on p 2-9, this facility is located in the Aransas Wood- Buffalo Migratory Flyway for the endangered whooping crane (*Grus americana*)

A significant major constraint for all of the facilities is the conflict between the flight training mission of NASCC and the location of the facilities in a major U.S. migratory bird flyway. This should inform landscape management at the facilities so that resulting vegetation components do not result in an increase of BASH issues. As noted in the general comments section above, the Service would like to know more about, and discuss opportunities for environmental resource management opportunities that could be available at Peary Place and which, because of BASH concerns, may not be an opportunity at the other NASCC facilities.

FIGURES 2-4, and 2-5: These figures err in labeling many areas that are tidal wetlands, tidal marsh, and wetlands along Oso Creek non-jurisdictional. Also, on Figure 2-4, an area that is labeled “Piping Plover Wintering Ground” should be labeled critical habitat.

SECTION 2.2.2 Climate: The Service recommends that this section be expanded to identify how climate affects operations at NASCC, for example, timing (daily and seasonally) of flight training.

SECTION 2.2.3 Land Use: The Service recommends that this section include more detailed information regarding the acres and nature of the land uses at each facility. For example, the Main Station segment neither references nor notes how much area is taken up by tenant facilities. Also, for many of the facility components, there are likely important buffers which would guide or limit certain resource management actions.

Section 2.2.4 Regional Land Use: In the first paragraph, note is made that the Nueces County NASCC facilities are covered by several regional land use plans and coastal zone programs. The INRMP should further discuss how the facilities are covered and/or the impacts of those plans and programs on the NASCC facilities. Further discussions in subsequent paragraphs only discuss the plans and programs, not the implications for NASCC facilities, planning, and mission.

FIGURES 2-7, 2-8, and 2-9: The Service recommends that acres for each habitat type, by facility, be included in the map legends.

FIGURE 2-10: The Service recommends that additional elevation contour lines be added which would more clearly define such things as the elevation of the runways. Also, in 2-10, the elevation of the southwest area of the main station is undefined.

FIGURE 2-13: There are significantly more tidal flats on the Main Station than are identified on this figure.

FIGURE 2-16, and 2-17: The Service recommends that the direction of drainage flow off of these facilities be identified on the maps.

FIGURE 2-18: No drainage direction for rainwater off of NOLF Goliad is identified, but should be.

SECTION 2.2.6.4 Groundwater: This section discusses what groundwater resources are present, but fails to discuss the impacts, if any, to operations and resource management of the facilities.

FIGURE 2-19: The map is misleading in that all of the grey “Urban” areas are not hard surface. The Service recommends that hard surface areas be distinguished from lawn and other landscaped areas. In the discussion of the Main Station natural and vegetation communities on page 2-38, note is made that the main station is mostly frequently mowed lawns.

FIGURE 2-20: the Service recommends that the map for NOLF Cabaniss identify the landscape cover outside of the agricultural outleashes and sugar hackberry woodland and distinguish between hard surface such as landing field tarmac and vegetation associations.

FIGURES 2-19, 2-20, and 2-21: The Service recommends that acreages for hard surface and for each vegetation type be included in the legends.

Table 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9: Summary of Installation Surveys ... The Service recommends that if each of the referenced studies cannot be included as an appendices to the INRMP, then an electronic library of these studies be provided on a cd with the final INRMP.

SECTION 3.0 NATURAL RESOURCE MANAGEMENT: This section does not adequately include site-specific recommendations which environmental and other managers at NASCC can consider and apply to facility management within mission boundaries. The broad statements about management for the various subcomponents of land management keep the document from a primary INRMP goal, that is being a from being the planning tool useful to environmental and other installation land and program managers.

Throughout chapter 3, in each of the subsections for Land Management, Fish and Wildlife Management, Outdoor Recreation Management, and Integrated Ecosystems Management and Partnering, there are sections which note which of the 4 Goals and various Objectives seem to apply to the topic. As there is no site-specific discussion of how these goals and objectives apply to the management topics, the Service recommends that a table format would just as clearly indicate what the authors believe are the goal and objective attainments. Additionally, such a table would have the added benefit of allowing readers to compare each of the land management topic goal and objective attainments to the others.

SECTION 3.1.2: As noted above, this section duplicates Section 1.3, and the Service recommends that one or the other of these be removed form the INRMP.

SECTION 3.2.1.1: The comments in this section are general. The Service recommends revising to address the specific water resource management issues, challenges and opportunities.

SECTION 2.2.1.1.1: This section appears to be mislabeled, as are subsequent sections 2.2.1.1.2, 2.2.1.1.3, 2.2.1.2.1, 2.2.1.2.2, 2.2.1.2.3, and 2.2.1.2.4. Each of these sections should correctly begin with the number '3'.

SECTION 3.2.1.5: Piping plover critical habitat is a rare and sensitive ecosystem that should be discussed in this section or, at a minimum; there should be a reference to the section of the INRMP where it is discussed.

SECTION 3.2.2.2: This section should contain reference to and discussion of the geographic location of the installation in a major migratory flyway. NASCC is located within one of the most avian species diverse parts of the country. An evaluation of BASH issues within the context of other land management responsibilities and goals seems warranted. Better information exchange regarding the species of birds which are involved in aircraft strikes would be valuable to partners, such as the Service, in making recommendations which could advance land management goals without increasing hazards to aircraft or to avian species. In Section 3.2.2.4, reference is made to a list of avian species that "pose a threat" to flight operations. Neither the list, nor identification of which species have affected flight operations is provided in the INRMP.

SECTION 3.2.2.6 Zoonosis Prevention: This section should include information regarding which of the zoonotic diseases listed have been documented at the installation.

SECTION 3.2.2.7 Rare, Threatened and Endangered Wildlife Species Management: The Service is concerned that a list of State-listed threatened and endangered species is not included in the INRMP.

Although not mandated by federal law, consideration of these species should be included in the overall ecosystem management goals of the installation.

The Service recommends that the INRMP more specifically identify which components of the BASH program could impact piping plover, Sprague's pipit, and red knot, and what form these impacts would take.

In the discussion of the maritime pocket gopher, it is not clear how gopher removal equates to conservation of this species.

In the section on the southern yellow bat, note is made that palm tree pruning should be discontinued to benefit this species. The Service would like to know if this measure is being implemented.

SECTION 3.2.3: This section could be revised to better distinguish the types and opportunities for fishing at the installation.

3.2.4.1 Training of Natural Resources Personnel: The list of training needs includes vegetation and wildlife management related to BASH; however, it has been the understanding of the Service that the BASH program is operated separately and with little interaction with the natural resources program. Although this separation of programs is, in the assessment of the Service, to the detriment of the natural resources, the INRMP is implying a connection that does not appear to be the current state at NASCC.

SECTION 4.0 Natural Resources Management Focuses: Note is made in the section titled "Fish and Wildlife Management" that portions of the main station and most of the other NASCC facilities are managed for fish and wildlife, primarily in support of the BASH Program. Without active interaction and discussion between the natural resources program and the BASH Program, it is not clear how effective fish and wildlife management can take place.

FIGURE 4-1, 4-2, and 4-3: The Service does not understand what is supposedly being illustrated by these figures.

SECTION 5.1.1: The Service recommends that this section include some specific examples of how NASCC has "taken a proactive approach towards integrating the military mission with concepts of sustainable land use". Likewise, specific examples at NASCC of conflicts that exist at the installation between the facility's mission and natural resources would be an excellent start to discussions among the facility managers as well as with the Navy's partners, such as the Service.





**DEPARTMENT OF THE NAVY**  
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST  
JACKSONVILLE, FL 32212-0030

5090  
Ser EV22/0304  
August 5, 2013

Mr. Russell Hooten  
Texas Parks and Wildlife Department  
TAMU-CC, 6300 Ocean Drive, NRC Suite 2501  
Unit 5846  
Corpus Christi, TX 78412

Dear Mr. Hooten:

SUBJECT: NAVAL AIR STATION CORPUS CHRISTI INTEGRATED NATURAL  
RESOURCES MANAGEMENT PLAN UPDATE

In accordance with the United States Department of Defense and the United States Department of the Navy (Navy) guidance for meeting Sikes Act Improvement Act requirements, Navy installations must update their Integrated Natural Resources Management Plans (INRMPs) every five years in cooperation with the United States Fish and Wildlife Service (USFWS) and appropriate state fish and wildlife agency. Under this guidance, the Pre-Final version of the five-year INRMP update was completed for Naval Air Station Corpus Christi in August 2013. A hard copy of the updated INRMP is enclosed for your review and comment. This INRMP identifies management strategies for natural resources under the Navy's jurisdiction, including benefits to threatened and endangered species known or with the potential to occur at the installation.

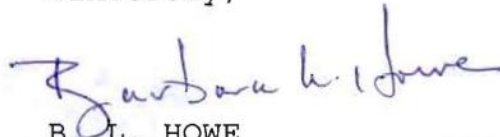
The Navy has not identified any significant changes to the Naval Air Station Corpus Christi mission requirements or its natural resources that would require major changes to the INRMP at this time. The Navy is requesting review of the INRMP from the Texas Parks and Wildlife Department (TPWD) to satisfy coordination requirements with federal and state agencies.

At this time, the Navy is requesting your feedback on the INRMP and invites you to evaluate the management strategies and INRMP projects identified in the document. Please provide us with any questions, comments, or concerns on the INRMP within 30 days of receipt of this letter.

5090  
Ser EV22/0304  
August 5, 2013

Please address your comments or questions to Mr. George Kenny, Natural Resources Specialist, at (904) 542-6878 or email: george.kenny@navy.mil. Thank you for assistance in ensuring our country's military readiness and continued stewardship of natural resources.

Sincerely,



B. L. HOWE  
Planning and Conservation  
Branch Head  
By direction of the  
Commanding Officer

Enclosures: Pre-Final Integrated Natural Resources Management  
Plan for Naval Air Station Corpus Christi





Life's better outside.®

October 28, 2013

George Kenny  
Natural Resources Specialist  
Navy region Southeast/NAAVFAC Southeast  
P.O. Box 30, building 903  
Jacksonville. FL 32212-0030

Commissioners

T. Dan Friedkin  
Chairman  
Houston

Ralph H. Duggins  
Vice-Chairman  
Fort Worth

Antonio Falcon, M.D.  
Rio Grande City

Dan Allen Hughes, Jr.  
Beeville

Bill Jones  
Austin

James H. Lee  
Houston

Margaret Martin  
Boerne

S. Reed Morian  
Houston

Dick Scott  
Wimberley

Lee M. Bass  
Chairman-Emeritus  
Fort Worth

Carter P. Smith  
Executive Director

RE: Naval Air Station Corpus Christi Pre-Final Integrated Natural Resources Management Plan Update, Corpus Christi, Nueces County, Texas

Dear Mr. Kenny:

This letter is in response to your request for review of the Pre-Final Integrated Natural Resources Management Plan (INRMP) for Naval Air Station-Corpus Christi (NASCC). Tetra Tech, Inc prepared the INRMP for the Navy.

### Project Description

In accordance with the Sikes Act Improvement Act, Navy installations must update their INRMPs every five years with the cooperation of the U.S. Fish and Wildlife Service (USFWS) and the state fish and wildlife agency (i.e., Texas Parks and Wildlife Department (TPWD)). The INRMP evaluates the natural resources of NASCC's facilities (NASCC-Main Station, Naval Outlying Field (NOLF) Cabaniss, and NOLF Waldron (all located in Nueces County); and NOLF Goliad, Goliad County), identifies issues, and proposes four goals and 24 objectives to address management strategies for the resources under the Navy's jurisdiction. Peary Place Transmitter Site (Nueces County) is also a NASCC facility; however, it does not currently provide operational support for the Installation military mission and its resources are not evaluated in the current INRMP.

TPWD staff reviewed the Pre-Final INRMP and offers the following comments and recommendations.

#### **2.2.9 Sensitive Wildlife Habitat and Rare Ecosystems**

Regarding NOLF Goliad, this section of the Pre-Final INRMP states that surveys of flowering plants have not identified any rare or sensitive plants and that a comprehensive survey has not been conducted. However, survey results reported in the 2012 document, "Biological Survey for Naval Outlying Field Goliad, Goliad, Texas" described the occurrence of *Liatris* species, possibly *Liatris bracteata*, a G2G3/S2S3 species (imperiled/rare globally and in state) and a species identified as a Species of Greatest Conservation Need (SGCN) in the

Texas Conservation Action Plan, the states wildlife action plan. Based on the common rootstock of all *Liatris* individuals found on NOLF Goliad, the authors of the report recommended all individuals occurring on NOLF Goliad be treated as potential threatened species.

**Recommendation:** TPWD recommends the Final INRMP revise this section to indicate that rare plant species have been identified on NOLF Goliad.

### **3.2.1.2 Vegetation and Habitat Management**

#### *2.2.1.2.4 Grounds Maintenance and Landscaping Management (Should be 3.2.1.2.4-see "General Comments" below)*

Under "Long-term Management" (Page 3-44), palm tree pruning would be conducted on the Main Station between 1 July and 31 October. Pregnant and/or lactating female Southern yellow bats (state threatened species) have been collected between April and mid-July; therefore, trimming palm trees in early July could potentially directly impact roosting pups not yet able to fly.

**Recommendation:** In accordance with Bat Conservation International (BCI) guidance, TPWD recommends palm frond pruning be delayed until 1 August each year to ensure potential impacts to young bats are avoided. During most of the year, surveying for the presence of bats prior to trimming palm trees would be sufficient to avoid negatively impacting bats. However, if palm trees are trimmed or removed between May and August, young bats (pups) unable to fly may be directly impacted. Simply waiting for bats to leave a palm tree roost during these months and then trimming the tree is not recommended by TPWD and is not a practice approved by BCI.

### **3.2.1.3 Agricultural Outleashes Management**

#### *Goal 1, Objective 1.7 and Project No. 8-Natural Resources Outreach*

According to Figure 2-21, much of the land use at NOLF-Goliad consists of agricultural outleashes, including parcels in which the rare plant, *Liatris* sp., has been documented. The Management Recommendations provided in the, "Biological Survey for NOLF Goliad" report include not disturbing *Liatris* sp. plants between June and December, including not mowing during their critical growth period.

**Recommendation:** To fulfill Goal 1, Objective 1.7 (maintain/enhance native vegetation) and Project No.8 (ensuring there are no conflicts between agricultural outlease contracts and natural resources management recommendations), TPWD agrees with the management recommendations

provided in the report referenced above and recommends they be implemented to ensure the preservation of the vegetation community supporting the rare plant occurring on NOLF-Goliad.

**General Comments**

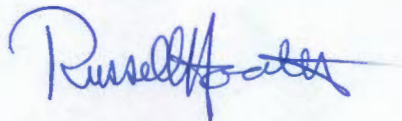
**3.2.1.2 Vegetation and Habitat Management**

It appears that the subsections under this section in the Pre-final INRMP are numbered incorrectly; that is, they begin with the number "2" rather than "3." For example, although located in Chapter 3, Riparian Areas Management is identified as being in subsection 2.2.1.1.2.

**Recommendation:** To be consistent with the rest of the INRMP, the subsections in Section 3.2.1.2 should be revised to conform to the numbering system used throughout the rest of the document.

I appreciate the opportunity to review and comment on this project. Please contact me at (361) 825-3240 or [russell.hooten@tpwd.texas.gov](mailto:russell.hooten@tpwd.texas.gov) if you have any questions regarding our comments or if we may be of further assistance.

Sincerely,



Russell Hooten  
Wildlife Habitat Assessment Program  
Wildlife Division

/rh 7737

cc: Pat Clements, USFWS-ES Corpus Christi Field Station  
Frank Weaver, USFWS-ES Corpus Christi Field Station



# **APPENDIX B**

## **NASCC BASH Instruction and Depredation Permits**

**Bird/Animal Strike Hazard (BASH) Program (NASCORPCINST 3750.16A) – 08 February  
2013**

**USFWS Migratory Bird Depredation Permit**

This page intentionally left blank.



# DEPARTMENT OF THE NAVY

NAVAL AIR STATION  
11001 D STREET SUITE 101  
CORPUS CHRISTI, TX 78419

NASCCINST 3750.16A

N32

FEB 08 2013

## NASCC INSTRUCTION 3750.16A

From: Commanding Officer, Naval Air Station Corpus Christi

Subj: BIRD/ANIMAL STRIKE HAZARD (BASH) PROGRAM

Ref: (a) OPNAVINST 5090.1  
(b) NAVFAC P-73, Vol II  
(c) OPNAVINST 3750.6  
(d) OPNAVINST 3710.7  
(e) FAA Handbook 7110.6  
(f) SWO20-AG-SAF-010 ORDNANCE TRANSPORTATION MANUAL, Chapter 3-7  
(g) CNICINST 3700

1. Purpose. To implement guidelines and actions in accordance with references (a) and (b), to reduce the potential of collision between aircraft and birds or other animals. This instruction does not supersede or subjugate the NAS Corpus Christi Air Operations Manual or VFR Course Rules.

2. Cancellation. NASCORPCINST 3750.16. This instruction has been substantially revised and should be reviewed in its entirety.

3. Background. No single solution exists to the BASH program; a variety of techniques and organizations must be involved to ensure success of the program. The program encompasses all actions which may identify, reduce, or eliminate bird or other animal hazards to aviation, specifically, bird avoidance, and bird control.

4. Objectives. BASH exists on this installation and within the immediate vicinity due to resident and migratory bird/animal species. Daily and seasonal bird movements create various hazardous conditions to aviation. This plan is designed to reduce the bird/animal hazard in and around Naval Air Station (NAS) Corpus Christi, and Navy Outlying Fields (NOLF) Waldron, Cabaniss, and Goliad.

5. Administration. This plan shall be reviewed and updated biennially. Recommended changes should be submitted to the NAS Corpus Christi Air Operations Officer, via the BASH Program Manager.

  
D. M. EDGECOMB

Distribution: List I, II, III

<https://g2.cnic.navy.mil/NASCORPUSCHRISTITX/Pages/default.aspx>

CNIC (N32)

CNRSE (N32)

## NAS CORPUS CHRISTI BASH PLAN

FEB 08 2013

## TABLE OF CONTENTS

CHAPTER NUMBER	PAGE NUMBER
CHAPTER 1 - GENERAL	
101. INTRODUCTION	1-1
A. PURPOSE	1-1
1. WHAT IS BASH?	1-1
2. WHY IS THE BASH PROGRAM IMPORTANT?	1-1
102. MISSION	1-2
103. LOCATION AND SETTING	1-2
A. AIRFIELD INSTALLATIONS DESCRIPTION	1-2
B. LOCAL AREA	1-3
C. GENERAL TOPOGRAPHY	1-3
D. LANDFILLS	1-3
E. HABITATS	1-3
104. SPECIES	1-4
105. EXPLANATION OF TERMS	1-4
A. WILDLIFE SERVICE (WS)	1-4
B. ACTIVE BIRD DISPERSAL	1-4
C. BASH	1-4
D. BIRD HAZARD WORKING GROUP (BWG)	1-4
E. BIRD HAZARD CONDITION (BHC)	1-4
1. BHC SEVERE	1-4
2. BHC MODERATE	1-4
3. BHC LOW	1-4
F. BASH WINDOW	1-4
G. BASH ADVISORY	1-4
H. BASH DETECTION AND DISPERSAL TEAM (BDDT)	1-4
I. DEPREDAATION	1-5
J. PYROTECHNICS	1-5
K. BIOACOUSTICS	1-5
L. PROPANE CANNONS	1-5
M. MODELS/DECOYS	1-5
N. WILDLIFE STRIKE	1-5
O. BIRD EXCLUSION ZONE	1-5
P. SALVAGE	1-5
CHAPTER 2 - ORGANIZATIONAL TASKS AND RESPONSIBILITIES	
201. AUTHORITY	2-1
202. BIRD HAZARD WORKING GROUP (BWG)	2-1
A. PARTICIPANTS	2-1
B. BWG FUNCTION	2-2



FEB 08 2013

203.	AIR OPERATIONS DEPARTMENT	2-2
	A. AIR OPERATIONS OFFICER	2-2
	B. AVIATION SAFETY OFFICER	2-2
	C. AIRFIELD MANAGER	2-2
	D. BASH COORDINATOR	2-3
	E. AIR TRAFFIC CONTROL	2-4
	F. FLIGHT SUPPORT	2-4
204.	TRAWING FOUR AVIATION SAFETY OFFICER	2-5
205.	TENANT COMMAND SAFETY OFFICERS	2-5
206.	PUBLIC SAFETY DEPARTMENT	2-6
	A. SAFETY	2-6
	B. SECURITY	2-6
207.	NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)	2-6
208.	PUBLIC AFFAIRS	2-7
	CHAPTER 3 - CONCEPT OF OPERATIONS	3-1
301.	GENERAL	3-1
302.	BIRD HAZARD WARNING SYSTEM	3-1
	A. BHC SEVERE	3-1
	B. BHC MODERATE	3-1
	C. BHC LOW	3-1
	D. BIRD WATCH ALERT	3-2
	E. BASH WINDOW	3-2
303.	BIRD HAZARD CONDITION REPORTS	3-2
	A. BIRD HAZARD REPORTING	3-2
	B. BASH DETECTION/DISPERSAL TEAM BHC REPORTING	3-2
	C. NOLF WALDRON, CABANISS, AND GOLIAD	3-2
	D. BHC DECLARATIONS BY MAINTENANCE PERSONNEL, SWEEPERS, GRASS MOWERS, AND OTHERS	3-3
	E. AIRCREW REPORTING	3-3
304.	DOWNGRADING BHC	3-3
305.	BIRD HAZARD COMMUNICATION	3-3
	A. CONTROL TOWER COMMUNICATIONS	3-3
	B. FWS COMMUNICATIONS	3-4
	C. FLIGHT PLANNING COMMUNICATIONS	3-4
306.	TYPES OF BASH DISPERSAL EQUIPMENT	3-4
	A. STATIC DETERRENT DEVICES	3-4
	B. PROPANE CANNONS	3-4
	C. BIOACOUSTICS	3-4
	D. PYROTCHNICS	3-4
	E. DEPREDDATION	3-5
	F. RECORD KEEPING	3-5
307.	FIRE AND EMERGENCY SERVICE PROCEDURES	3-5

FEB 08 2013

308.	LAND MANAGEMENT PROCEDURES	3-5
	A. VEGETATION	3-5
	B. CONTROLLING BROAD-LEAFED WEEDS	3-6
	C. PLANTING BARE AREAS	3-6
	D. FERTILIZING	3-6
	E. REMOVING EDGE EFFECT	3-6
	F. LEVELING OF AIRFIELD	3-6
	G. REMOVING DEAD VEGETATION	3-6
	H. REMOVING BIRD AND ANIMAL CARCASSES FROM THE AIRFIELD	3-6
	I. PEST CONTROL	3-6
	J. MAINTAINING DRAINAGE DITCHES	3-6
	K. EMPLOYING EROSION CONTROL VEGETATION	3-6
	L. ELIMINATE ROOSTING SITES	3-6
	M. BIRD PROOF BUILDINGS, HANGARS AND STRUCTURES	3-6
309.	MANAGING OFF-BASE LAND USE	3-7
	CHAPTER 4 - AIRCREW PROCEDURES	4-1
401.	FLIGHT PLANNING	4-1
402.	AERODROME PROCEDURES	4-1
403.	LOW LEVEL ROUTES	4-2
404.	ACTIONS FOLLOWING A BIRD STRIKE	4-2
405.	BIRD STRIKE REPORTING PROCEDURES	4-2
406.	COLLECTING WILDLIFE REMAINS	4-3
407.	OPERATIONAL LIMITS AND GO/NO-GO CRITERIA	4-4
	CHAPTER 5 - LOCAL BIRD SPECIES	5-1
501.	GENERAL	5-1
502.	NAS CORPUS CHRISTI/NOLF WALDRON/NOLF CABANISS/ANIMAL HAZARDS	5-1
	A. AVIAN SPECIES	5-1
	1. GULLS	5-1
	2. WATERFOWL (DUCKS, GEESE, SWANS)	5-1
	3. LONG-LEGGED WADERS (HERONS AND EGRETS)	5-1
	4. RAPTORS (HAWKS, FALCONS, KITES, EAGLES, AND VULTURES)	5-2
	5. WILD TURKEY, QUAIL, AND PHEASANTS	5-2
	6. SANDPIPERS/SHOREBIRDS	5-2
	7. TERNS	5-2
	8. OWLS	5-2
	9. GOATSUCKERS (NIGHTHAWKS), WHIPPOORWILLS, ETC.	5-2
	10. WOODPECKERS	5-3
	11. FLYCATCHERS	5-3
	12. HORNED LARKS	5-3
	13. SWALLOWS AND SWIFTS	5-3
	14. CROWS AND RAVENS	5-3
	15. BLACKBIRDS, GRACKLES, COWBIRDS, AND STARLINGS	5-3
	16. MEADOWLARKS	5-3

FEB 08 2013

17. HOUSE SPARROWS	5-3
B. MAMMALIAN SPECIES	5-4
1. COYOTES	5-4
2. RABBITS	5-4
3. RODENTS	5-4
4. DEER	5-4
5. JAVALINA	5-4
6. FERAL PIG	5-4

LIST OF ILLUSTRATIONS/APPENDIXES

APPENDIX (A) BASH SELF-INSPECTION CHECKLIST	A-1
---	-----

FEB 08 2013

## CHAPTER 1

## GENERAL

## 101. INTRODUCTION.

A. PURPOSE. The purpose of the Naval Air Station (NAS) Corpus Christi Bird/Animal Strike Hazard (BASH) Management Plan is to provide guidance that will minimize wildlife hazards on and around the airfield that pose a threat to aviation safety. This plan is in accordance with OPNAV Instruction 5090.1B, Chapter 22, Natural Resources Management, which states that naval air stations are responsible for preparing and implementing a BASH Management Plan, following the outcome of an ecological study or wildlife hazard assessment (CNO 1994). This plan also fulfills OPNAV Instruction 3750.6R and compliance with CNICINST 3700.

1. What is BASH? BASH is an acronym for Bird/Animal Strike Hazard. The purpose of the BASH program is to manage the hazard associated with collisions between wildlife and aircraft. The program focuses on management of the airfield to reduce quality and attractiveness as habitat for wildlife, managing wildlife populations, thereby minimizing the potential of wildlife/aircraft strikes, and working with installation personnel to improve the reporting and communicating of wildlife activity and wildlife/aircraft strikes, both damaging and non-damaging. Damaging strikes include holes in the body of aircraft, broken engine fan blades, cracks to the canopy, etc. Damaging strikes have the potential of resulting in loss of life to aircrew, costing the Navy millions of dollars per year in repairs to naval aircraft, and loss of training opportunities. Non-damaging strikes usually involve blood smears or feather fragments stuck to the aircraft without penetration to the body of the aircraft.

2. Why is the BASH Program Important? It is important to institute a proactive BASH program at naval airfields for several reasons. The primary goal of the BASH program is to minimize the potential for loss of aircrew life. The BASH program achieves this objective by addressing the aviation safety hazard associated with wildlife near airfields. An effective BASH program also strives to minimize secondary BASH impacts, such as damage to aircraft and impairment of training. Aircraft collisions with wildlife are too costly and hazardous to not be properly addressed or managed.

3. Bird strikes have plagued Naval Aviation since its early beginnings. The Navy's first loss of life due to a bird strike occurred in 1914, coincidentally the same year it obtained its first aircraft. From 1980-2002, Naval Aviators reported 1,420 bird strikes, which resulted in 346 aircraft mishaps, 247 FOD'ed engines and \$25,607,953.00 in damages. Ten aircraft were destroyed and one fatality occurred. However, within that same period, the USAF had two major BASH-related mishaps with two aircraft totally destroyed and 24 fatalities. These incidents, and the recent destruction of two Naval Aircraft, have heightened the Navy/DOD's interest in BASH programs. The Naval Safety Center's review of recent USN bird-aircraft mishaps found that the lack of a BASH Plan was a consistent deficiency.

4. An effective BASH program at naval air stations can reduce the relative risk associated with wildlife in the airfield operating environment. Procedures have been established for effectively minimizing and communicating hazardous wildlife activity, reporting wildlife/aircraft strikes, collecting

FEB 08 2013

and identifying wildlife/aircraft strike remains, and improving awareness of the potential hazards to naval aviation due to wildlife. The guidelines, as presented in this management plan, shall be adopted by the tenant squadrons and departments of NAS Corpus Christi.

102. MISSION. Naval Air Station (NAS) Corpus Christi, Navy Outlying Fields (NOLF) Waldron, Cabaniss and Goliad have large and potentially dangerous bird and animal populations. Daily animal movements in the vicinity of the airfields create various hazards to aircraft. Accordingly, the BASH Program is designed to manage animals and habitats to provide increased levels of safety during the critical phases of flight. This plan establishes specific procedures to reduce known and future bird and mammalian hazards. No single solution or agency can solve the bird and mammalian strike problem. Therefore, a variety of techniques and organizations must be involved in the overall program. The NAS Corpus Christi BASH program's primary goal is to promote aviation safety through a proactive approach of managing potential wildlife hazards and educating personnel. This plan is designed to:

- A. Increase awareness among all airfield personnel of the issues central to the success of the BASH program.
- B. Improve communication of wildlife hazards and activity at NAS Corpus Christi.
- C. Improve wildlife/aircraft strike reporting and collection of strike remains.
- D. Deter and manage wildlife hazards based on scientific research, improved wildlife/aircraft strike reporting, and information gathered through communication of wildlife hazards and activity.
- E. Coordinate BASH efforts of all personnel working on or near the airfield.

### 103. LOCATION AND SETTING.

#### A. AIRFIELD INSTALLATION DESCRIPTION.

1. Truax Field (NAS Corpus Christi) is an active military airfield. The primary missions supported are flight training, maritime patrol, aircraft repair, and search and rescue. The primary aircraft types using the runways are T-6, T-34, T-44, TC-12, P-3, UAS, and HU-25. AH-1, UH-60, CH-47, HH-65, and other helicopters are operated at the seawall by the Corpus Christi Army Depot and USCG. NASCC hosts transient aircraft from various Navy and other military commands.

2. NOLF Cabaniss is an active military airfield. The primary mission supported is multi-engine flight training. The primary aircraft types are the T-44 and TC-12.

3. NOLF Waldron is an active military airfield. The primary mission supported is single-engine flight training. The primary aircraft type is the T-34.

4. NOLF Goliad is an active military airfield. The primary mission supported is single-engine flight training. The primary aircraft type is the T-6.

FEB 08 2013

## B. LOCAL AREA.

1. NAS Corpus Christi (field elevation 19' MSL) is located within the corporate city limits of the City of Corpus Christi, Texas. The City of Corpus Christi lies along the southern edge of Corpus Christi Bay and is separated from the Gulf of Mexico by a barrier island (Mustang Island). NASCC Main Installation (2,844 acres) lies on the Encinal Peninsula, and is surrounded on three sides by water: Oso Bay, Corpus Christi Bay, and Laguna Madre.

2. NOLF Waldron (field elevation 25' MSL, 851 acres), located south of the main installation on the Flour Bluff Peninsula, is bordered by Oso Creek, Corpus Christi Bay, and Laguna Madre. NOLF Waldron contains grazing leases outside of the airfield fence line on approach areas.

3. NOLF Cabaniss, (field elevation 30' MSL, 971 acres) is located to the west of the main installation in the city limits of Corpus Christi and lies adjacent to a putrescible waste landfill transfer station. The site contains agricultural out leases for sorghum (in clear zone areas) and hay (within the airfield fence line).

4. NOLF Goliad, (field elevation 324' MSL, 1156 acres) is located approximately 58 miles to the northwest of NAS Corpus Christi and lies in a rural area of Berclair County. The site contains agricultural out leases of hay. There is a pond located less than one half mile southeast of the fire facility that acts as an attractant for wildlife.

## C. GENERAL TOPOGRAPHY.

1. Truax Field, Cabaniss, and Waldron have generally level topography. Cabaniss and Goliad are considered inland fields. Waldron and Truax Field are considered coastal fields due to their proximity to beach/bay habitats. Aircraft in the pattern for Truax fly over the Oso Bay mudflats and Spoil Islands in the upper Laguna Madre.

2. Laguna Madre. Aircraft in the pattern for Waldron fly over the upper Laguna Madre and Oso Bay. Cabaniss is adjacent to Oso Creek, a brackish water body. A private dammed freshwater pond lies on runway 35 approach.

D. LANDFILLS. Elliott Landfill Transfer Station, a City of Corpus Christi facility, was built on property adjacent to NOLF Cabaniss in the 1970s, and expanded in the early 1980s. Once a putrescible landfill with a composting facility, it has been converted to a transfer station, but remains extremely attractive to thousands of gulls and vultures as well as wading birds, ducks, blackbirds, and grackles.

E. HABITATS. South Texas lies in the Central US flyway and is a world-renowned birding area with over 300 species of birds known to inhabit or pass through the region (See NASCC Integrated Natural Resources Management Plan for species list). The major habitats, woodlands, wetlands, grasslands, and open water are very attractive to birds. Additionally, standing water, perch sites, tall brush, and short grass are present on each airfield and attract large numbers of individual and flocking birds. The combination of all of these environments, along with the highest bird density for a cubic

FEB 08 2013

kilometer of atmosphere of any place in the United States (150 birds per cubic kilometer has been registered during migratory periods) increases the potential for serious BASH issues.

104. SPECIES. Chapter 5 contains a comprehensive listing of birds/mammals, which may be observed on all airfields. There may be occasional sightings of other species during migration, but this list is considered thorough for BASH purposes.

105. EXPLANATION OF TERMS.

A. WILDLIFE SERVICE (WS). An office of the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service which may be under contract at installations to provide BASH assistance.

B. ACTIVE BIRD DISPERSAL. Harassment techniques employed to disperse birds from the airfield and surrounding areas. Methods may include chase, pyrotechnics, bioacoustics, and depredation.

C. BASH. A general term to describe bird and other wildlife which represent a collision hazard to aviation operations.

D. BIRD HAZARD WORKING GROUP (BWG). Coordinates BASH issues and requirements across departments and tenants.

E. BIRD HAZARD CONDITION (BHC). A bird hazard alert condition used to warn aircrew of bird activity.

1. BHC SEVERE. Heavy concentration of birds (more than 15 large or 30 small) on or immediately adjacent to the active runway or their specific locations that present an immediate hazard to flight operations. Active dispersal will be initiated during BHC Severe and dispersal team personnel shall remain on the airfield actively involved in dispersal techniques until the BHC is downgraded.

2. BHC MODERATE. Moderate concentrations of birds (5 to 15 large or 15 to 30 small) observed in locations that represent a probable hazard to flying operations. Positive actions should be taken to disperse the concentrations of birds that are causing the hazard.

3. BHC LOW. Sparse bird activity on and above the airfield (less than 5 large or 15 small) with a low probability of a hazard to aviation.

F. BASH WINDOW. Known periods of severe bird activity where restrictions to flight operations may be imposed.

G. BASH ADVISORY. A radio transmission from Air Traffic Control (ATC) or aircrew reporting specific bird hazard information and when feasible, BASH advisories should be real-time or disseminated via Automated Terminal Information Service (ATIS) broadcasts.

H. BASH DETECTION AND DISPERSAL TEAM (BDDT). Dedicated airport personnel who report BHC and disperse problem birds or other animals via approved dispersal methods.

FEB 08 2013

I. DEPREDATION. Technique that may be used to remove problem birds and other animals permanently from the airfield and hangars when other tactics are ineffective. Permits are required from the U.S. Fish & Wildlife Service for migratory bird species and from the Texas State Fish & Game Agency for game animals, such as deer, Rio Grande turkey and javelina.

J. PYROTECHNICS. Noise producing devices fired from pistol or shotgun. May be used to scare birds away from runways and airport areas. Pyrotechnics to be used are Class 1.4E explosives.

K. BIOACOUSTICS. Recorded sounds of bird distress and predator calls used to disperse birds off runways and other airport areas.

L. PROPANE CANNONS. Stationary non-projectile sound producing device that may be used to disperse birds from airport areas.

M. MODELS/DECOYS. Various static devices that may be used to disperse birds from airport areas. May include scarecrows, decoys, Mylar tape, and eye spots.

N. WILDLIFE STRIKE. Any contact between a bird or other animal and an aircraft, whether or not damage occurred. All wildlife strikes, damaging or non-damaging, are required to be reported to the Naval Safety Center by the aircraft custodian.

O. BIRD EXCLUSION ZONE. The designated area surrounding the airfield where bird habitation is discouraged.

P. SALVAGE. The act of collecting wildlife or wildlife remains from an aircraft or from the airfield environment. Birds covered by the Migratory Bird Treaty Act must be reported to the U.S. Fish & Wildlife Service via a Salvage Permit. Certain mammalian species are reported through state agency permitting requirements. The USDA Biologist is the primary point of contact for questions on Salvage.



NASCCINST 3750.16A

FEB 08 2013

This page intentionally left blank.

FEB 08 2013

## CHAPTER 2

## ORGANIZATIONAL TASKS AND RESPONSIBILITIES

201. **AUTHORITY.** The Commanding Officer is responsible for the BASH Program and the approving authority for all recommended modifications. The BASH Program is a part of the Aviation Safety Program, and as such, the Air Operations Officer is designated as the BASH Program Manager and shall monitor the effectiveness of the program. Active participation by Air Operations and NAVFAC Environmental departments are key to ensuring success of the program.

202. **BASH WORKING GROUP (BWG).** The BWG is organized to implement and monitor the BASH Management Plan, collect and review wildlife hazard data, and recommend actions in land and wildlife management and/or operational procedures to reduce wildlife hazards to aircraft. The BWG allows installation departments affected by wildlife hazards the opportunity to discuss problems and possible solutions. BWG members include civilian and military personnel from various departments. The BWG shall meet quarterly or as needed with representatives from each organization concerned with bird hazards.

## A. PARTICIPANTS.

1. Air Operations Officer (Program Manager, Chairperson)
2. NASCC Aviation Safety Officer
3. USDA Biologist (BASH Coordinator)
4. Public Works Officer
5. Airfield Manager
6. NASCC Natural Resource Manager
7. TRAWING FOUR Aviation Safety Officer
8. Air Traffic Control Representative
9. VT-27 Squadron Aviation Safety Officer
10. VT-28 Squadron Aviation Safety Officer
11. VT-31 Squadron Aviation Safety Officer
12. VT-35 Squadron Aviation Safety Officer
13. Customs and Border Protection Representative
14. Coast Guard Representative
15. CCAD Representative
16. Community Plans and Liaison Officer (CPLO)

FEB 08 2013

17. Public Affairs Officer (PAO)

B. BWG FUNCTION. The tasks and responsibilities of the BWG include:

1. Develop, update, and review the implementation and effectiveness of the NAS Corpus Christi BASH Management Plan.

2. Monitor base-wide compliance with reference (c).

3. Collect and review data on all wildlife hazards.

4. Identify and recommend actions to reduce wildlife hazards through land and wildlife management practices.

5. Recommend changes in operational procedures.

6. Disseminate wildlife activity data as provided by the BASH Coordinator.

7. Facilitate implementation of BASH management recommendations, as outlined in the BASH Management Plan.

203. AIR OPERATIONS DEPARTMENT. Tasks and responsibilities of the Air Operations Department:

A. AIR OPERATIONS OFFICER. The tasks and responsibilities of the Air Operations Officer include:

1. Chair the annual BWG meeting.

2. Oversee the execution of the BASH Management Plan. Report progress, issues, and significant BASH issues to the Commanding Officer.

3. Request and maintain annual funding through the Air Operations Regional Program Director in support of the NAS Corpus Christi BASH Program.

4. Direct the Airfield Manager, BASH Coordinator, and Flight Support division to ensure effective execution of the BASH Program.

5. Liaison with all aviation activities at NAS Corpus Christi concerning BASH issues. Address BASH developments and issues at the TW-4 Executive Safety Council meetings.

B. Aviation Safety Officer. The tasks and responsibilities of the Aviation Safety Officer include:

1. Assist the Air Operations Officer in the execution of the BASH Management plan.

2. Address BASH developments and issues at the monthly Aviation Safety Council meetings.

C. AIRFIELD MANAGER. The tasks and responsibilities of the Airfield Manager include:

1. Conduct periodic exercises and inspections of the BASH program.

FEB 08 2013

2. Coordinate with NAVFAC and contractors in controlling grass height, problematic foliage, and executing annual controlled burns on the airfield.
  3. Coordinate with the BASH Coordinator and off-station civilian and private entities in the purchase and placement of BASH control devices.
  4. Liaison with CNATRA Det concerning strike remains collection procedures and compliance with Smithsonian remains collection requirements.
  5. Conduct annual review of the USDA APHIS contract. Make modification recommendations to the Air Operation Officer.
- D. BASH COORDINATOR. The contracted USDA Biologist shall execute the tasks and responsibilities of the BASH Coordinator, which include:
1. Execute and manage the BASH Program as directed by the Air Operations Officer.
  2. Develop and execute passive, active, and static procedures to reduce BASH hazards at Truax, Cabaniss, Goliad, and Waldron airfields.
  3. Monitor grass height, drainage ditches, etc., and report problems to the Airfield Manager.
  4. Coordinate with and receive from CNATRA Det and aviation maintenance contractors all strike remains for collection, documentation, and forwarding to the Smithsonian for DNA analysis.
  5. Ensure a replacement USDA Biologist is scheduled to assume BASH Coordinator duties during periods of leave, TAD, etc.
  6. Develop a continuing information and education program to disseminate bird hazard information.
  7. Establish a BASH awareness training program for ATC and Flight Support personnel.
  8. Maintain a file of all wildlife strikes occurring at NAS Corpus Christi, NOLF Waldron, NOLF Cabaniss, and NOLF Goliad working areas.
  9. Conduct ongoing wildlife/airfield surveys and provide data and analysis to the BWG and Aviation/Executive Safety Council meetings.
  10. Brief tenant commands on BASH activities and potential wildlife hazards via safety stand downs and squadron briefings.
  11. Assist in the development of natural resource management strategies to reduce wildlife/aircraft strike potential.
  12. Maintain the records for Federal and State permits required for depredation, salvage, collection, and possession of wildlife species.
  13. Coordinate wildlife studies with Environmental as necessary to improve hazard control, assess the potential impacts of control activities on

FEB 08 2013

wildlife populations and distribution, and evaluate the potential effects of wildlife displacement.

14. Implement wildlife damage control measures, e.g. wildlife hazing/deterrence, trapping, depredation, etc.

15. Monitor wildlife activity during the biennial air show.

16. Coordinate BASH management practices with other NAS Corpus Christi departments, as necessary.

17. Train the BASH Detection and Dispersal Team (BDDT).

18. Conduct Wildlife Hazard Assessment (WHA) as required.

E. AIR TRAFFIC CONTROL. Tasks and responsibilities of the Air Traffic Control Division include:

1. In the absence of the BASH Coordinator, or at the discretion of the Facility Watch Supervisor, declare BHC based on reported sightings reported by competent personnel.

2. Pass BHC information to Operations Duty Officer.

3. Advise Air Operations Officer, Airfield Manager, the BASH Coordinator, and Tenant Command Operations Duty Officers anytime BHC SEVERE condition is declared.

4. Alert the BASH Coordinator/BDDT of observed wildlife hazards that require dispersal.

5. Facilitate priority movement of BASH Coordinator on the airfield to disperse wildlife on or near active runways.

6. Include BHC and bird advisory information on ATIS broadcasts. Update BHC as a result of changes in bird/animal activity.

7. Issue ATC/pilot report bird information advisory to aircraft over air traffic control frequencies, per FAA Orders 7110.65 and 7210.3.

8. Establish a BASH training program covering this instruction for all ATC personnel. This training will be documented in training jackets and reviewed annually.

F. FLIGHT SUPPORT. The tasks and responsibilities of the Flight Support Division include:

1. Respond to reported wildlife/aircraft strikes and conduct runway sweeps as required.

2. Conduct periodic inspections of the airfield for wildlife/aircraft strikes, at least twice daily.

3. Assist in collection, bagging, and storage of any wildlife remains found on the airfield. Notify the BASH Coordinator for pick up of remains.

FEB 08 2013

4. During routine operations on the base, report any observed concentrations of wildlife directly to the Tower on FM radio and contact the BASH Coordinator via cell phone. Include all relevant specifics, including location, altitude, number and species.

5. Staff BDDT to provide a ready response element to report BHC and disperse problem birds/animals via approved methods.

204. **TRAWING FOUR AVIATION SAFETY OFFICER.** Responsibilities of the TRAWING FOUR Safety Officer include:

- A. Monitor the effectiveness of the BASH Management Plan.
- B. Ensure the BASH Management Plan is a part of safety reviews conducted by the Naval Safety Center.
- C. Address ongoing BASH developments and issues at the monthly Aviation Safety Council and quarterly Executive Safety Council meetings.
- D. Conduct training as appropriate to support this plan.
- E. Publish operating instructions and conduct training as appropriate to support this plan.
- F. Ensure representatives are assigned to the BWG.
- G. Issue specific guidance to units on:
  - 1. Ensure squadrons report all bird/animal strikes via BASH HAZREP using WESS.
  - 2. Bird remains collection and preservation by maintenance personnel.

205. **TENANT COMMAND SAFETY OFFICERS.** Responsibilities of Tenant Command Safety Officers include:

- A. Designate a representative to the BWG.
- B. Address ongoing BASH developments and issues at the TW-4 Aviation and Executive Safety Council meetings.
- C. Ensure a bird hazard awareness program is established and aircrew briefings conducted to include films, posters, and information on seasonal bird hazards. Monitor, on a regular basis, aircrew mission briefings to ensure existing BASH information is briefed.
- D. Coordinate unit flying activities to minimize exposure to migratory birds. Contact the BASH Coordinator for updated information on migratory routes.
- E. Brief contractor maintenance personnel on the proper procedures for collection and preservation of bird remains. Even the smallest fragment of a feather or bloodstain should be preserved for DNA identification.

F. Ensure wildlife/aircraft strikes are reported to the BASH Coordinator and the Naval Safety Center via WESS. (<http://www.safetycenter.navy.mil/>).

1. Ensure BASH HAZREPs are sent to the following UICs: N63110 (CNATRA), N52812 (TRAINING AIR WING FOUR), N00216 (NAS Corpus Christi), and appropriate squadron UICs.

2. Include the BUONO and side number (MODEX) of the aircraft when completing BASH reports. For non-damaging bird strikes, assume maintenance has allocated one hour per event when determining cost. For damaging bird strikes, list the total of parts and labor costs. The labor cost should be the hourly rate times the man hours on the MAF. The reporting custodian is TW-4.

G. Brief bird hazard awareness and the Corpus Christi BASH program to all hosted aviation units.

**206. PUBLIC SAFETY DEPARTMENT. Tasks and responsibilities:**

A. SAFETY. The tasks and responsibilities include:

1. Review instructions, training plans, SOPs for compliance with Occupational Safety and Explosives Safety standards.

B. SECURITY. The tasks and responsibilities include:

1. Enforce base regulations that prohibit the feeding of wildlife, including feral cats on the installation.

2. Report any overflowing trash receptacles onboard Naval Air Station Corpus Christi to the NAVFAC POC.

**207. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC). Tasks and responsibilities:**

A. Designate a representative to the BWG.

B. Ensure implementation of BASH Coordinator and BWG proposed projects to reduce wildlife hazards to aviation safety.

C. Provide assistance in partnership with adjacent landowners regarding their land management practices.

D. Maintain runway lateral and approach zones in a manner that is least attractive to birds.

E. Ensure all trash receptacles onboard NAS Corpus Christi have covers to prevent bird/animal access and are emptied on a timely basis to prevent overflowing. Trash is a significant wildlife attractor.

F. Incorporate BASH friendly management practices as described in the base Integrated Natural Resources Management Plan (INRMP).

G. Oversee grounds maintenance contracts to ensure BASH criteria is properly addressed.

FEB 08 2013

H. Monitor vegetation growth within the Primary Surface Area, such as grass height, woody vegetation, and aquatic vegetation. Also, coordinate mowing and vegetation removal with the Airfield Manager and BASH Coordinator.

I. Monitor surface water drainage within the Primary Surface Area and report any drainage problems such as persistent standing water to the Airfield Manager.

J. Remove wildlife found in hangars, e.g. raccoons, opossums, etc., per guidance from the BASH Coordinator.

K. Ensure training is conducted for all contractor personnel on responsibilities, actions, and techniques applied under this instruction.

L. ENVIRONMENTAL. Tasks and responsibilities include:

1. Designate a representative for the BWG.
2. Coordinate INRMP revisions and updates with the Air Operations Officer (BASH Program Manager).
3. Recommend changes to environmental conditions and management practices to reduce wildlife strike potential. These changes will be presented to the BWG for consideration.
4. Initiate necessary environmental documentation for airfield modifications as required by law.
5. Provide Natural Resources/Wildlife Service support as outlined below:
  - a) Obtain Federal and State permits required for depredation, salvage, collection, and possession of all protected species.
  - b) Coordinate wildlife studies as necessary to improve wildlife hazard control, assess the potential impacts of control activities on wildlife populations and distribution, and evaluate the potential effects of wildlife displacement.
  - c) Conduct controlled burns as needed.

208. PUBLIC AFFAIRS. Public Affairs will provide a public information program designed to inform base personnel, dependents, and the general public on the development of hazardous uncontrolled bird activity and the measures being taken to minimize the danger.



NASCCINST 3750.16A  
FEB 08 2013

This page intentionally left blank.

FEB 08 2013

CHAPTER 3

CONCEPT OF OPERATIONS

301. GENERAL. The BASH program is an ongoing process including both information dissemination and active/passive bird/animal control techniques. Of these processes, the most critical is the aircrew notification and warning system. This system establishes procedures for the immediate exchange of information between ground agencies and aircrews concerning the existence and location of birds/animals that pose a hazard to flight safety. Additionally, a cautionary advisory is published in the DOD Flight Information Publication AP/1 under Supplementary Aerodrome Remarks.

302. BIRD HAZARD WARNING SYSTEM. The following standardized BHC will be used at NAS Corpus Christi, NOLF Waldron, NOLF Cabaniss, and NOLF Goliad to warn aircrew and support personnel of the current bird threat to operations. These codes are consistent with the USAF codes in section B of the DOD Flight Information Handbook (FLIP). Bird locations should be given with the condition code.

A. BHC SEVERE. Generally defined as heavy concentrations of birds (more than 15 large or 30 small) on or immediately adjacent to the active runway or other specific locations that present an immediate hazard to flight operations. Active dispersal will be initiated during this BHC and the BASH Coordinator shall remain on the airfield actively involved in dispersal techniques until this BHC is downgraded.

Note: SEVERE may also be declared when birds of any size or quantity present an immediate hazard.

B. BHC MODERATE. Generally defined as moderate concentrations of birds, (5-15 large or 15-30 small) observed in locations that represent a possible hazard to flight operations. Positive actions should be taken to disperse the concentrations of birds that are causing the hazard.

C. BHC LOW. Sparse bird activity on and above the airfield (less than described in Moderate) with a low probability of hazard.

Note: If, in the judgment of the observer, the number of birds is less than those indicated for a specific BHC, and a hazard is believed to exist, a higher BHC may be declared. Example: Condition SEVERE may be declared if vultures or a deer are immediately adjacent to the active runway.

BIRD HAZARD CONDITIONS

BHC	BIRD ACTIVITY
SEVERE	15+ large birds or 30+ small birds
MODERATE	5 - 15 large or 15 - 30 small
LOW	Sparse bird activity

Table 1

Note: The Tower may determine if bird activity away from the primary runway constitutes a threat to flying operations. If it does not, the Tower may lower the BHC for the primary runway while keeping the higher BHC for the other area.

D. BIRD WATCH ALERT. A general warning that indicates when weather, time of day, and seasonal conditions make an influx of birds onto the airfield likely. Upon receipt of special conditions, Tower Supervisor will set the alert and the Tower will include a general statement in ATIS broadcasts.

E. BASH WINDOW. BASH windows are based on historical bird survey data that show specific times when a hazard is known to exist, i.e., dawn seagull movements, etc. When BASH windows are set, aircraft operations during these times are not recommended. Squadron flight schedulers should avoid scheduling operations during BASH windows.

### 303. BIRD HAZARD CONDITION REPORTS.

A. BIRD HAZARD REPORTING. The NAS Corpus Christi Air Operations Officer, FWS, or designated representative ensures hazardous conditions are reported. Declaration of a BHC will be based on the following:

1. Visual observation of bird activity on or near the airfield by the Tower or Flight Support personnel.
2. Information relayed by ATC Radar, airborne aircraft, and taxiing aircraft.
3. Observations may be relayed to the Tower by any of the following personnel: Airfield facilities, weather observers, ground electronics maintenance, airfield lighting technicians, crash crew, sweepers, mowers, security police, transient line personnel, and any other personnel driving on the airfield with a cell phone or FM radio.

#### B. BHC REPORTING.

1. The most accurate and real-time reporting of bird hazard information is obtained from the BASH Coordinator and airfield observers.
2. When the BASH Coordinator is patrolling the airfield, he will have the primary responsibility to make BHC reports to the control tower. The BASH Coordinator will continue to make real-time reports and update BHC as hazard conditions change.
3. Once BHC SEVERE has been declared, the condition will be updated, at a minimum, every five minutes until downgraded. When aircraft are holding for BHC SEVERE, the BDDT will report to the Tower immediately if initial attempts to disperse the birds have failed. During BHC SEVERE, the BDDT shall remain on the airfield and be actively involved in dispersal techniques until BHC SEVERE is downgraded.

#### C. NOLFS WALDRON, CABANISS, AND GOLIAD.

1. Prior to scheduled flight operations, Flight Support personnel will make a BASH sweep of the runway and pass BHC reports to the FWS and RDO (if on station).
2. The BASH Coordinator will make periodic sweeps of the runway when breaks in flight operations allow, and report BHC to the FWS and RDO (if on station).

FEB 08 2013

D. BHC DECLARATIONS BY MAINTENANCE PERSONNEL, SWEEPERS, GRASS MOWERS, AND OTHERS.

1. If a bird hazard exists, other personnel may notify the BASH Coordinator, Tower, or FWS, as applicable. This notification can be made on a radio net or by telephone. Telephone reports can be passed to the FWS at extension 2506. Reports should include:

- a) Identity of caller (agency for ground personnel, call sign for aircrews).
- b) Location
- c) Altitude
- d) Time of sighting
- e) Approximate number of birds
- f) Type of birds (if known)
- g) Behavior of birds (soaring, flying to or from a location, etc).

E. AIRCREW REPORTING. Aircrews should report significant activity. On a low-level route/range area, notify ATC and Squadron Command/Operations Duty Officer.

304. DOWNGRADING BHC. Once a BHC has been declared, it shall be downgraded commensurate with updated information. The Tower Supervisor will make the final determination on BHC. NOLF Waldron and NOLF Cabaniss FWS will make final determination on BHC.

305. BIRD HAZARD COMMUNICATION. Disseminating BHC is critical to BASH effectiveness. The agencies below will disseminate the BHC by the following means.

A. CONTROL TOWER COMMUNICATIONS.

- 1. Include BHC on ATIS Broadcasts.
- 2. Notify inbound/departing aircraft of BHC if aircraft has received ATIS and the BHC has changed.
- 3. Provide additional bird advisories per reference (e).
- 4. The Tower Supervisor will direct the BASH Coordinator to the location where the wildlife is posing a threat.
- 5. Pass BHC to FWS/Flight Planning.
- 6. For rapidly changing BHC, place a statement on ATIS advising aircrews to contact Ground, Tower, or Final Controller for the latest BHC.
- 7. Pass BHC to aircraft outbound to any NOLF.

FEB 08 2013

8. Notify other area airfields via ATC direct lines of all sightings of large flocks or migratory movements.

B. FACILITY WATCH SUPERVISOR (FWS) COMMUNICATIONS.

1. Notify the BASH Coordinator and the NAS Corpus Christi Operations Duty Officer when the BHC is changed to Condition Severe.

2. Pass BHC to NOLF Waldron and Cabaniss Tower(s).

C. FLIGHT PLANNING COMMUNICATIONS.

1. Flight Planning Office will, upon receiving the BHC from the Tower, update the Airfield Information Display in Base Operations.

2. Provide BASH information and warnings to local and transient aircrews.

306. BASH DISPERSAL. There are a variety of methods for dispersing birds using static, pyrotechnic, bioacoustics, and depredation equipment. Any or all of these may be used to control wildlife activity.

A. STATIC DETERRENT DEVICES. Static deterrents include, but are not limited to: Propane cannons, scarecrows, silhouettes, and effigies. They are often effective in bird deterrence. Static devices are designed to augment the activities of the bird dispersal teams. At no time should static deterrents be considered a replacement for dispersal teams. Static devices should be moved by the BASH Coordinator or BDDT 50-100 feet from their existing locations at least once daily. This activity will inhibit the decline in their deterrent effect occurring as wildlife become accustomed to the device.

B. PROPANE CANNONS. The BASH Coordinator or other qualified personnel may position and operate propane sound cannons based on active runway, bird locations, and air traffic density. Locations will be changed daily to avoid habitation by the birds.

C. BIOACOUSTICS. Bioacoustics is audio taped distress or predator calls of actual birds. Special care must be taken to play the tape in short intervals to prevent habitation by the birds. The BASH Coordinator will play the tape 20-30 seconds, and then pause briefly. Repeat as required. Birds should respond by taking flight or becoming alert. These calls are effective for waterfowl, gulls, songbirds, and shorebirds. Pyrotechnics should be used in conjunction with bioacoustics to enhance complete dispersal. Bioacoustics will be the first option employed to control airfield bird habitation.

D. PYROTECHNICS. Pyrotechnics are effective for dispersing most bird species and may also be used for coyotes, deer, and other animals. Pyrotechnics are fired from modified pistols and 12 gauge shotguns. Pyrotechnics may include a variety of devices similar to commercial fireworks, including bangers, whistlers, screamers, and salutes. These small but very loud firecrackers are shot from the pistol/shotgun into flocks or near individual animals to frighten them away when they are discharged. Proper procedures for using Pyrotechnics are as follows:

FEB 08 2013

1. Liaison with the Tower prior to discharging pyrotechnics and coordinate the location. If aircraft operations are imminent; ensure the BHC is raised prior to initiating dispersal operations.

2. Use proper PPE to include ear and eye protection, and gloves.

3. If applicable, play the distress call 20-30 seconds to get the birds to respond by taking flight or becoming alert. Do not be surprised if they gather around the vehicle that is playing the distress tape. They are responding to one of their own who they believe is "hurt" or "in distress."

4. Do not load the gun in the vehicles. Step outside, cock the gun, load the cap then load the pyrotechnic in the barrel of the gun.

5. Point the launcher at 45 degrees or higher into the air, preferably toward the flock of birds. Turn away from the launcher and pull the trigger.

E. DEPREDATION. Occasional depredation of birds reinforces the other methods. Shooting one or two from a flock then following with a volley of pyrotechnics is generally a very effective strategy for deterrence. Domestic Pigeons, European Starlings, and House Sparrows may be removed without permit. All other birds that are removed using lethal methods must be reported to the U. S. Fish & Wildlife Service under the Depredation permit process. Any mammals removed may require a state equivalent permit.

F. RECORD KEEPING. The BASH coordinator will use and collect activity logs to document all bird dispersal operations to include species, location, methods, and number of birds dispersed. Data will be briefed at the BWG.

307. FIRE AND EMERGENCY SERVICE PROCEDURES. If fire-fighting crews detect the presence of birds on or near the airfield, they will pass the information to the BASH Coordinator and Tower. When the BASH Coordinator is not present, crash vehicles may be used to disperse wildlife as required.

308. LAND MANAGEMENT PROCEDURES. One of the most effective and permanent methods of discouraging wildlife from using the airfield is the removal of attractive habitat features. A comprehensive habitat management plan should be developed (when funding and manpower are available) for the Primary Surface Area (PSA), defined as the area surrounding the airfield measuring 750 feet from the centerline of the runways plus the approach zones. The following land use management practices are to be applied within the PSA and incorporated into a habitat management plan.

A. VEGETATION. Grass heights in excess of 14 inches provide habitat for rodents, which attract birds of prey (raptors). In addition, long grass may lay flat, referred to as lodging, and encourage flocking species to loaf on the airfield. Areas with grass heights below 7 inches are of equal concern because they attract loafing birds (such as geese). Therefore, grass height should be maintained between 7 and 14 inches within the PSA. When grasses do not naturally achieve at least 10" in height they should be encouraged to do so by fertilization. Mowing should begin adjacent to runways and finish in the infield or outer-most grass areas. This will cause prey and other animals to move away from active runways, thus minimizing the potential for a wildlife/aircraft strike during take-off or landing. Grass should be cut before it goes to seed to discourage seed eating birds.

FEB 08 2013

B. CONTROLLING BROAD-LEAFED WEEDS. Keep broad-leafed weeds to a minimum on the airfield. Apply herbicides as necessary for control. Broad-leafed weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Obtain assistance in herbicide selection for weed control, appropriate grass seed selection, fertilization, and erosion control from the Navy Biologist.

C. PLANTING BARE AREAS. Eliminate bare areas on the airfield. Plant grass as necessary and appropriate to maintain ground cover at 7 inches to 14 inches in height.

D. FERTILIZING. Selectively stimulate grass growth to promote a uniform cover at 7 inches to 14 inches in height. Irrigation may be required to support turf growth.

E. REMOVING EDGE EFFECT. Maintain the airfield as uniformly as possible to reduce the transition zone between two distinct habitat types (e.g., brush to grassland).

F. LEVELING OF AIRFIELD. Level or fill high or low spots to reduce attractiveness to birds and prevent standing water.

G. REMOVING DEAD VEGETATION. As soon as possible, remove dead vegetation such as brush piles, and the cover it affords.

H. REMOVING BIRD AND ANIMAL CARCASSES FROM THE AIRFIELD. This is to avoid attracting scavengers that feed on them. Forward remains, which may have been caused by collision with aircraft, to the BASH Coordinator for identification.

I. PEST CONTROL. Invertebrates and rodents are key food sources for many birds. Periodically survey and reduce these pests when required. Pesticides and traps can reduce pest populations. Only Armed Forces Pest Management Board (AFPMB) approved pesticides are authorized and must be used strictly according to label instructions.

J. MAINTAINING DRAINAGE DITCHES. Regularly inspect ditches to keep them clear. Maintain ditch sides as steeply as possible (minimum slope ratio of 5 to 1) to discourage wading birds and emergent vegetation. Improve drainage as necessary to inhibit even temporary ponds or puddles. When able, cover ditches with netting/plastic fencing.

K. EMPLOYING EROSION CONTROL VEGETATION. Use vegetation that is appropriate for the region and does not produce seeds at heights below 14 to 18 inches.

L. ELIMINATE ROOSTING SITES. Control roosts by vegetation management of roost sites where possible. Prune trees to reduce the number of perches if necessary.

M. BIRD PROOF BUILDINGS, HANGARS, AND STRUCTURES. Often, bird proofing of buildings and hangars is required to exclude Pigeons, Sparrows, and Swallows. Excluding birds from a structure they currently utilize will often displace them to an adjacent structure. Existing birds should be removed prior to the exclusion effort whenever possible. Denying access by

FEB 08 2013

screening windows, closing doors, and blocking entry holes is most effective. When necessary consider:

1. Toxic perches may be installed where maximum numbers of birds will contact them. Ensure perches are maintained with avicides to remain effective.
2. Pellet guns may be used as a short-term solution only. Use of lethal controls will be performed by authorized personnel only. Proper safety equipment and skilled personnel are required.
3. Netting may be installed under superstructure to exclude birds from roosting areas.
4. Avitrol, a pest management tool, may be placed in or near hangars to remove birds or to create a distressed response that scares other birds.
5. Trapping and removal. A large cage with food and water may be used to trap birds. If used, release birds away from buildings or depredate if permitted by law.
6. Sharp projections may be used in limited areas such as ledges and overhands, or small places where birds cannot be allowed. However, they are too expensive for large areas.
7. Night harassment. High-pressure air or water may be used to make hangars an undesirable roosting site. Persistence is the key.

309. **MANAGING OFF-BASE LAND USE.** The Navy cannot control off-base land use; however, when a proposed land use may increase or alter bird populations and habits (i.e., landfills, new crops, etc.), Navy concerns should be addressed at public hearings and zoning meetings. The Community Plans and Liaison Officer, USDA Biologist, and Public Works shall monitor off-base land use and report findings to the BWG.



NASCCINST 3750.16A

FEB 00 2013

This page intentionally left blank.

## CHAPTER 4

### AIRCREW PROCEDURES

#### 401. FLIGHT PLANNING.

A. Check FLIP AP/1 (Supplementary Aerodrome Remarks) and NOTAMS for information about permanent and seasonal bird problems at both departure and destination airports and on route of flight.

B. Check local NOTAMS and flight planning displays for BHC and BASH Windows in effect.

C. Consult with the Tenant Command/Operations Duty Officer for additional BASH information.

D. Brief all crewmembers on potential bird problems.

E. Discuss emergency procedures before departure, including aborts following a strike and engine failure.

F. Discuss procedures for cockpit lost communications, including change of aircraft control.

G. If applicable, use of day/night visor is recommended.

#### 402. AERODROME PROCEDURES.

A. Prior to taxi, consult the ATIS broadcast for current BHC.

B. When taxiing, watch for birds on or around the airfield. The most frequently struck birds (Meadow Lark) have a brown or black coloring on their back and yellow undercoat making them hard to see on the tarmac or concrete. Flocking birds may be partially hidden in grass areas. Look for raptors circling overhead, perched in trees, tall bushes and on airfield structures. Report bird sightings to the Tower immediately.

C. Birds on the ground face into the wind and may not see or hear you coming. They may take flight just prior to you reaching them.

D. If birds are observed, notify the Tower and request that the BASH Coordinator disperse them before takeoff if they are in a location that presents a potential danger to you or other aircraft.

E. Use landing lights as appropriate. Although there is no conclusive evidence that birds see and avoid aircraft lights, it will make the aircraft more visible.

F. Travel as much as possible above the bird layer. Subject to Course Rules/ATC instructions minimize time spent below 2000 feet AGL.

G. If dense bird concentrations are expected, consider avoiding high-speed descent and approach. Reducing speed can significantly reduce impact energy. The force of impact is roughly proportional to the square of the aircraft speed.

H. If flocks are encountered during approach, consider going around for a second attempt, the approach area may then be clear.

I. When able, descend and climb-out in a straight line. This makes it easier for the birds to anticipate your flight path and thus get out of your way.

J. Consider avoiding flying one hour before and after dawn and dusk to the maximum extent practical.

403. **LOW LEVEL ROUTES.** All flights should avoid those segments that are under BHC Severe based on migration patterns or Weather Radar reports. Low-level hazard guidance is available via the Avian Hazard Advisory System (AHAS, <http://www.usahas.com/>) and the Bird Avoidance Model (BAM, <http://www.usahas.com/bam/>). Guidance for aircrew actions when the risk from birds is indicated as SEVERE is contained in amplifying squadron instructions. Each squadron duty office should maintain a copy of this data. The following, for briefing purposes, are some general operational recommendations to reduce threats from bird strikes:

A. When practical, reduce low-level flight time. 99% of all bird strikes occur below 2300 feet AGL.

B. Reduce formation flying. The first aircraft can redirect birds into trailing aircraft.

C. Reduced airspeeds will allow birds to be seen sooner and lessen damage in event of a strike.

404. **ACTIONS FOLLOWING A BIRD STRIKE.**

A. If airborne, complete the damaged aircraft checklist, as applicable, per specific NATOPS procedures.

B. During a takeoff or planned touch and go, the pilot at the controls/instructor should assess the option of aborting if a bird strike occurs, and if runway remaining is available to stop. Bird strike damage cannot be accurately assessed in flight and may result in a complex airborne emergency. Only maintenance personnel on the ground can make damage assessments. Several bird strikes that appeared to cause minor damage have proven to be much more substantial and, had aircrews continued the mission, a serious emergency could have resulted. Structural damage, such as a dent in the wing, has led to fuel and hydraulic system failure. Birds lodged in landing gear have prevented gear extension.

C. Aircrew experiencing en route bird strikes should abort the mission when possible.

D. After landing, if you suspect or have had a strike, check the aircraft for damage. Any remains (blood, feathers, etc.) shall be collected by aircrew/maintenance personnel and forwarded to the BASH Coordinator.

405. **BIRD STRIKE REPORTING PROCEDURES.** Per OPNAVINST 3750.6R, reporting wildlife/aircraft strikes is an essential requirement of a successful BASH program. Aircrew and maintenance personnel at the squadron level, as well as

Flight Support and Crash Crew personnel are required to report wildlife/aircraft strikes and collect wildlife remains, if possible. The following procedures outline how personnel should report a wildlife/aircraft strike.

A. If airborne, inform Control Tower and complete emergency landing, if required. Notify Tower even in the case of a probable strike. Notify the Tenant Command/Operations Duty Officer of the wildlife/aircraft strike, as soon as practical.

B. After post-flight inspection, preserve any remains (however slight) and place in a clear plastic bag. Forward the bag with bird remains to the Squadron Safety Officer.

C. Report strikes to Tower and Tenant Command/Operations Duty Officer even if no bird remains are found on the aircraft; Flight Support personnel may be able to retrieve the bird on the airfield.

D. Squadron Safety Officers shall follow up local reporting by entering an online BASH report in WEISS via the Naval Safety Center web site [www.safetycenter.navy.mil](http://www.safetycenter.navy.mil). Both damaging and non-damaging strikes are required to be reported.

E. All wildlife remains collected for identification must be reported to the appropriate Federal and State agencies. All collected avian species covered under the Migratory Bird Treaty Act must be reported through the station's U.S. Fish & Wildlife Service Depredation/Salvage permit. All station permitting requirements will be performed by the USDA Biologist.

F. Aircrews must also report near misses that involve evasive action or whenever the proximity of the miss is "too close for comfort" to their Squadron Safety Officers, who shall enter the report as a "near miss" online as stated above.

406. COLLECTING WILDLIFE REMAINS. It is necessary to know which wildlife species are problematic so that appropriate risk management measures can be implemented. Therefore, positive identification of the wildlife species is essential. All wildlife remains, either discovered on an aircraft or the airfield, are required to be collected. The following guidelines are provided for wildlife/aircraft strike remains collection and identification.

A. Remove wildlife remains from the aircraft or the airfield, and place in a clear plastic bag, even if it's a moistened towel used to wipe off the blood smear. It does not take much (remains) to identify the bird species.

B. Attach a sheet of paper with the location wildlife was collected, time, and aircraft side number if known to the bag.

C. Collect both damaging and non-damaging wildlife/aircraft strike remains from aircraft.

D. Forward the bag with bird remains to the BASH Coordinator at Hangar 58, Rm. 217.

FEB 08 2013

407. OPERATIONAL LIMITS AND GO/NO-GO CRITERIA. Upon notification that BHC SEVERE, MODERATE, or LOW is set, procedures and restrictions for conducting Flight Operations at the airfield shall be in accordance with Tenant Command SOP.

FEB 08 2013

This page intentionally left blank.

FEB 08 2013

## CHAPTER 5

## LOCAL BIRD SPECIES

501. GENERAL. The following is a summary of birds within the airfield environment. Associated with each is a brief description of how they can be controlled or avoided. Each control measure will require action by one or more tasked organizations as described in Chapter 2. It is very important to know which avian species or airfield attractants are present before control techniques can be effectively applied.

502. NAS CORPUS CHRISTI/NOLF WALDRON, AND CABANISS ANIMAL HAZARDS.

## A. AVIAN SPECIES.

1. Gulls. These birds represent the most significant hazard to aircraft at airports worldwide. Due to their omnivorous feeding habits and preference for flat, open areas to rest, they are commonly found on this airfield. Gulls are most active just after sunrise and before sunset as they move to and from feeding areas. Maintenance of grass height between 7 and 14 inches is critical in reduction of gull numbers. Even with this in effect, gulls may inhabit the airfield, particularly during inclement weather. Persistent harassment using pyrotechnics and bioacoustics is necessary to discourage these birds. Other techniques such as gas cannons, model gulls, radio-controlled model aircraft and even falconry should be considered if available and cost-effective. Poisoning of earthworms and insects (especially grasshoppers) may be accomplished if these invertebrates are found to attract gulls. Do not allow these birds to establish a habit of using the airfield to feed, breed, or rest.

2. Waterfowl (ducks, geese, swans). A distinction must be made between resident and migrating populations. Resident waterfowl are attracted to an area to breed or feed. Ponds, lakes, drainage ditches, etc., may attract these birds, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Steepening ditch and pond banks and removing vegetation will reduce waterfowl numbers. When possible, drainage of water sources should be accomplished. Grain fields may also attract waterfowl in large numbers and should be eliminated. Pyrotechnics, gas cannons, and effigies are all excellent control techniques. Use of live ammunition or opening base areas to waterfowl hunting may also be used for control. Resident birds are most active at dawn and dusk, moving at low altitudes to and from feeding areas. Avoid flying near wildlife refuges, or any ponds, lakes or rivers with known waterfowl concentrations during these times. Migrating waterfowl are particularly dangerous to flight safety due to the large numbers and generally higher altitude of the birds. Large flocks of waterfowl travel along traditional flyways to their breeding and wintering grounds during spring and fall. Huge flocks may stop along the route awaiting favorable weather conditions to continue. Migrating birds are most active from sunset through midnight, with numbers decreasing in the early morning hours. September through February is most hazardous. Avoidance of flying during the evening hours is generally safest. Wintering concentration areas should be avoided.

3. Long-legged Waders (Herons and Egrets). Most of these species are attracted to water where they feed on fish, amphibians, reptiles, and

FEB 08 2013

arthropods. Control is best accomplished by eliminating the food sources. Steepening the sides of ditches and ponds and removing emergent vegetation will drastically reduce accessibility to food sources. Pyrotechnics should be used to disperse any birds that do not disperse after habitat modification.

4. Raptors (Hawks, Falcons, Kites, Eagles, Vultures). These birds can be particularly hazardous to aircraft because of their size and widespread distribution over bases and low-level areas. Raptors (particularly vultures) use thermals to their advantage to search for prey. These birds become active during mid-morning and remain aloft until late afternoon. Avoid areas with thermal-generating terrain such as ridgelines, rolling hills, water. Landfills are particularly attractive to soaring vultures. In the fall, raptors migrate by day to areas of heavy winter concentrations in the southern states. These birds can be controlled by removal of dead animals and removal of dead trees and other perching sites on the airfield. Pyrotechnics may be used to frighten raptors from the airfield.

5. Wild Turkey, Quail, and Pheasants. These game birds are most effectively controlled through proper grass-height management. Do not allow grass to exceed 18 inches and eliminate all weeds and brush patches on the airfields, particularly if the plants are seed producing. Pyrotechnics, gas cannons, live ammunition or periodic hunts can effectively disperse these birds. The depredation of these birds outside the normal hunting season requires special permits from the State Fish & Game Agency.

6. Sandpipers/Shorebirds. The most significant hazard from these birds occurs when large numbers flock in tight groups, particularly during migration and along coastlines. Many of these species such as Sanderlings and Dunlins may nest on airfields in the Fall and Winter. To control these birds, proper grass height management must be observed. Water in puddles should be eliminated and ditch banks steepened to limit access to these birds. Other species such as Killdeer are quite adept at avoiding aircraft. Pyrotechnics and bioacoustics can be used for all species and some respond well to falconry.

7. Terns. These are fish eating, gull-like birds in coastal areas and on some major river systems and lakes. Avoid flying near areas where these birds may be active, such as nesting colonies or piers in coastal areas. Remove the food source if these birds pose a significant hazard.

8. Owls. Most owls are nocturnal and attracted to rodents as a food source. Rodent control may be necessary on the airfield. Limit the number of perch sites by removing perch sites such as unnecessary fence posts and dead trees. Avoid over-flying landfills at night to reduce hazards from owls.

9. Goatsuckers (Nighthawks), Whippoorwills, etc. These birds are active particularly at sunset when insects are abundant. Little can be done to limit their number other than insect control. Avoid flying at times when these birds are abundant, particularly near lakes, streams, or other areas with large insect populations.



FEB 08 2013

10. Woodpeckers. Woodpecker strikes should be extremely rare. These birds are common in forested areas, but generally remain below canopy level. On the airfield, elimination of trees should eliminate strikes with these birds. Migratory birds may be encountered, but are rarely struck.

11. Flycatchers. These birds are present on airfields to feed on insects. Strikes are infrequent, but should not be overlooked. Control is best accomplished by control of insects and removal of perch sites such as fence posts, tree limbs, bushes, high spots on the field, etc.

12. Horned Larks. These birds are very difficult to control. They are attracted by bare spots such as along runway sides, where they eat weed seeds and insects. The best defense against these birds is a thick, uniform grass with no bare spots. Consider coating bare spots, particularly along runways, with oil-base or asphalt cover. Pyrotechnics can be used, but these birds will tend to fly only short distances and settle down. Persistence is the key to success with this species.

13. Swallows and Swifts. These birds eat insects in flight and are commonly found above airfields. Insect control will reduce Swallow numbers and discouragement of nesting will further decrease numbers. Remove mud nest from hangars, etc., with a hose as the birds begin nesting and when nesting is complete. Nesting in hangars can be discouraged by harassing the birds as they work on building. If Swallows are noted resting on runways or taxiways, use pyrotechnics to disperse them. Nest removal from hangars shall be coordinated with the Environmental Division of Public Works. Nest removal is covered by a permit with the U.S. Fish & Wildlife Service.

14. Crows and Ravens. These omnivorous birds are common in open areas and around landfills and solid waste transfer stations. These birds may occur in large flocks particularly at sunset as they return to roost sites. Proper grass-height management will reduce population numbers. Remove any known roost sites or thin individual roost trees. Landfills and transfer stations must be operated in a manner to discourage these birds. Bioacoustics, pyrotechnics, and lethal methods can be used to frighten and remove these birds if they occur on the airfield.

15. Blackbirds, Grackles, Cowbirds, and Starlings. These birds can be particularly hazardous because they frequently occur in huge flocks, sometimes in the millions. Blackbirds and Starlings are attracted to flat, open areas to feed, rest, or stage/pre-roost. Maintenance of grass height between 7 and 14 inches is the best method of reducing airfield Blackbird and Starling numbers. Blackbirds and Starlings respond well to an intense frightening program using bioacoustics, pyrotechnics, and lethal methods. Other methods should be used to supplement this program as necessary. Starlings are not federally protected and may be removed without permits. Permits are required for other species. Occasional shooting of birds will reinforce other frightening techniques. Poisoning or trapping may also be considered with USDA Wildlife Service assistance. If these birds occur in hangars, toxic bird perches are recommended to eliminate the problem. Avoid at all costs flying near known Blackbird and Starling roosts, especially at sunrise and sunset and during spring and fall migration.

16. Meadowlarks. These birds occur on nearly every airfield and are attracted to grasslands and low weeds. Eliminate broad-leafed weeds and

maintain grass height at 7-14 inches. Elimination of suitable perching sites, such as fence posts and brush will also aid in population reduction. Pyrotechnics can be used, but Meadowlarks usually only fly a short distance before settling down again. Persistence is the key to success.

17. House Sparrows. These birds are not frequently struck by aircraft, but are common pests around structures. House Sparrows often nest in hangars, dense shrubs, and trees. These birds are not protected by law and may be destroyed without permit. Toxic bird perches may be used to remove house sparrow from hangars or other structures. Frightening techniques are usually ineffective against these birds.

B. MAMMALIAN SPECIES. While concern is mostly centered on birds, several mammalian species also pose threats to flight operations and must be considered. Close coordination with the station Integrated Natural Resources Management Plan is necessary to reduce this type of hazard.

1. Coyotes. These animals are attracted to airfields by rodents, rabbits and other food sources. Dens may be found in banks, culverts, or other suitable areas. Rodent control will reduce the numbers of these animals. Pyrotechnics can be used to frighten these species and occasional shooting and trapping of individual animals or recurrent pests will also reduce the hazard.

2. Rabbits. In addition to direct hazards to aircraft these animals often attract raptors. Proper grass management will reduce the numbers of these animals on airfields. Poisoning can also be effective for reduction of populations.

3. Rodents. These animals attract raptors. Control by maintaining a uniform turf at the proper heights. Rodenticides may be used in some cases.

4. Deer. This mammalian species poses the greatest threat to aircraft due to its size and preferred nocturnal activities. Control techniques include modifying perimeter fences to become animal proof and selected shooting of problem individuals. Permits are required from the State Fish & Game Agency.

5. Javelina. This mammalian species poses the greatest threat to aircraft due to its size and preferred nocturnal activities. Control techniques include modifying perimeter fences to become animal proof and selected shooting of problem individuals. Permits are required from the State Fish & Game Agency.

6. Feral Pig. This mammalian species poses the greatest threat to aircraft due to its size and preferred nocturnal activities. Control techniques include modifying perimeter fences to become animal proof and selected shooting of problem individuals.

## APPENDIX A

### BASH Self-Assessment Checklist

#### PLANS AND INSTRUCTIONS

1. Does the Facility have a Current BASH Instruction/Plan within the past 5 years?
2. Is the BASH Plan referenced in the Facility Integrated Natural Resources Management Plan (INRMP)?
3. Does the Facility Pest Management Plan reference the BASH Plan?
4. Does the Facility BASH Instruction establish a Facility Bird Hazard Working Group (BHWG)?
5. Does this BHWG meet on a regular basis?
6. Are Facility departments including Aviation Safety, Public Works, Environmental, Security and Air Operations involved in the BHWG?
7. Is the Commanding Officer or Training Wing Commodore or their representative(s) involved in the BHWG?

#### REPORTING

8. Are both damaging and non-damaging wildlife strikes reported to the Naval Safety Center's WESS System:  
<http://www.safetycenter.navy.mil/wess/default.htm>
9. Is the process in place and is it mandatory that ALL wildlife strike remains are collected and turned in to the Smithsonian Institution for positive species identification?
10. Is wildlife strike data tracked by the Facility and analyzed for trend analysis and management recommendations?
11. Does the Dispersal Team or USDA Wildlife Service biologist assist squadrons with the collection of wildlife strike remains and do they have the proper equipment for remains removal and collection?
12. Does the Facility have a recent strike reporting dataset from the Naval Safety Center and the Smithsonian Institution for the facility itself and tenant squadrons?

#### SURVEYS

13. Has a Wildlife Hazard Assessment or similar survey been conducted for the Facility?

FEB 08 2013

14. Are wildlife surveys conducted on the airfield and adjacent areas to observe potential and actual wildlife hazards?
15. Have wetland areas, seasonal ponding areas, and food sources for wildlife been evaluated for management strategies to reduce attractiveness to wildlife?
16. Have hangars, airfield buildings and airfield equipment been inspected for nesting birds and documented with the Airfield Manager for necessary removal or deterrent actions?
17. Is there a current bird control and nest removal program for the hangars and airfield buildings? If so, is there documentation to show where nests have been removed and how many?
18. Do bird droppings cause problems for equipment, aircraft, and personnel?
19. Are hangar doors kept closed to limit access of birds and wildlife?
20. Are there habitats within the AOA that are particularly attractive to wildlife that should be managed?
21. Is the airfield grass being managed at a height to discourage local and seasonal problem wildlife? Are the grass height protocols defined in the BASH Plan?
22. Are there manmade areas near the runways that attract wildlife (golf courses, recreation areas, horse stables, storm water retention ponds, drainage ditches, landfills, and transfer stations, etc.)?

#### COMMUNICATIONS

23. Do Control Tower personnel relay wildlife hazard information received from ground personnel to pilots within the local area?
24. Do the control tower issue Bird Hazard Conditions via the Automated Terminal Information System (ATIS)?
25. Is the BASH program presented in the Airfield Vehicle Operators Indoctrination Course (AVOIC)?
26. Does the AVOIC encourage everyone within the AOA to report wildlife hazards to the tower?
27. Does the AVOIC promote the recovery of all wildlife remains found on the runway surfaces?
28. Do all ATC personnel have a good understanding of the current BASH Plan?
29. Does anyone from the Facility attend the annual BASH USA Conference?

30. Are posters, pictures, maps, etc. related to the BASH Program posted in aircrew spaces, safety bulletin boards, and base operations/flight planning?

#### NATURAL RESOURCES MANAGEMENT

31. Does the facility have agricultural outleases within the AOA?

32. Are these agricultural leases managed to reduce BASH potential?

33. Have agricultural practices within the airfield environment and public agricultural lands adjacent to the airfield been evaluated for wildlife attractants?

34. Are trees and shrubs located within the Primary Surface and Clear Zones of the runways that are attractants to wildlife and should be removed?

35. Is there a hunting program on the facility within the AOA?

36. Does this hunting program support the BASH Program?

37. Has there been an effort to identify BASH attractants on lands adjacent to the Facility?

38. Is there a cooperative agreement with adjacent landowners to decrease the BASH potential on the Facility?

39. Are Federal or State listed plants or wildlife found within the AOA?

40. If so, are these species an issue with the management of the BASH Program?

41. Are there any proposed or planned natural resources programs or projects within the AOA that would increase the risk of a BASH event?

42. Are there any proposed MILCON or other construction projects within the AOA that would cause the increased risk of a BASH event?

#### WILDLIFE CONTROL

43. Does the Installation have a Bird Detection and Dispersal Team (BDDT) patrolling the aerodrome?

44. Is this BDDT active on a daily or on an On-Call basis?

45. Is the BDDT equipped with harassment and lethal control equipment?

46. Is a USDA Wildlife Service Biologist or technician present on the facility?

47. If so, has this person received the USDA WS Airport Certification training?

FEB 08 2013

48. Does the USDA/WS person participate in the BHWG?
49. Does the USDA/WS person participate in Wing or Squadron Safety Stand downs?
50. Does this team control and maintain bird dispersal equipment?
51. Does the facility have a current Depredation and Salvage Permit from the US Fish and Wildlife Service and associated State Wildlife agencies?
52. Does the Facility have any other Wildlife related permits supporting the BASH Program?

FEB 08 2013

This page intentionally left blank.



**Permit Number: MB122529-0**  
Effective: 04/10/2019 Expires: 03/31/2020

Issuing Office:

Department of the Interior  
U.S. FISH AND WILDLIFE SERVICE  
Migratory Bird Permit Office  
P.O. Box 709  
Albuquerque, NM 87103  
Tel: 505-248-7882 Fax: 505-248-7885

ADMINISTRATOR, MIGRATORY BIRD PERMIT OFFICE - REGION 2

Permittee:

**U S NAVAL AIR STATION - CORPUS CHRISTI**  
**11001 D STREET, SUITE 101**  
**CORPUS CHRISTI, TX 78419-5032**  
**U.S.A.**

Name and Title of Principal Officer:

PHILIP M BROCK, CAPT - COMMANDING OFFICER OF NAS CORPUS CHRISTI

Authority: Statutes and Regulations: 16 USC 703-712; 50 CFR Part 13, 50 CFR 21.41.

Location where authorized activity may be conducted:

NAS CORPUS CHRISTI & NAVAL AUXILIARY FIELDS AT WALDRON & CABANISS & GOLIAD  
NUECES COUNTY & GOLIAD COUNTY  
CORPUS CHRISTI TX & GOLIAD, TX

Reporting requirements:

**ANNUAL REPORT DUE: 04/10**

**You must submit a report to your Regional Migratory Bird Permit Office, even if you had no activity. Report form is at: [www.fws.gov/forms/3-202-9.pdf](http://www.fws.gov/forms/3-202-9.pdf).**

Authorizations and Conditions:

- A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.
- B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.
- C. Valid for use by permittee named above: **US NAVAL AIRSTATION - CORPUS CHRISTI.**
- D. You are authorized to take, temporarily possess, and transport the migratory birds specified below to relieve or prevent injurious situations impacting public safety. All take must be done as part of an integrated wildlife damage management program that emphasizes nonlethal management techniques. You may not use this authority for situations in which migratory birds are merely causing a nuisance.

(1) The following may be lethally taken in accordance with Title 50 Code of Federal Regulations (CFR) part 21.41, no more than: **(1,000 migratory birds**, in addition to those covered by applicable Depredation Orders in CFR part 21, excluding endangered/threatened species and eagles & raptors (hawks, owls, caracaras). Within the 1,000 migratory birds, **only (10) individuals of each species from BCR 21, 36 & 37, listed below, may be taken.**

ALTAMIRA ORIOLE	HOODED ORIOLE	SANDWICH TERN
AMERICAN BITTERN	HUDSONIAN GODWIT	SCISSOR-TAILED FLYCATCHER
AMERICAN OYSTERCATCHER	LARK BUNTING	SEASIDE SPARROW
AUDUBON'S ORIOLE	LE CONTE'S SPARROW	SEDGE WREN





**Permit Number: MB122529-0**  
Effective: 04/10/2019 Expires: 03/31/2020

**US NAVAL AIRSTATION - CORPUS CHRISTI**

Continued from page one.

AUDUBON'S SHEARWATER	LEAST BITTERN	SHORT-BILLED DOWITCHER
BAND-RUMPED STORM-PETREL	LEAST TERN	SHORT-EARED OWL
BELL'S VIREO	LESSER YELLOWLEGS	SMITH'S LONGSPUR
BLACK RAIL	LITTLE BLUE HERON	SNOWY PLOVER
BLACK SKIMMER	LOGGERHEAD SHRIKE	SOLITARY SANDPIPER
BOTTERI'S SPARROW	LONG-BILLED CURLEW	SPRAGUE'S PIPIT
BUFF-BELLIED HUMMINGBIRD	MARbled GODWIT	SUMMER Tanager
BUFF-BREASTED SANDPIPER	MOUNTAIN PLOVER	SWAINSON'S HAWK
CASSIN'S SPARROW	NELSON'S SHARP-TAILED SPARROW	SWAINSON'S WARBLER
CHESTNUT-COLLARED LONGSPUR	NORTHERN BEARDLESS-TYRANNULET	SWALLOW-TAILED KITE
CURVE-BILLED THRASHER	ORCHARD ORIOLE	TROPICAL PARULA
DICKCISSEL	PAINTED BUNTING	UPLAND SANDPIPER
ELF OWL	PEREGRINE FALCON	VARIED BUNTING
GRASSHOPPER SPARROW	PROTHONOTARY WARBLER	VERDIN
GREEN PARAKEET	RED-BILLED PIGEON	WHIMBREL
GULL-BILLED TERN	RED-CROWNED PARROT	WHITE-COLLARED SEEDEATER
HARRIS' SPARROW	REDDISH EGRET	WHITE-TAILED HAWK
HARRIS'S HAWK	RED-HEADED WOODPECKER	WILSON'S PLOVER
HENSLOW'S SPARROW	ROSE-THROATED BECARD	YELLOW RAIL
	RED KNOT	

Authorized to lethally take for health and human safety at airports: no more than (1) **DOUBLE-CRESTED CORMORANT** between the dates [4/1/2019 - 12/31/2019], and no more than (1) **DOUBLE-CRESTED CORMORANT** at airports between the dates [1/1/2020 - 3/31/2020].

(2) The following may be live-trapped and relocated: **Raptors (including vultures), excluding Threatened & Endangered species and eagles.**

E. You are authorized in emergency situations only to take, trap, or relocate any migratory birds, nests and eggs, including species that are not listed in Condition D (except bald eagles, golden eagles, or endangered or threatened species) when the migratory birds, nests, or eggs are posing a direct threat to human safety. A direct threat to human safety is one which involves a threat of serious bodily injury or a risk to human life.

You must report any emergency take activity to your migratory bird permit issuing office at **(505) 248-7882** or **PermitsR2MB@fws.gov** within 72 hours after the emergency take action. Your report must include the species and number of birds taken, method, and a complete description of the circumstances warranting the emergency action.

F. You are authorized to salvage and temporarily possess migratory birds found dead or taken under this permit for (1) disposal, (2) transfer to the U.S. Department of Agriculture, (3) diagnostic purposes, (4) purposes of training airport personnel, (5) donation to a public scientific or educational institution as defined in 50 CFR 10.12, (6) donation to persons authorized by permit or regulation to possess them, or (7) donation of migratory game birds only to a public charity (those suitable for human consumption). Any dead bald eagles or golden eagles salvaged must be reported within 48 hours to the National Eagle Repository at (303) 287-2110 and to the migratory bird permit issuing office at **(505) 248-7882** or **PermitsR2MB@fws.gov**. The Repository will provide directions for shipment of these specimens.

G. You may not salvage and must immediately report to U.S. Fish and Wildlife Service Office of Law Enforcement any dead or injured migratory birds that you encounter that appear to have been poisoned, shot, electrocuted, have collided with industrial power generation equipment, or were otherwise killed or injured as the result of potential criminal activity. See USFWS OLE contact information below.



**Permit Number: MB122529-0**  
Effective: 04/10/2019 Expires: 03/31/2020

---

#### US NAVAL AIRSTATION - CORPUS CHRISTI

H. You may use the following methods of take: (1) firearms; (2) nets; (3) falconry abatement; and (4) legal lethal and live traps. Birds caught live may be euthanized or transported and relocated to another site approved by the appropriate State wildlife agency, if required. When using firearms, you may use rifles or air rifles to shoot any bird when you determine that the use of a shotgun is inadequate to resolve the injurious situation. The use of any of the above techniques is at your discretion for each situation.

Pole traps may be used to capture raptors only when all other reasonable and appropriate methods of deterrence and management prove ineffective. Pole traps employed between sunrise and sunset must be checked at least every 2 hours. Pole traps employed between sunset and sunrise must be checked at least once during the night. Pole traps must be closed down during inclement weather (e.g., precipitation or extreme temperatures) unless they are monitored continuously. Birds captured using pole traps must be relocated a distance sufficient to minimize potential for return to the capture site (preferably at least 100 miles away), except as otherwise authorized by your migratory bird permit issuing office. If injured, the bird must be transferred immediately to a federally permitted migratory bird rehabilitator or licensed veterinarian for care at the permittee's expense.

Anyone who takes migratory birds under the authority of this permit must follow the American Veterinary Medical Association Guidelines on Euthanasia when euthanization of a bird is necessary ([http://www.avma.org/issues/animal\\_welfare/euthanasia.pdf](http://www.avma.org/issues/animal_welfare/euthanasia.pdf).)

I. You may temporarily possess and stabilize sick and injured migratory birds and immediately transport them to a federally licensed rehabilitator for care.

J. The following subpermittee is authorized: **USDA APHIS Wildlife Services**. In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

K. You and any subpermittee(s) must comply with the attached Standard Conditions for Migratory Bird Depredation Permits. **These standard conditions are a continuation of your permit conditions and must remain with your permit.**

**For suspected illegal activity, immediately contact USFWS Law Enforcement at:** Regional Office - Albuquerque, New Mexico - 505-248-7889

END.

# **APPENDIX C**

## **Wildlife Hazard Management Plan**

This page intentionally left blank.

# NAS CORPUS CHRISTI BASH PROGRAM

## WILDLIFE HAZARD MANAGEMENT PLAN



## 1. Introduction

a. This Wildlife Hazard Management Plan (WHMP) is the source document for Naval Air Station Corpus Christi's (NASCC), to include outlying landing fields Waldron (KNWL), Cabaniss (KNGW), and Goliad (KNGT), Integrated Wildlife Damage Management (IWDM) strategy and requirements. This document was developed by the NASCC Bird/Animal Aircraft Strike Hazard (BASH) Working Group (BWG) and is approved by the Commanding Officer (CO). Accordingly, any deviation from the plan expressed herein must be sanctioned by the BWG and briefed to the CO. The WHMP provides the final BASH program component combining the local BASH program concept of operations NASCCINST 3750.16B and wildlife hazards identified in the Wildlife Hazard Assessment (WHA) with specific IWDM actions to mitigate, control, remove, or depredate these hazards to local airfield operations. The WHMP infuses risk management into resource planning by identifying habitat modification techniques and wildlife management actions for priority funding which will provide the greatest improvement to aviation safety.

b. IWDM actions, addressed below, will be managed by the Air Operations Officer and the BWG, and updated annually. [Paragraph 6 addresses Airfield Environment Management (AEM) which provides airfield habitat management procedures and requirements for each of the categories as detailed in FAA Advisory Circular 150/5200-33b. It prioritizes grounds maintenance and pest management funding by segregating the airfield operating area into BASH Mitigation Zones (BMZ). Paragraph 7 addresses Wildlife Management (WM). It prioritizes identified wildlife hazards by risk severity and provides specific actions to manage their presence or removal from the airfield.]

## 2. BWG Members

- 2.1 Air Operations Officer (Chairman)
- 2.2 Assistant Air Operations Officer
- 2.3 Aviation Safety Officer
- 2.4 Airfield Manager
- 2.5 Deputy Airfield Manager
- 2.6 USDA-WS BASH Coordinator
- 2.7 USDA-WS BASH Technician
- 2.8 Community Planning and Liaison Officer (CPLO)
- 2.9 Air Traffic Control Facilities Officer (ATCFO)
- 2.10 Natural Resources Manager
- 2.11 Deputy Public Works Officer

2.12 Airfield Services WDDT Lead

2.13 Training Air Wing 4 (TW-4) Aviation Safety Officer

2.14 TW-4 Ground Safety Officer

2.15 Tennant Command Safety Representatives

3. Requirements. A WHMP integrates the local WHA, Integrated Natural Resources Management Plan (INRMP), Integrated Pest Management Plan (IPMP), AEM, WM and OPNAVINST 3750.6S Safety Management System (SMS) principles into a cohesive strategy to mitigate aviation safety risks posed by wildlife hazards to local airfield operations.

a. Federal permits

Federal Fish and Wildlife Depredation Permit, kept at Natural Resources Management Branch. They are required for the lethal removal of migratory birds.

Renewal of the permit involves the USDA Biologist completing a Form 37. This describes the methods used, recommendations made and damage caused during the period covered by the permit. The USDA Biologist also includes a list of species, numbers and reason/justification that should be covered in the new permit, in order to maintain aviation safety for the new permitting period. In addition, the USDA Biologist completes a report of all species and numbers that were dispersed/harassed, lethally removed and any nests that may have been destroyed under the permit. This is all forwarded to the Natural Resources Division who reviews it and sends it, along with the additional information they provide to the permitting office.

Department of the Interior, U.S. Fish and Wildlife Service, Migratory Bird Permit Office. Federal Migratory Bird Permit for Depredation – Airports, Effective: 06/15/2018 Expires: 03/31/2019 Permit Number: MB122529-0, valid at NASCC, NGW, KNWL. Electronic copy of permit is maintained at S:\NACC\AirOps\BASH\Depredation Permits.

Department of the Interior, U.S. Fish and Wildlife Service, Migratory Bird Permit Office. Federal Migratory Bird Permit for Depredation – Airports, Effective: 01/01/2018 Expires: 12/31/2018 Permit Number: MB84359A-0, valid at KNGT. Electronic copy of permit is maintained at S:\NACC\AirOps\BASH\Depredation Permits.

Department of the Interior, U.S. Fish and Wildlife Service, Migratory Bird Permit Office. Depredation – Wildlife Services, Effective: 05/15/2018 Expires: 03/31/2019 Permit Number: MB714649-0, valid for use by USDA APHIS WILDLIFE SERVICES - TEXAS. Electronic copy of permit is maintained at S:\NACC\AirOps\BASH\Depredation Permits.

b. State permits

This depredation permit is kept with the USDA Biologist.

Permits are good for 5 years.

They allow the lethal take of state regulated game animals in this case white-tailed deer and Javelina. Permit requires annual report to be completed by the permit holder and sent to TPWD.

Renewal requires submitting necessary paperwork to the TPWD Permit Office.

Texas Parks and Wildlife Department, Permit to Kill Depredating Wildlife (Javelina & White Tailed Deer), Permit No. DEP-0414-2855, Effective: 04/22/2015 Expires: 04/21/2020. Electronic copy of permit is maintained at S:\NACC\AirOps\BASH\Depredation Permits.

c. Integration with other management plans and guidance documents.

(1) NASCC Integrated Natural Resource Management Plan (INRMP)

(2) NASCC Integrated Pest Management Plan (IPMP)

#### 4. References

(a) CNICINST 3750.1

(b) NASCCINST 3750.16B

(c) NASCC INRMP

(d) NASCC IPMP

(e) NASCC WILDLIFE HAZARD ASSESSMENT (WHA)

(f) CNIC BASH MANUAL

(g) FAA AC 150/5200 32A

(h) FAA AC 150/5200 33B

(i) FAA PART 139 CERT ALERT 16-03

(j) FAA PART 139 CERT ALERT 98-05

(k) USDA VEGETATION RECOMMENDATIONS FOR AIRPORTS

(l) WILDLIFE HAZARD MANAGEMENT AT AIRPORTS MANUAL

(m) NASCC JOINT LAND USE STUDY



## (n) NASCC STORMWATER STUDY AND ASSESSMENT

5. BASH Mitigation Zones (BMZ). (Appendices 1-4)

a. BMZ 1- Area encompassed by the runway primary surface area defined as 500 feet or 1,000 feet laterally from runway centerline for Class A and B runways respectively to include the Type I and II clear zones at the ends of the runways as defined in UFC 2-000-05N, Appendix E.

b. BMZ 2 - Area from the edge of the primary surface area out to the airfield perimeter fence. At installations with no airfield perimeter fence the Air Operations Officer and BWG will define the boundary.

c. BMZ 3 - Area from airfield perimeter fence or notional perimeter boundary to the installation perimeter fence.

d. BMZ 4 - Area from installation perimeter fence typically out to 10,000 feet but may extend out to five miles. Distance is measured from the center of the airfield.

6. Airfield Environment Mitigations (AEM)

a. In alignment with FAA Advisory Circular 150/5200-33B, the AEM defines the airfield environment mitigations, BMZ mapping and resourcing requirements below for each of the local BASH-relevant categories. Non-relevant categories marked as N/A.

## (1) Waste disposal

(a) Transfer station- The JC Elliot Landfill operates a waste transfer station near OLF Cabaniss. The transfer station is located 2000 ft to the Northwest of the APR of RWY 13 and falls within BMZ 3. USDA-WS should work closely with the CPLO to establish relations with JC Elliot Landfill administration personnel. Formal agreements should include covering of all putrid waste daily, in order to limit foraging by Vultures, Caracara, Laughing Gulls, Herring Gulls, and other scavenging birds.

(b) Fishing Boat Waste - NASCC has two fish cleaning stations located within BMZ 2. One is located near the Outdoor Recreation Adventure Center (ORAC). The second is located near the NASCC RV Park. No issues have been reported however continual monitoring for bird activity is recommended.

(c) Landfills - The JC Elliot Landfill operates near OLF Cabaniss. The landfill is located 2000 ft to the Northwest of the APR of RWY 13 and falls within BMZ 3. USDA-WS should work closely with the CPLO to establish relations with JC Elliot Landfill administration personnel. Formal agreements should include covering of all putrid waste daily, in order to limit foraging by Vultures, Caracara, Laughing Gulls, Herring Gulls, and other scavenging birds.

(d) Underwater Waste Discharge – N/A

- (e) Recycling centers - N/A
- (f) Construction and demolition disposal sites and facilities - N/A
- (g) Fly ash disposal - N/A
- (h) Composting Operation - N/A
- (i) Trash Receptacles - NASCC/OLF's – Trash receptacles located within BMZ's 1,2 and 3 at TRUAX are emptied twice a week. Patrons are encouraged to keep lids and doors closed on receptacles at all times.

## (2) Water management facilities

(a) Storm water management - NASCC encompasses over 2,800 acres, with storm water drained by a collection system that includes approximately 255,000 linear feet (lf) of storm sewers and culverts, 47,000 lf of open channels, 485 manholes, 1,166 inlets, and 46 outfalls. These areas also include a large number of industrial, commercial and administrative buildings and support structures. The balance of the facility is made up of primarily housing and recreational areas. The average imperviousness of the overall installation has been estimated at 35 percent. The facility is located on a coastal plane with little topographic relief; much of the heavily developed central portion of the base is between 11 and 14 feet above mean sea level (AMSL). This limits main branches of the storm water collection system to shallow slopes. Lower segments of some storm lines are at or below sea level.

(b) Wastewater treatment facilities - NASCC has two wastewater treatment facilities that fall within BMZ 3. The wastewater treatment facility used for NASCC is within BMZ 2 and is located roughly 1200ft from the APR of RWY 22. The second wastewater treatment facility is the Laguna Madre Wastewater Treatment facility which falls within BMZ 3 and is 1.2 miles from the APR of RWY 31L.

(c) Artificial marshes – N/A

(d) Wastewater discharge and sludge disposal – N/A

## (3) Wetlands

(a) Truax - The most recent wetland delineation for the Main Station was completed in 2004 (Turner Collie & Braden Inc. 2004). Approximately 106.1 ac (42.9 ha) of palustrine and estuarine wetlands are present at the Main Station. The USFWS National Wetlands Inventory database has identified approximately 122.9 ac (49.7 ha) of additional wetlands at the Main Station. Typical wetland types present include salt marsh, vegetated tidal flats, and freshwater marsh. Wetlands at the Main Station occur primarily along the littoral zone of Oso Bay and just inland from coastal areas as isolated depressions.

(b) Cabaniss - The most recent wetland delineation for NOLF Cabaniss was completed in 2004 (Turner Collie & Braden Inc. 2004). Approximately 28.2 ac (11.4 ha) of wetlands are present at NOLF Cabaniss. The USFWS National Wetlands Inventory database has identified approximately 30.3 ac (12.3 ha) of additional wetlands at NOLF Cabaniss. All of the wetlands at NOLF Cabaniss are associated with the floodplain areas along Oso Creek. Due to the brackish water conditions and the mixture of vegetation associated with Oso Creek, including woodland communities, a variety of wetland types occur at NOLF Cabaniss.

(c) Waldron - The most recent wetland delineation for NOLF Waldron was completed in 2004 and identified no jurisdictional wetlands at NOLF Waldron (Turner Collie & Braden Inc. 2004). The USFWS National Wetlands Inventory database has identified approximately 27.3 ac (11.0 ha) of wetlands at NOLF Waldron. Wetlands at NOLF Waldron are located primarily outside of the airfield area and occur within the Clear Zone areas located off the ends of the runways.

(d) Goliad - A wetland delineation has not been conducted at NOLF Goliad. The USFWS National Wetlands Inventory database has identified approximately 14.5 ac (5.9 ha) of wetlands at NOLF Goliad. A majority of the wetland acreage at NOLF Goliad is associated with the freshwater pond located between the two runways, although a few small pockets of wetlands are located near the runways, outside the active areas of the airfield.

(4) Dredge spoil containment areas - N/A

(5) Agricultural activities

(a) Crop production - NOLF Cabaniss includes approximately 116 ac (46.9 ha) of land leased for hay production and approximately 40 ac (16.2 ha) of land located in the Clear Zone leased for row crop production. The Navy recently designated approximately 500 ac (202 ha) of NOLF Goliad as agricultural outlease lands, that will include hay production within areas surrounding the runways at this site. Restrictions should be listed in the lease agreements to eliminate harvesting and/or cutting operations during daylight hours with the exception of weekends when no flight operations occur. Row crop selection should be reviewed by the BWG prior to approval.

(b) Livestock production - Three separate leases for grazing cattle and horses totaling 64 ac (25.9 ha) are located in the Clear Zone areas at NOLF Waldron. Occasional grazing may be authorized on out-lease parcels; however, the terms of the out-lease should require all dead livestock to be removed from the lease within 24 hours of discovery to reduce the risk of attracting scavengers such as turkey vultures to the area.

(c) Aquaculture – N/A

(d) Alternative uses of agricultural land – N/A

(6) Golf courses, landscaping and other land use areas

(a) Gravel areas and gravel roof top – NASCC/OLF areas of gravel exist primarily around buildings, along edges such as sidewalks, service roads, and construction laydown yards found within BMZ 1,2,3. None of these areas have been designated as wildlife attractants. These areas should continue to be monitored in the future to ensure they are not attracting birds to the area. Any plans for modification to these areas in the future should take BASH issues into consideration and be reviewed by the BWG.

(b) Grass maintenance – NASCC/OLF’s grass maintenance varies at each of the airfields. It is recommended that all airfields maintain grass height between 7’ to 14” within BMZ 1 and BMZ 2 using BASH PRIORITY ONE as guidelines to negotiate maintenance contracts.

(c) Herbicide and pesticide – NASCC/OLF’s herbicides are used for vegetation control within BMZ 1,2,3. Herbicides can be a valuable tool for managing vegetation however incorrect application can result in creation of wildlife hazards. Large herbicide application should be reviewed by the BWG prior to implementation.

At NASCC Pesticides are used with BMZ 1,2,3. Pesticides are commonly used on structures to control insects and rodents. Pesticides can be an effective tool in mitigating prey base on the airfield. Any large scale pesticide application should be reviewed by the BWG prior to implementation.

(d) Tree and shrub maintenance – NASCC/OLF’s tree and shrub maintenance varies at each of the airfields. The BWG should establish a standard within BMZ 1 and 2 at all airfields using BASH PRIORITY ONE as a guidance.

(e) Commercial fishing – N/A

(f) Shellfish harvesting – N/A

(7) Hunting programs - N/A

## 7. Wildlife Management

### a. Wildlife Hazard Assessment Summary

During the WHA a total of 39 different species of birds were observed at NASCC. Several of these bird species or groups are considered hazardous to aviation safety. Songbirds make up 67% of the total strikes at NASCC (2009-2012), and swallows make up the highest majority of those strikes at 20%. While swallows are the most commonly struck species, Raptors and Seabirds/Cormorants such as Turkey Vultures, Red-tailed Hawks represent the highest cost related to strikes. These two species groups made up 62% of the total cost of strikes from October 2008 – December 2012. However, these are by no means the only avian species of concern at NASCC. Numerous species of mammals were observed within the AOA at NASCC. Of these the Javelina (*Pecari angulatus*), because of their high numbers, propensity to form loose

bands from 2-25, and their size (40-50lbs) are species of concern. Recommendations were made aimed at improving strike reporting, program awareness, program management, and implementation of passive and direct control methods with a focus on problem species identified in strike data.

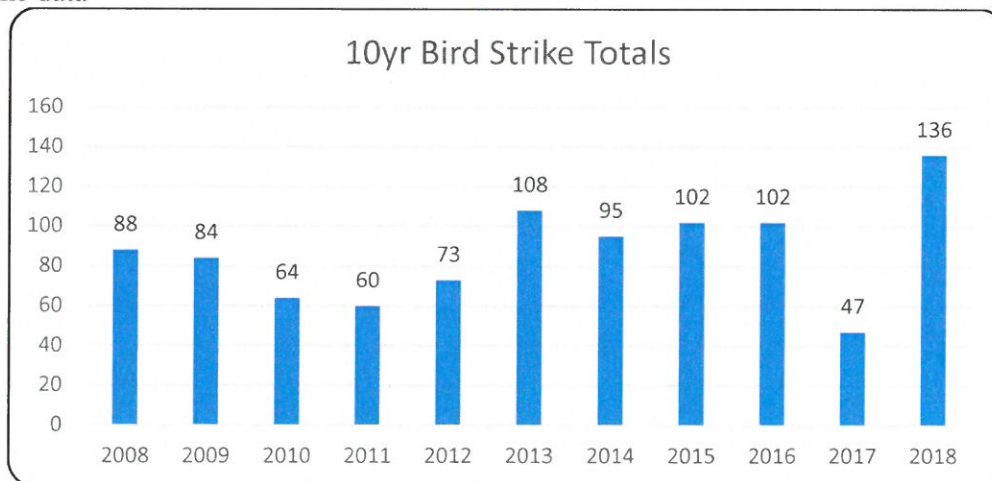
A number of hazardous wildlife species do not show up using normal Risk Assessment methods due to lack of strike incidents, however, they do pose a significant risk to aircraft operations. For that reason, some of these species will be analyzed separately.

b. Wildlife species most hazardous to aviation (*from WHA list*)

Wildlife Species Risk Assessment Oct.2008-Dec.2012			
SPECIES	HAZARD SCORE	# STRUCK	RISK SCORE
Turkey Vulture	60	7	420
Unknown Raptor	29	6	174
Black Vulture	72	5	360
Red-Tailed Hawk	43	4	172
Broad-Winged Hawk	30	3	90
Osprey	37	2	74
White-Tailed Hawk	29	2	58

Observed Hazardous Species Risk Assessment			
SPECIES	HAZARD SCORE	Probability	RISK SCORE
White-Tailed Deer	88	1	88
Javelina	(no score available)		
Coyote	22	1	22
Free Ranging Dog	71	1	71

c. Strike data



Bird strike totals based on WESS reporting system 2008-2018.

d. The BASH program at NASCC shall implement an integrated approach to wildlife damage management. To that end many strategies being implemented are designed to have mitigating effects on numerous wildlife species. Passive and direct control measures should include habitat management and daily patrols conducted by trained WDDT members that include active dispersal, exclusion, lethal control, mandatory strike/near miss reporting, regularly scheduled formal surveys, and airport personnel training. Strike/ near miss data, which may include species and location, is compiled and analyzed in order to identify trends which are used to develop and evaluate targeted mitigation strategies. These strategies will be referred to as Normal BASH program strategies. Below are strategies being implanted that are species specific which are aimed at reducing overall strike rates and reducing costs associated with wildlife strikes.

### **White-tailed Deer**

Deer species are generally browsers, preferring broad-leaf weeds, shrubs, and trees. Deer, in particular, are also attracted to agricultural fields. Tall fences can discourage these animals from entering the airfield area. Fencing should be secured to the ground as deer will often push under a fence with little more than an 8 to 10 inch opening. During the non-hunting times of the year, an aggressive pyrotechnic and depredation program should be initiated. During night-time and low-visibility operations, airfields with significant deer populations should perform pre-flight and pre-landing runway sweeps. Deer will also take advantage of forested areas near an airfield for cover. If tree stands are located in the airfield environment and no fencing is on site, then tree line vegetation (edge effect) and forest understory need to be routinely cleared to enable effective harassment.

### **Raptors (Vultures, Falcons, Eagles, Kites, and Hawks)**

Raptors are hazardous to aircraft because of their size, and soaring flight tendencies. Many raptors fly using thermals in search of prey and for transiting to other areas. Flight operations should avoid areas with thermals generating terrain such as ridgelines, rolling hills, and near large bodies of water. Landfills are particularly attractive to vultures and should be avoided during flight operations. In the fall, large numbers of raptors will migrate in large concentrations riding thermals in large groups called kettles. Aircraft operating from airfields in known raptor migration concentration areas should avoid ridgelines, rolling hills, and large bodies of water during the fall migration period. This information should be in pre-flight briefings and bird advisories. Removing dead animals on and around the airfield, proper management of landfills, and rodent and insect control on airfields can help control raptors. Any obsolete airfield poles, signs, other above ground fixtures, and trees that can be used as a perch location should be removed especially those nearest to the active runways. Inactive nests should be removed. Pyrotechnics, propane cannons, and depredation can disperse or remove these birds. Edge habitats should be limited in the areas near the airfield as these are small mammal habitats. Grass management for raptors is unsettled science. Longer grasses may increase small mammal populations but may also greatly decrease hunting effectiveness while shorter grasses may decrease small mammal populations but increase hunting effectiveness. Each airfield should be proactive if they have a raptor issue due to the threat to airfield safety. Grass management

should be considered adaptive and written that way in maintenance contracts so adjustments can be made if one grass length is determined ineffective for raptor control. Research has discovered that juvenile or first-year birds present the highest risk for a bird strike. Problem raptors, especially juveniles and first-year birds, can be removed by capture and relocation, but certain individuals may require depredation if relocation does not work. Special permitting procedures are required for harassing and depredating eagles.

### **Coyotes and Foxes**

These animals are attracted to airfields by rodents, rabbits, and other food sources. Dens may be found in mounds, banks, culverts, and other suitable areas. Chain link fencing used for deer control will also be effective as long as it is securely attached to or buried in the ground. Rodent control may reduce the numbers of these animals. Use pyrotechnics to scare these animals supported by an aggressive depredation program.

#### **e. BASH HAZARD PRIORITY ONE**

(1) Target Issue: NASCC and Outlying Airfields contain within BMZ 1&2 heavily overgrown areas. Large trees and brush provide cover, nesting, and perching habitat for many bird species. Areas identified as Rookeries by the USDA Biologist or BWG should be considered the highest priority and removed first. Large mammals such as coyotes, Javelina, and white-tailed deer also utilize this habitat for cover.

(2) Specific Actions Needed to Control or Address: Clear and maintain all vegetation located within BMZ 1&2. Grass height should be maintained at a height between 7" to 14". All trees and shrubs should be removed to establish a monotypic stand of grass. Bare areas located within BMZ 1&2 should be established with grasses known to have low wildlife value. Any hydro-seeding operations within BMZ 1&2 should be reviewed by the BWG prior to implementation. Areas of concern located in BMZ 2 should be addressed as time/funding allows.

(2.1) The storm water fallout area at Truax field has tall woody vegetation and shrubs serving as potential perching and nesting sites for many bird species however the greatest concern is that this area is potentially used as a rookery sight for Great Blue Herons. Several records indicate this area is a major issue and should be addressed as soon as possible. Please see Area 1 of attached map in appendix C-1.

#### **(3) Responsibilities, requirements and assessment**

(a) Action lead is the Installation Airfield Manager, James Baker.

(b) Coordination and communication required and relationship to other program areas/plans: close coordination is required with NAVFAC Corpus Christi in order to identify and prioritize these issues into the Master Airfield Priority List. Local FMD personnel will need to incorporate work requests into the Work Induction Board (WIB) for further action.

(c) Funding - TBD

(d) Execution timeline: FY 19 and beyond.

(e) Action/project effectiveness and measures of effectiveness: Cleared areas will not encourage wildlife habitation, including birds. Cleared areas should yield a lower bird and wildlife inventory.

f. BASH HAZARD PRIORITY TWO

(1) Target issue: NASCC and Outlying Airfields have areas within BMZ 1&2 that do not drain within 48 hours. These areas of standing water attract multiple species of wading birds, shorebirds, and ducks. If not addressed areas can develop aquatic vegetation that not only provide food sources for species noted, but also act as an indicator of developing wetlands. If left for too long of a time period, it is possible these areas could be designated as wetlands and would require additional cost and steps to mitigate.

(2) Specific actions needed to control or address target issue: At Truax field drainage issues can be found in multiple locations. Perimeter road was raised and has caused several drainage issues near the 31R and 31L approach ends. It is recommended culverts need to be installed to allow water to move under perimeter road into the storm water drainage ditch. Some areas may need to be regraded to completely eliminate the issue. Concrete, asphalt, and dirt found near the 35 and 4 approaches could provide excellent filler to regrade problem areas.

(2.1) OLF Goliad has a pond located within BMZ 2. The pond should be drained by breaching the dam or other means necessary to eliminate standing water. Open water and the aquatic vegetation found within this site has been identified as a major attractant for multiple species of ducks and wading birds. Breaching or other means should be coordinated with the BWG.

(3) Responsibilities, requirements and assessment

(a) Action lead is the Installation Airfield Manager, James Baker.

(b) Coordination and communication required and relationship to other program areas/plans: close coordination is required with NAVFAC Corpus Christi in order to identify and prioritize these issues into the Master Airfield Priority List. Local FMD personnel will need to incorporate work requests into the Work Induction Board (WIB) for further action.

(c) Funding – TBD

(d) Execution timeline: FY 19 and beyond.

(e) Action/project effectiveness and measures of effectiveness: improved drainage should yield lower overall bird presence while mitigating further unwanted wetland. Measure of effectiveness includes a lower bird count for both Truax and Goliad than that of previous years.

g. BASH HAZARD PRIORITY THREE



(1) Target issue: At Truax the storm water ditches on the 31R and 31L end are overgrown with aquatic vegetation.

(1.2) OLF Cabaniss has a large storm water drainage ditch that borders the south east perimeter of the airfield. It is heavily overgrown with trees, shrubs, and aquatic vegetation.

(2) Specific actions needed to control or address target issue: Short term solution is to remove vegetation causing blockage to assure optimum efficiency. Aquatic herbicide can be used to control vegetation however care should be taken not to heavily treat the sides of the ditch which can lead to major erosion. Long term solutions are to go underground with these drainage ditches or concrete line ditches to completely eliminate vegetation growth.

(3) Responsibilities, requirements and assessment

(a) Action lead is the Installation Airfield Manager, James Baker.

(b) Coordination and communication required and relationship to other program areas/plans: close coordination is required with NAVFAC Corpus Christi in order to identify and prioritize these issues into the Master Airfield Priority List. Local FMD personnel will need to incorporate work requests into the Work Induction Board (WIB) for further action.

(c) Funding - TBD

(d) Execution timeline– FY 19 and Beyond

(e) Action and project effectiveness: Much like the second BASH priority, clearing the storm water ditch should yield lower overall bird presence while mitigating further unwanted wetland. Measure of effectiveness includes a lower bird count for both Truax and Goliad than that of previous years.

#### h. BASH HAZARD PRIORITY FOUR

(1) Target issue: Improve/replace exclusion fencing at Truax, Waldron, Cabaniss. Large mammals such as white-tailed deer, Javelina, coyotes, and feral dogs have high hazard ratings. Issues with all four of these mammals are ongoing and have been a well-documented issue.

(2) Specific actions needed to control or address target issue: Whenever fencing is to be replaced or repaired NASCC should use FAA Part 139 CertAlert No. 16-03 as the standard for all perimeter fencing around the airfield.

(3) Responsibilities, requirements and assessment

(a) Action lead is the Installation Airfield Manager, James Baker.

(b) Coordination and communication required and relationship to other program areas/plans: close coordination is required with NAVFAC Corpus Christi in order to identify

and prioritize these issues into the Master Airfield Priority List. Local FMD personnel will need to incorporate work requests into the Work Induction Board (WIB) for further action.

(c) Funding – TBD

(d) Execution timeline – FY 19 and Beyond

(e) Action and project effectiveness: Improved fencing should yield a lower rate of encounter with white-tailed deer, Javelina, coyotes, and feral dogs.

i. BASH HAZARD PRIORITY FIVE

(1) Target issue: Structures not pertinent to air operations and no longer in use should be removed. This includes abandoned structures, runways, sheds, machinery, old culverts, light poles or other features identified by the BWG. Such structures are attractive to rodents, small birds, and rabbits; which are prey-base attractants for hawks, owls, and other predators that can become a significant wildlife strike hazard.

(2) Specific actions needed to control or address target issue: Truax has abandoned structures around an old shooting range. This includes a small awning and a large building no longer in use. These should be demolished and removed from the airfield.

(3) Responsibilities, requirements and assessment

(a) Action lead is the Installation Airfield Manager, James Baker.

(b) Coordination and communication required and relationship to other program areas/plans: close coordination is required with NAVFAC Corpus Christi in order to identify and prioritize these issues into the Master Airfield Priority List. Local FMD personnel will need to incorporate work requests into the Work Induction Board (WIB) for further action.

(c) Funding – TBD

(d) Execution timeline – FY 19 and Beyond

(e) Action and project effectiveness: Removed structures should yield a lower overall count of small rodents, birds, and rabbits, and effectively lower the predator rate for the airfield(s).

Funding Priority	WHMP Section	Specific Actions to Address Target Issue	Permit Requirement	Execution Timeline	Status (% complete)
1	e	Cabaniss – Clearing 46 acres: Outboard of Runway 13, there are 46 acres that require clearing to conform to UFC standards for Class A Runways	N/A	FY 2019	0%
1	e	Cabaniss – Clear and grub Clear Zones 13-31, 17-35.	N/A	FY 2019	0%
2	f	Truax – Install culvert on fire pit road that is located on inboard side of Yankee Taxiway. W.O.# BNWNLF \$,366.20.	N/A	FY 2019	0%
2	f	Cabaniss – Grade drainage pip at RW31. W.O.#BF7GGk	N/A	FY2019	0%
3	g	Truax and Cabaniss – Remove aquatic vegetation that is causing drainage ditches to overflow and creating a bird attractive environment.	N/A	FY2019	0%
4	h	Replace/improve fencing at Truax, Cabaniss, and Waldron in order to prevent entry of large mammals.	N/A	FY2019	0%
5	i	Truax – Remove old runway approach lighting control foundation and support structures from the Clear Zone of RW 31L overrun.	N/A	FY 2019	0%

NASCC BASH Hazard Priorities

8. WHMP amendment, approval, review and update

a. Amendment process. This WHMP is meant to be a "living document" and a recurrent agenda item at periodic BWG meetings. Should the BWG determine during the course of a year (between formal reviews) to make substantive changes to hazard priorities or mitigation procedures, or to add an emergent hazard, the changes should be documented in BWG meeting minutes, briefed to the CO and included as part of the annual WHMP review process.

b. Command approval. CO signature approval of a WHMP is required only once during the command tour although they may elect to sign it each year. If the local BASH instruction is updated during the tour, the WHMP can be appended to it under the cover of a single signature for both documents. If the WHMP is a stand-alone document, however, then it requires a cover page on command letterhead and the CO's signature. Once a change of command occurs, then the existing cover page and this signature page should be removed and replaced with new one. The Air Operations Officer and Public Works Officer (PWO) will sign on the "Approved by" lines and submit the whole document to the new CO for signature.

c. Review and update. This document will be formally reviewed every 12 months from the date of the CO's signature until the next change of command. The BWG shall revalidate all AEM mitigation procedures and WM risk assessments and procedures and make any document

changes as required. Once the BWG validation and document update is complete, the Air Operations Officer and PWO will sign the "Reviewed by" lines below and brief the CO. The completed annual BASH self-assessment checklist shall also be included in the brief.

9. Appendices

- a. BASH Mitigations Zones for NASCC
- b. FAA Part 139 CertAlert No. 16-03
- c. Problem Areas for TRUAX

**Approved by:**

\_\_\_\_\_  
**Air Operations Officer/Date**

\_\_\_\_\_  
**Public Works Officer/Date**

**Reviewed by:**

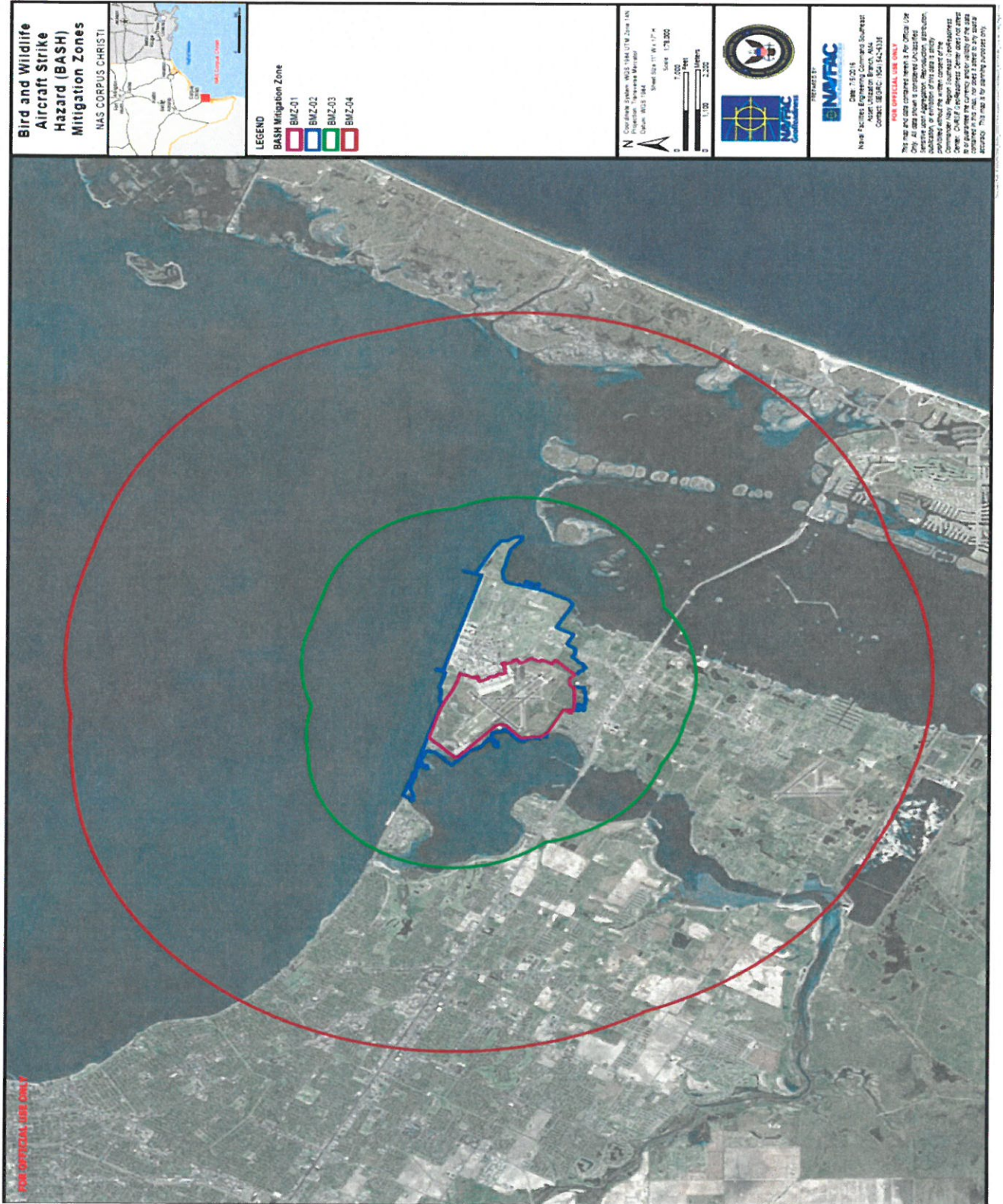
\_\_\_\_\_  
**Air Operations Officer/Date**

\_\_\_\_\_  
**Public Works Officer/Date**

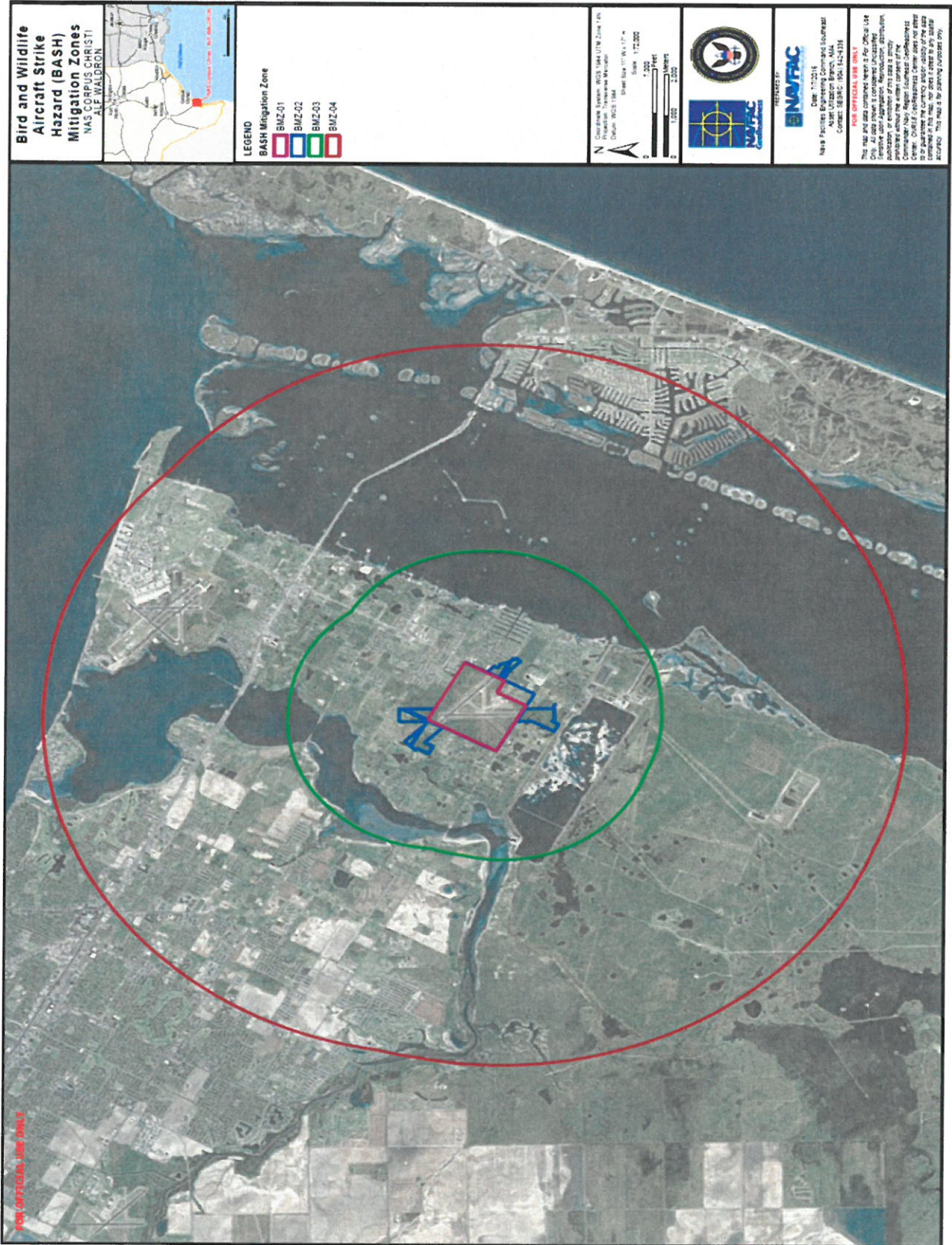
**Reviewed by:**

\_\_\_\_\_  
**Air Operations Officer/Date**

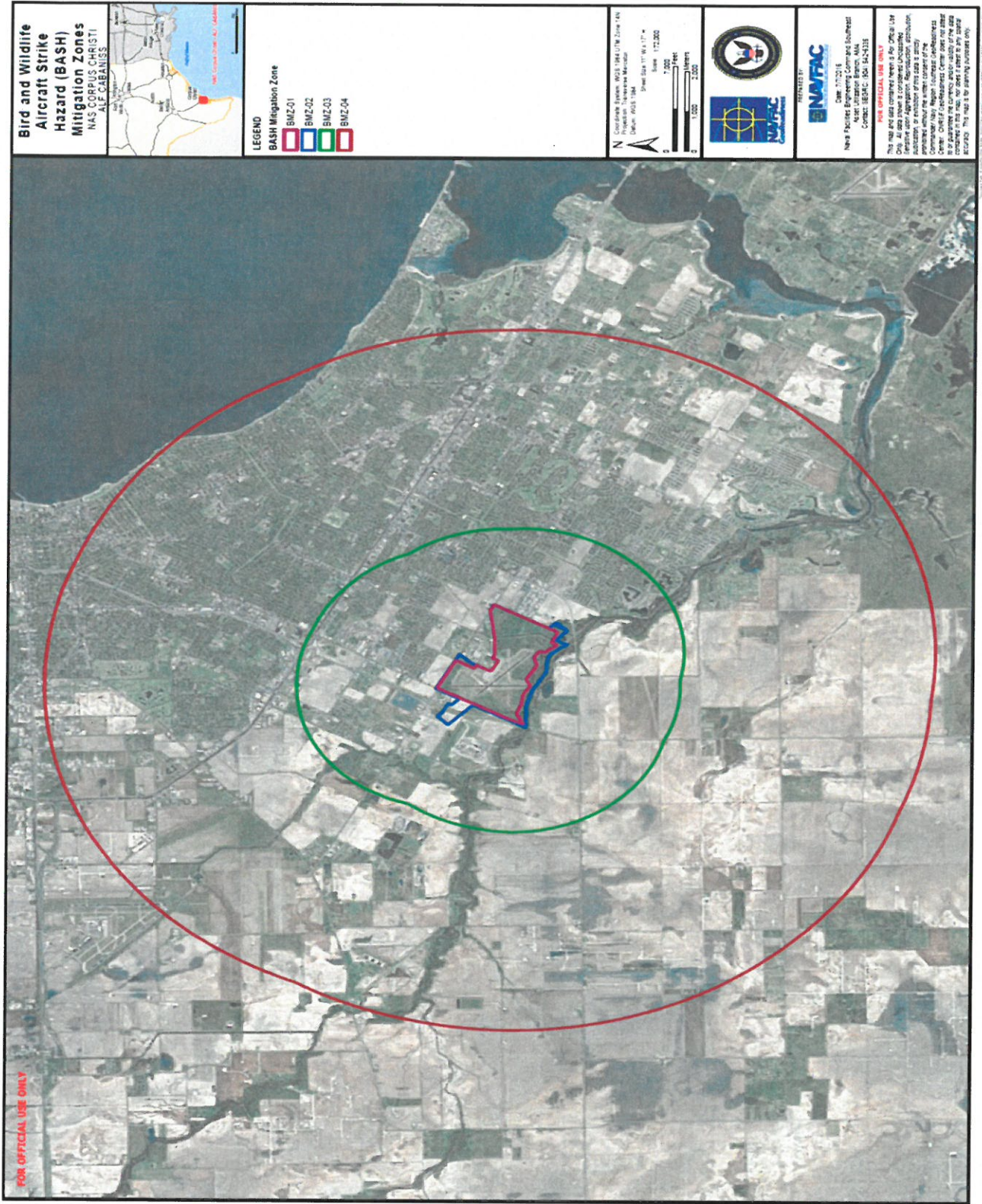
\_\_\_\_\_  
**Public Works Officer/Date**



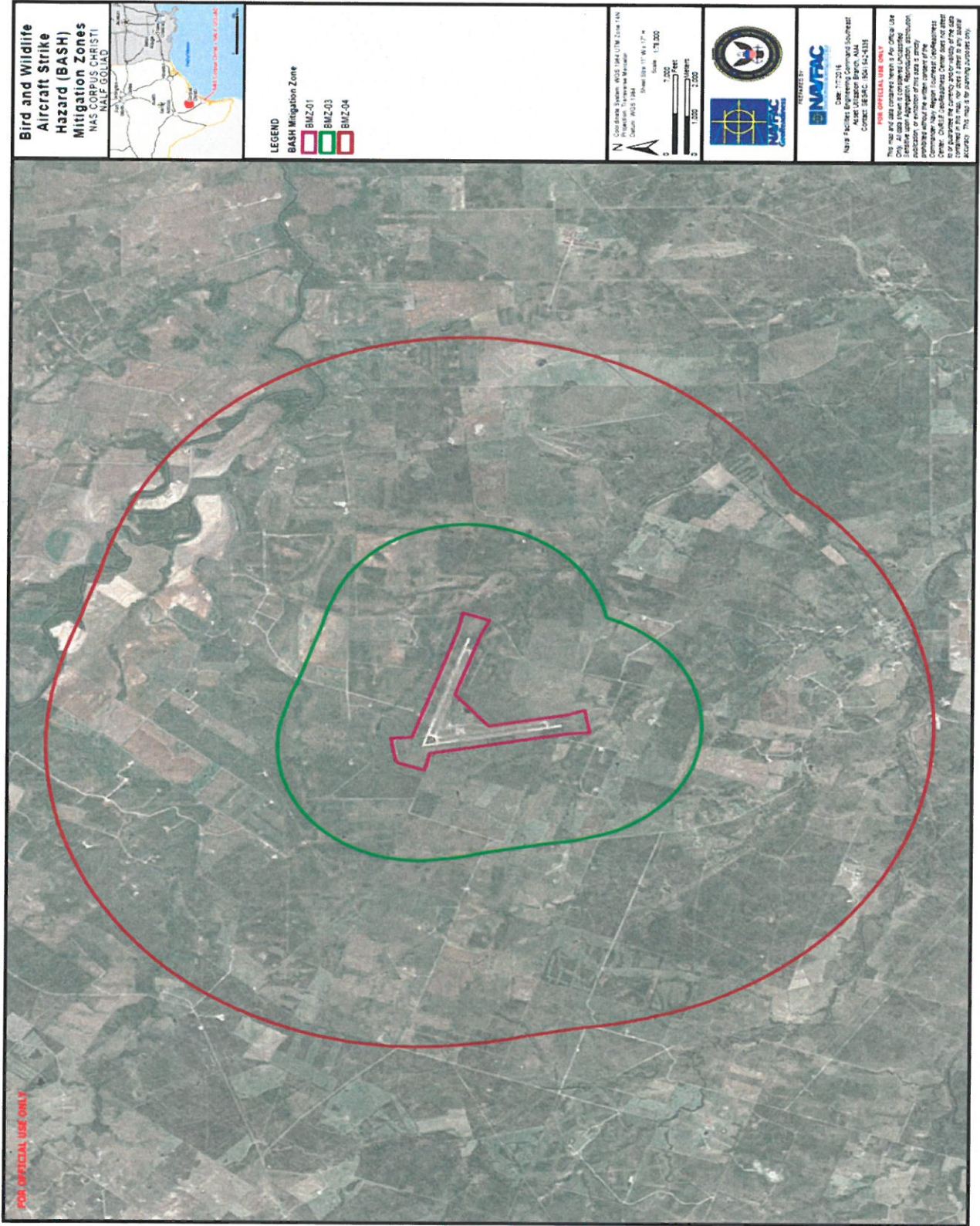
Appendix A-1



Appendix A-2



Appendix A-3



Appendix A-5





## Federal Aviation Administration National Part 139 CertAlert

\*\*Advisory\*\*Cautionary\*\*Non-Directive\*\*Advisory\*\*Cautionary\*\*Non-Directive\*\*Advisory\*\*Cautionary\*\*Non-Directive\*\*

**Date:** 08/03/2016 No. 16-03  
**To:** Airport Operators and FAA Airport Certification Safety Inspectors (ACSI)s  
**Subject:** Recommended Wildlife Exclusion Fencing  
**Point of Contact:** Amy Anderson, AAS-300, (202) 267-7205  
 Email: [amy.anderson@faa.gov](mailto:amy.anderson@faa.gov)

### 1. Purpose.

This CertAlert contains airfield exclusion methods for deer and other large mammals.

### 2. Cancellation.

This CertAlert cancels CertAlert 01-01, Deer Aircraft Hazard, dated February 1, 2001; CertAlert 02-09, Alternative Deer Fencing, dated December 12, 2002; and CertAlert 04-16, Deer Hazard to Aircraft and Deer Fencing, dated December 13, 2004.

### 3. Background.

Elevated deer and coyote populations in the United States represent an increasingly serious threat to both Commercial and General Aviation Aircraft. According to the National Wildlife Strike Database, deer and coyote are the most frequently struck terrestrial mammals (37 and 34 percent, respectively). Deer are responsible for 92 percent of the mammal strikes that resulted in damage. From 1990 to 2015, over 1,107 deer-aircraft collisions and 487 coyote-aircraft collisions were reported to the Federal Aviation Administration (FAA). Of these reports, 932 of the deer strikes (84%) and 43 of the coyote strikes (9%) indicated the aircraft was damaged as a result of the collision.

The FAA reminds airport operators that controlling deer and other medium to large terrestrial mammals on and around airfields is very important. Two recent incidents include a Cessna 195B sustaining significant damage on landing as a result of veering off the runway to avoid striking white-tailed deer in Virginia and a Cessna 310 that was destroyed on approach to an airport in Michigan when it collided with a white-tailed deer.

### 4. Recommendations.

Proper fencing is the best way of keeping deer and coyotes off aircraft movement areas. In some cases, deer have been observed jumping over 8-foot fencing and coyotes have been observed scaling 6-foot fencing. Deer and coyotes can fit through very small gaps between

## Appendix B-1

8/3/2016

FAA Part 139 CertAlert No. 16-03

gates and under fencing. Deer have been observed squeezing through a 7.5-inch gap at the bottom of a fence. Coyotes can fit through 6 inch x 4 inch gaps under a fence and they will also dig under the fence to access the airfield.

The FAA recommends a 10-foot fence<sup>1</sup> with 3-strand barbed wire outriggers. In some cases, an airport may be able to use an 8-foot fence with 3-strand barbed-wire outriggers, depending on the amount of deer activity in a local area.

A 4- to 5-foot skirt of fencing material, attached to the bottom of the fence and buried at a 45-degree angle on the outside of the fence, is ideal to prevent animals from digging under the fence and reduce the chance of washouts. If the fence skirting cannot be installed at a 45-degree angle, then it is acceptable to install it horizontally underground several inches beneath the surface. This type of fencing also greatly increases airport security and safety. A concrete base<sup>2</sup> along the bottom of the fence is also an option to prevent burrowing or digging under the fence. Airport Operators should keep the fence line right-of-way free of excess vegetation. The fence line should be inspected daily, and a fence inspection schedule should be included in an airport's Wildlife Hazard Management Plan (WHMP). If the proposed inspection schedule is less than daily, it should be approved by an ACSI for Part 139 certificated airports. Washouts, breaks, or other holes in the fence need to be repaired as soon as they are discovered.

Gates should close with less than 6-inch gaps to prevent entry by deer or coyotes. If the gates have gaps along the bottom, installation of concrete "speed bumps" under the gate can be a solution. If the gaps are between the gates or the poles, a heavy brush material or interlocking metal bars can also be installed to preclude entry by deer or coyote. In some cases, a single strand of barbed wire strung between the bottom of the fence and the ground where there are gaps will minimize the potential for wildlife access.

Chain link fencing is a type of wire-mesh fencing. Other types of wire-mesh fencing that are suitable for exclusion of wildlife at airports include woven-wire and v-mesh fencing. Also, high tensile welded-wire fencing has been used successfully at different airports to exclude deer and coyotes. However, these types of fencing must be researched thoroughly when choosing an adequate fencing material for an airport due to the variability in durability, life span, and the spacing of mesh and welded wire.

In some cases, electric fencing or matting may offer a suitable alternative. Recent improvements in fencing components and design have greatly increased the effectiveness and ease of installation of electric fences. Tests by the U.S. Department of Agriculture (USDA), National Wildlife Research Center, have shown that some 4- to 6-foot, 5- to 9-strand electric fences designs can be 99% effective at stopping deer. Installation of some of the newer electric fences requires neither specialized equipment nor training; however, they may require more maintenance than other types of fence and must be consistently electrified. Airport sponsors must contact their local Airport District Office (ADO) to

<sup>1</sup> AC No: 150/5370-10G, *Standards for Specifying Construction of Airports (Part 8 – Fencing)*, provides details on different fencing and post materials (e.g., chain link, welded and woven wire mesh, galvanized or pvc coating, etc.).

<sup>2</sup> Additional information regarding underground skirting, fence base materials, vegetation clearance recommendations, and installation procedures can be found in AC 150/5370-10G.

8/3/2016

FAA Part 139 CertAlert No. 16-03

discuss eligibility for AIP funding or requirements for a Modification to Standards (MOS).

In limited situations, the use of non-conductive, composite, frangible electric fence posts and fence conductors may allow the installation of electric fence closer to the aircraft movement area than would normally be allowed with standard link fencing material. Please note that electric fencing may produce radio frequency interference that could be disruptive to NAVAIDS and airport communications and should be considered when determining types of fencing.

The key for excluding deer and coyotes is the proper installation and maintenance of a fence that is:

- Of sufficient height to deter jumping and scaling
- Constructed of a material that is difficult to penetrate
- Constructed fully around the airfield without gaps below the fence or at the gates or that mitigates the gaps with other exclusionary materials
- Constructed to deter digging or burrowing under the fence

The most suitable fence for an airport depends on many factors, including the observed wildlife hazards, the potential impacts of certain types of fencing, seasonality of hazards, costs (both for construction and maintenance), and adjacent habitat types. Airport sponsors must contact their local ADO to discuss what types of fencing are eligible for AIP funding.

For proposed fencing that will intersect wetlands or surface waters (streams, rivers, etc.), the airport sponsor should determine what state and federal permits will be required prior to installation. Fencing that is located in wetlands or over surface waters typically requires additional maintenance and/or cleaning due to debris getting caught and potentially damaging the fence. If a culvert is located along the perimeter fence, grates or some other barrier should be placed over the culvert to ensure wildlife cannot access the airfield through the culvert. The barrier should allow for water movement and should be inspected and cleared of debris regularly to ensure water is flowing efficiently.

Airport sponsors should include new and/or improved wildlife fencing in their WHMP as a prioritized action item. If deer are observed on or near the aircraft movement area, immediate action must be taken to remove them.

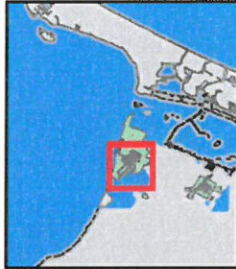
Airport operators can contact the State Wildlife Management Agency or the nearest USDA, Wildlife Services Office for assistance with deer problems.



Brian Rushforth, Manager  
Airport Safety and Operations Division, AAS-300

3

**NAS  
CORPUS CHRISTI  
AIRFIELD CLEAR ZONES**



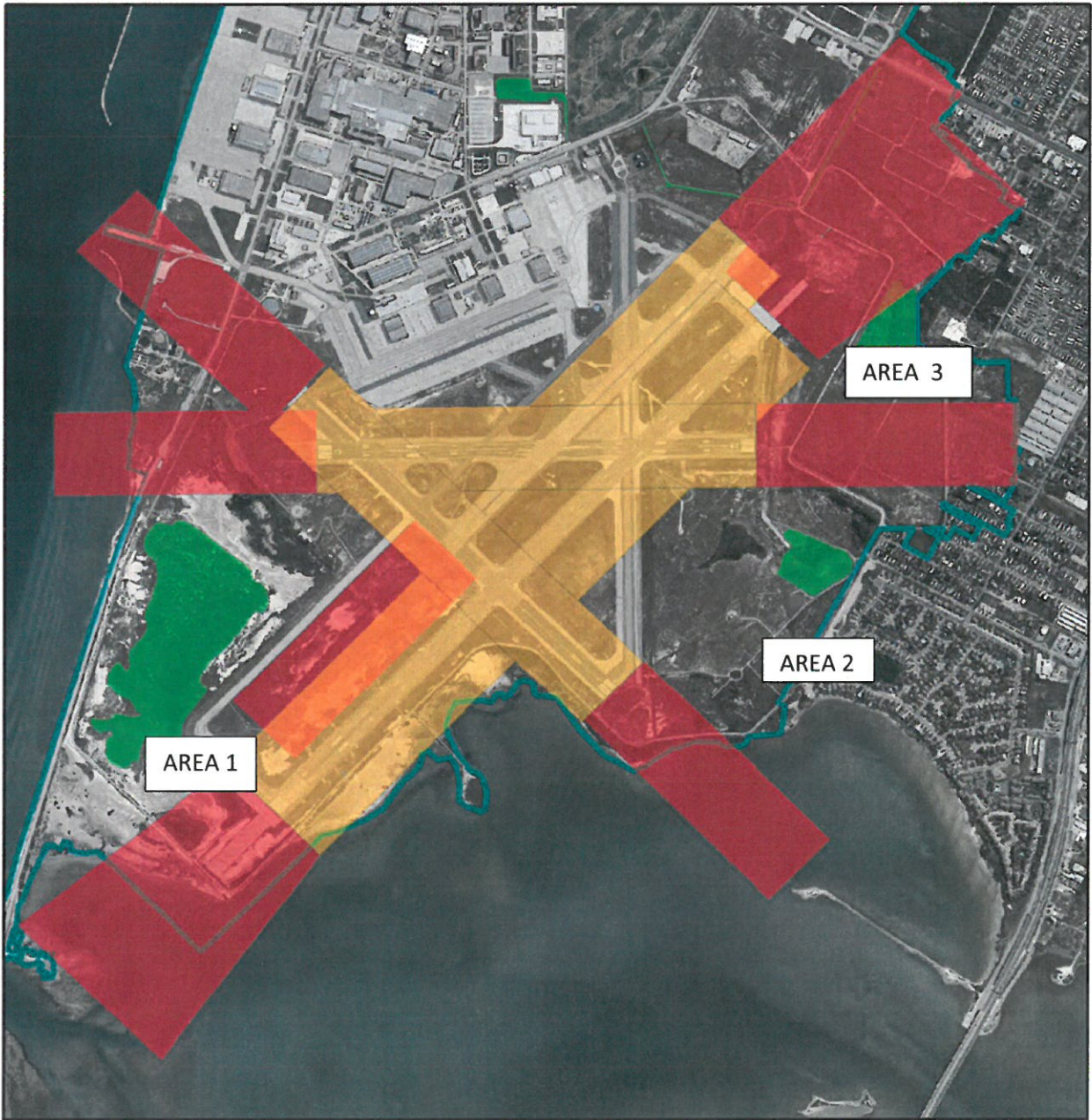
- Transition Area
- Clear Zones
- Fauna Hazards
- Roads
- Buildings
- Installation Area

Coordinate System: UTM 14N  
Transverse Mercator  
Datum: NAD '83  
Scale: 1:18,000

1 inch = 1,500 feet



Map Created: October, 2013  
Created By: E. Rippons



Appendix C-1

# **APPENDIX D**

## **Applicable Regulations and Public Laws**

This page intentionally left blank.

Number	Title	Description
<b>Federal</b>		
7 United States Code (USC) §136	Federal Insecticide, Fungicide and Rodenticide Act	Governs the use and application of pesticides in natural resources management plans.
10 USC §2665	Sale of Certain Interests in Lands; Logs	The sale of forest products is authorized to finance the cost of managing forest resources for commercial production.
10 USC §2667	Armed Forces, Leases; non-excess property of military departments and Defense Agencies	Provides general requirements for leasing certain lands that will promote national defense or be in the public interest.
16 USC 661-666c	Fish and Wildlife Coordination Act	Authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.
16 USC §1451 et seq.	Coastal Zone Management Act of 1972	Provides for management of the nation's coastal resources, including the Great Lakes, and balances economic development with environmental consideration. Outlines two national programs, the National Coastal Zone Management Program and the National Estuarine Research Reserve System.
16 USC §1801 et seq.	Magnuson–Stevens Fisheries Conservation and Management Act	Establishes policies for the sustainable management of fishery resources and the protection of essential fish habitats
16 USC §3951-3956	Coastal Wetlands Planning, Protection and Restoration Act	Enacted to identify, prepare, and fund construction of Texas coastal wetlands restoration projects.
31 USC §1535	Money and Finance – The Budget Process – Agency Agreements	Provides policy on how an agency or major organizational unit within an agency may place an order with a major organization within the same agency or another agency for goods or services
33 USC §401 et seq.	Rivers and Harbors Act	Requires authorization from the U.S. Army Corps of Engineers for the construction of any structure in or over any navigable waters of the U.S. and the excavation/dredging or deposition of material in these waters or any obstruction or alteration in a navigable water.
33 USC §2701	Oil Pollution Act	Requires planning for, rescue of, minimization of injury to, and assessment of damages or injury to fish and wildlife resources from the discharge of oil.

Number	Title	Description
42 USC 1962d	Water Resources Planning Act of 1965, as amended	Provides for the optimum development of the Nation's natural resources through the planning of water and related resources.
42 USC §13201 et seq.	Energy Policy Act, Coastal Impact Assistance Program (Section 384)	Assists coastal producing states and their political subdivisions (parishes, counties, and boroughs) in mitigating the impacts from Outer Continental Shelf oil and gas production.
Public Law 65-186	Migratory Bird Treaty Act (MBTA), as amended (16 USC §703)	Prohibits taking or harming a migratory bird, its eggs, nest, or young without the appropriate permit.
Public Law 74-46	Soil Conservation and Domestic Allotment Act, as amended (16 USC 590a et seq.)	Provides for application of soil conservation practices on federal lands.
Public Law 86-70	Bald and Golden Eagle Protection Act of 1940, as amended (16 USC §668 et. seq.)	Prohibits the taking (harassment, sale, or transportation) of bald or golden eagles, alive or dead, whole or in part and their nest and/or eggs.
Public Law 88-29	Outdoor Recreation Coordination Act, as amended (16 USC §4601-1(f)(1))	Requires consultation with the National Park Service regarding management for outdoor recreation.
Public Law 90-542	Wild and Scenic Rivers Act, as amended (16 USC §1271-1287)	Required identification and protection of any river or stream that qualifies under the Act.
Public Law 90-543	National Trails Systems Act of 1968, as amended (16 USC §1241 et seq.)	Promotes development of recreational, scenic, and historic trails for persons for diverse interest and abilities.
Public Law 90-583	Carlson-Foley Act of 1968 (43 USC §1241 et seq.)	Provides for the control of noxious plants on land under control or jurisdiction of the federal government.
Public Law 91-190	National Environmental Policy Act (NEPA) of 1969, as amended (42 USC §4321 et seq.)	Establishes a national policy to preserve important natural aspects of our national heritage and enhance the quality of renewable resources.



Number	Title	Description
Public Law 92-500	Federal Water Pollution Control Act (Clean Water Act) of 1972, as amended (33 USC §1251 et seq.)	Section 303 requires States to identify waters that do not or are not expected to meet applicable water quality standards with technology-based controls alone and to develop programs to achieve the State standards. Section 319 requires federal agencies to comply with State nonpoint source pollution abatement guidelines. Section 401 prohibits point source discharge of pollutants into navigable waters, unless an appropriate permit is first obtained. Section 402 controls direct discharges into navigable waters and covers National Pollutant Discharge Elimination System permits, issued by either U.S. Environmental Protection Agency (EPA) or an authorized state/tribe, with industry-specific, technology-based and water-quality-based limits and pollutant monitoring and reporting requirements. Section 404 prohibits discharge of dredged or fill material into navigable waters of the United States, including wetlands, without first obtaining a permit from the U.S. Army Corps of Engineers.
Public Law 92-522	Marine Mammal Protection Act (16 USC §1361-1407)	Prohibits the taking or harming of marine mammals without the appropriate permit.
Public Law 93-205	Endangered Species Act of 1973, as amended (16 USC §1531 et seq.)	Provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. Requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of an endangered or threatened species. Requires biological assessments of any agency action when an endangered or threatened species may be present in the area(s) affected by the action.
Public Law 93-378	Resources Planning Act, as amended (16 USC §1600)	Requires a complete national assessment or inventory of all forest, rangeland resources, and public needs every ten years, along with a plan to meet those needs.
Public Law 93-523	Safe Drinking Water Act, as amended (42 USC §300f et seq.)	Protects the quality of drinking water in the U.S. whether from above ground or underground sources
Public Law 96-366	Fish and Wildlife Conservation Act (Nongame Act) of 1980, as amended (16 USC §2901 et seq.)	Encourages the development of conservation plans for nongame fish and wildlife of ecological, educational, aesthetic, cultural, recreational, economic or scientific value.
Public 96-510	Comprehensive, Environmental Response, Compensation and Liability Act, as amended (42 USC §9601 et seq.)	Authorizes Natural Resource Trustees to recover damages for injury to, destruction of, or loss of natural resources resulting from the release of a hazardous substance.

Number	Title	Description
Public Law 104-332	National Invasive Species Act (16 USC §4321)	Prescribes policies to prevent the introduction and spread of non-indigenous species into U.S. waters
Public Law 105-85	Sikes Act Improvement Act (SAIA) of 1997 (passed as an amendment to the Sikes Act of 1960)	Each integrated natural resources management plan (INRMP) prepared under this Act should provide for the sustainable use by the public of natural resources, to the extent that the use is not inconsistent with the needs of fish and wildlife resources. The Secretary of the Interior, in consultation with state fish and wildlife agencies, must submit a report annually on the amounts expended by Interior and state fish and wildlife agencies on activities conducted pursuant to INRMPs to respective Congressional committees with oversight responsibilities.
Public Law 106-224	Plant Protection Act of 2000 (7 USC §7701 et seq.)	Prohibits importing, exporting, or moving in interstate commerce an unauthorized plant pest. Prohibits the unauthorized mailing, and knowing delivery by a mail carrier, of plant pests.
Public Law 107-77	Appropriations Act of 2002	Authorizes appropriations for the Departments of Commerce, Justice, and State, the Judiciary, and related agencies for the fiscal year ending September 30, 2002.
Public Law 107-314	National Defense Authorization Act	Exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.
Public Law 1004	Water Quality Act of 1987	Adoption of new water quality standard provisions. Establishes the Estuary of National Significance Program.
15 Code of Federal Regulations (CFR) 923	Coastal Zone Management Program Regulations	Establishes requirements for review of approved management programs and grant application procedures for program funds.
15 CFR 930	Federal Consistency with Approved Coastal Management Programs	Describes the obligations of all parties who are required to comply with the federal consistency requirements of the Coastal Zone Management Act.
32 CFR 190	Natural Resources Management Program	Provides Department of Defense (DoD) policy on natural resources management.
40 CFR 230	Guidelines for Specification of Disposal Sites for Dredge or Fill Materials	Provides procedures for the disposal of dredge or fill materials in the ocean and outlines potential impacts. Section 230.43 defined vegetated shallows as a special aquatic site.
50 CFR 17	Endangered and Threatened Wildlife and Plants	Prescribes policies for the conservation and restoration of endangered and threatened wildlife and plants.

Number	Title	Description
Executive Orders (EOs) 11514 and 11991	Protection and Enhancement of Environmental Quality	Directs issuance of instructions and guidelines relative to preparation of Environmental Impact Statement.
EO 11988	Floodplain Management	Requires federal agencies to evaluate effects of action they have taken on floodplains.
EOs 11989 and 12608	Off-Road Vehicles on Public Lands	Restricts the use of off-road vehicles (including all vehicles used in hunting and other outdoor activities when off paved surfaces) away from paved roads or other designated hard surfaces.
EO 11990	Protection of Wetlands	Requires government agencies, in carrying out agency actions and programs affecting land use, to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands
EO 12088	Federal Compliance with Pollution Control Standards	Ensures that all necessary actions are taken to prevent, control, and abate environmental pollution with respect to federal facilities and activities under control of the Agency.
EO 12962	Recreational Fisheries	Requires Federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities.
EO 13112	Invasive Species	Requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems
EO 13148	Greening the Government through Leadership in Environmental Management	Mandates that environmental management considerations must be a fundamental and integral component of Federal Government policies, operations, planning, and management and that sustainable management is pursued through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment.
EO 13186	Responsibilities of Federal Agencies to Protect Migratory Birds	Imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.
EO 13352	Facilitation of Cooperative Conservation	Requires that the Secretaries of the Interior, Agriculture, Commerce, and Defense and the Administrator of the EPA shall carry out the programs, projects, and activities of the agency in a manner that facilitates cooperative conservation.
48 Federal Register (FR) 43098-43105	Endangered and Threatened Species Listing and Recovery Priority Guidelines	Establishes guidelines for determining how to make the most appropriate use of resources available to implement the Endangered Species Act. Describes priority listing numerical scale.

Number	Title	Description
59 FR 58982-59028	Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species	Presents an updated compilation of vertebrate and invertebrate animal taxa native to the U.S., including the maritime pocket gopher that are being reviewed for possible addition to the List of Endangered and Threatened Wildlife under the Endangered Species Act.
60 FR40837	President's Executive Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds	Provides guidance developed by the interagency workgroup under the direction of the Federal Environmental Executive to assist federal agencies in the implementation of environmentally and economically beneficial landscape practices, and requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.
66 FR 36137-36143	Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Wintering Piping Plovers	Designates 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas as critical habitat for the wintering population of the piping plover.
70 FR 12710-12716	Final List of Bird Species to Which the MBTA Does Not Apply	Provides a list of bird species to which the MBTA does not apply.
71 FR 168	Memorandum of Understanding Between DoD and USFWS to Promote the Conservation of Migratory Birds	Outlines a collaborative approach to promote the conservation of migratory bird populations, identifies specific activities where cooperation between the parties will contribute substantially to the conservation of migratory birds and their habitats.
77 FR 69993-70060	Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions	Presents an updated list of plant and animal species native to the United States, including Sprague's pipit and red knot that are regarded as candidates for or have been proposed for listing under the ESA.
77 FR 76066-76067	Endangered and Threatened Wildlife and Plants; Draft Recovery Plan for the Gulf Coast Jaguarundi	Establishes a recovery plan for the Gulf Coast jaguarundi with the objective of removing the species from protection under the ESA.
<b>State</b>		
Texas Administrative Code (TAC) Sections 65.171-176	Endangered, Threatened, and Protected Animals	Contains laws and regulations pertaining to endangered or threatened animal species, and prohibits the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit.
TAC, Sections 69.01-9	Endangered, Threatened, and Protected Native Plants	Contains laws and regulations pertaining to endangered or threatened plant species.
TAC, Chapter 97	Communicable Diseases	Provides details on control of communicable diseases.

Number	Title	Description
TAC, Chapter 169	Rabies Control and Eradication, Subchapter A	Provides details on vaccine requirements and protocols as mandated by the state of Texas, and requires that all dogs and cats be vaccinated against rabies by 4 months of age and on a 1-year or 3-year basis thereafter.
TAC, 169.121 and Texas Health and Safety Code, Sections 81.351-353	Reptile-Associated Salmonellosis; Subchapter I, Animal-Borne Diseases	Requires retail stores that sell reptiles to post warning signs and distribute written warnings regarding reptile-associated salmonellosis to purchasers in accordance with the form and content designated by the Texas Department of State Health Services.
TAC, Title 30, Chapter 307	Texas Surface Water Quality Standards	Codifies Texas Surface Water Quality Standards in accordance with the Clean Water Act.
TAC, Title 31, Chapter 501	Coastal Management Program	Establishes the Coastal Management Program to provide for more effective and efficient use of public funds to manage coastal natural resource areas.
Texas Health and Safety Code, Chapter 821	Treatment and Disposition of Animals, Subchapter C	Requires all animals in animal shelters be euthanized in a humane manner with only one of two methods by a licensed veterinarian or certified technician: administering sodium pentobarbital or commercially compressed carbon monoxide.
Texas Natural Resources Code, Title 2, Chapter 33	Texas Natural Resources Code, Coastal Public Lands Management Act	Establishes that the natural sources of coastal public lands shall be preserved and that the public interest in the use of public coastal lands shall be protected.
Texas Parks and Wildlife Code, Title 5, Chapter 88	Endangered Plants	Contains definitions, regulations, state lists, penalties and permits for endangered plants in Texas.
Texas Parks and Wildlife Code, Subchapter G	Aquatic Vegetation Management	Establishes guidelines for developing state and local aquatic vegetation management plans.
Texas Penal Code 42.09	Animal Cruelty	Makes it a Class A Misdemeanor to abandon a pet dog or cat, punishable with up to a \$4,000 fine and/or a year in jail.
	Seagrass Conservation Plan for Texas	Identifies resource management problems and outlines planning objectives and long and short range strategies and actions to protect and preserve Texas seagrasses.

Number	Title	Description
<b>Navy</b>		
	Chief of Naval Operations (CNO) Policy Letter Preventing Feral Cat and Dog Populations on Navy Property	States that installations must adopt proactive pet management procedures that prevent the establishment of free-roaming cat and dog populations. Additionally, installations must ensure the humane capture and removal of feral cats and dogs, and efforts should be made to find homes for adoptable animals.
Commander, Navy Installations Command (CNIC)INST 3700	Navy Bird/Animal Aircraft Strike Hazard (BASH) Program Implementing Guidance	Establishes policy and procedures for implementing the CNIC BASH Program, establishes mandatory BASH event reporting and remains collection procedures, and establishes BASH program procedures.
CNIC M-BASH	BASH Manual	Presents additional recommended policies, procedures, and instructional material to serve as an aid to CNIC shore aviation commands in developing local BASH policies and related personnel training programs; and identifies key BASH statutory and regulatory requirements, and provides advisory information for management of Navy airfields.
NAVFACINST 6250.3F	Performance and Reporting of Pest Control Operations in the Naval Shore Establishment	Provides policy for how pesticide use should be reported with detailed information about the preparation and use of the Pest Management Report.
NAVFACINST 7110	Funds Management for Fish and Wildlife and Game Conservation and Rehabilitation	Budgets and estimates preparation for fish and wildlife, game conservation and rehabilitation.
NAVFAC P-73	Real Estate Operations and Natural Resources Management Procedural Manual - Volumes 1 and II	Addresses all CNO natural resources program requirements, guidelines, and standards.
OPNAVINST 3750.6R Ch. 4	Naval Aviation Safety Program Reference	Issues policies and provisions of the Naval Aviation Safety Program, addresses aircraft mishap investigations, procedures and reporting for wildlife/aircraft strikes.
OPNAVINST 4790.2D	Naval Aviation Maintenance Program	Provides standards to improve aviation material readiness and safety standards.
OPNAVINST 5090.1C, Change 1	Environmental and Natural Resources Program Manual	Establishes policy and assigns responsibilities for the Navy Natural Resources Program, and directs major claimants and intermediate commands to ensure that subordinate commands support natural resources programs on installations under their control.
OPNAV 11010.36C	Air Installations Compatible Use Zones (AICUZ) Program	Provides guidance from the CNO and Commandant of the Marine Corps responsible for management of the AICUZ Program.

Number	Title	Description
SECNAVINST 5090.6A	Environmental Planning for Department of the Navy Actions	Provides comprehensive program of environmental planning and stewardship in support of the readiness of the US naval forces.
SECNAVINST 6240.6E	Environmental Protection and Natural Resources Management Program	Assigns responsibility to the Chief of Naval Operations and the Commandant of the Marine Corps for the development and implementation of natural resources programs on all land and water areas under the jurisdiction of the Department of the Navy.
NASCORPCIN ST 3750.16	NAS Corpus Christi BASH Management Plan	Provides guidance that will minimize wildlife hazards on and around the airfield that pose a threat to aviation safety.
<b>DoDI</b>		
DoD Directive 4700.4	Natural Resources Management Program	Prescribes policies and procedures for an integrated program for multiple-use management of natural resources on DoD property.
DoD Financial Management Regulation 7000.14-R	Volume 11A – Reimbursable Operations, Policy, and Procedures	Provides general reimbursement procedures for when DoD Components perform work or sell property within the DoD, to other US government agencies and to private parties.
DoD Instruction (DoDI) 4700.2	Secretary of Defense Awards for Natural Resources and Environmental Management	Prescribes policies and procedures for an integrated program for multiple-use management for natural resources on property under DoD control.
DoDI 4165.67	Revitalizing Base Closure Communities – Base Closure Community Assistance	Requires clear zones be maintained at the end of all runways. This includes cutting or topping trees, shrubs, brush, or other forms of obstructions to ground level, where DoD determines these obstructions would interfere with the operation of aircraft, including emergency landings
DoDI 4715.03	Natural Resources Conservation Program	Implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control
DoDI 6055.6	DoD Fire and Emergency Services Program	Establishes a comprehensive Fire and Emergency Services Program and prescribes policies to prevent and minimize loss of DoD lives and damage to property and the environment.
DoDI 7310.5	Accounting for Production and Sale of Forest Products	Provides policy, procedures, and assigns responsibilities for DoD reimbursement and for a State’s entitlement to a share in the net proceeds derived from forest products sold from military installations or facilities.

Number	Title	Description
DoD Technical Guide No. 37	Armed Forces Pest Management Board, Integrated Management of Stray Animals on Military Installations	Provides additional guidance for installations in addressing feral cat control issues.
<b>Other</b>		
	Clean Water Action Plan	A presidential initiative to restore and protect America's waters by reducing nonpoint pollution, emphasizing collaborative strategies around watersheds, increasing wetlands, protecting coastal waters, providing incentives for protection of forest and grassland buffers, and promoting community-based planning.
	Guidance for Implementation of Federal Wildland Fire Management Policy	Provides for consistent implementation of the 1995/2001 Federal Fire Policy, as directed by the Wildland Fire Leadership Council. This guidance also calls for increased dialogue and collaboration between federal agencies and tribal, local, and state agencies as plans are updated and implemented to manage wildfires in order to accomplish resource and protection objectives
	Forest Service Directive System, Forest Service Manual and Handbooks	Codifies the agency's policy, practice, and procedures. The system serves as the primary basis for the internal management and control of all programs and the primary source of administrative direction to Forest Service employees.
Federal Aviation Administration (FAA), Advisory Circular 150/5200-32A	Reporting Aircraft Wildlife Strikes	Explains the importance of reporting collisions between aircraft and wildlife (i.e., wildlife strikes), and examines recent improvements in the FAA's Bird/Other Wildlife Strike Reporting system; how to report a wildlife strike; what happens to the wildlife strike report data; how to access the FAA National Wildlife Aircraft Strike Database; and the FAA's Feather Identification program.
FAA, Advisory Circular 150/5200-33B	Hazardous Wildlife Attractants on or Near Airports	Provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports as well as airport development projects that affect aircraft movement near hazardous wildlife attractants.



# **APPENDIX E**

## **Flora and Fauna Lists**

**Table E-1. Flora of the Main Station.**

**Table E-2. Flora of NOLF Cabaniss.**

**Table E-3. Flora of NOLF Waldron.**

**Table E-4. Flowering Plants Known to Occur at NOLF Goliad.**

**Table E-5. Birds Known or with the Potential to Occur at the Main Station.**

**Table E-6. Birds Known or with the Potential to Occur at NOLF Cabaniss.**

**Table E-7. Birds Known or with the Potential to Occur at NOLF Waldron.**

**Table E-8. Birds Known to Occur at NOLF Goliad.**

**Table E-9. Fish, Amphibians, and Terrestrial Reptiles Known or with the Potential to Occur in Nueces County.**

**Table E-10. Fish, Amphibians, and Terrestrial Reptiles Known or with the Potential to Occur at NOLF Goliad.**

**Table E-11. Terrestrial Mammals Known or with the Potential to Occur in Nueces County.**

**Table E-12. Terrestrial Mammals Known to Occur at NOLF Goliad.**

**Table E-13. Rare, Threatened, and Endangered Species Known or with the Potential to Occur at NASCC.**

This page intentionally left blank.

# Flora of NASCC

**Table E-1. Flora of the Main Station.**

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Carpetweed Family</b>	<b>Aizoaceae</b>		
Slender seapurslane	<i>Sesuvium maritimum</i>	N	A
Shoreline seapurslane	<i>Sesuvium portulacastrum</i>	N	P
<b>Amaranth Family</b>	<b>Amaranthaceae</b>		
Silverhead	<i>Blutaparon vermiculare</i>	N	P
Plains snakecotton	<i>Froelichia floridana</i>	N	A
<b>Cashew Family</b>	<b>Anacardiaceae</b>		
Brazilian peppertree	<i>Schinus terebinthifolius</i>	I	P
<b>Carrot Family</b>	<b>Apiaceae</b>		
Spadeleaf	<i>Centella asiatica</i>	I	P
Button eryngo	<i>Eryngium yuccifolium</i>	N	P
Largeleaf pennywort	<i>Hydrocotyle bonariensis</i>	N	P
Sweetroot	<i>Osmorhiza</i> sp.		
<b>Holly Family</b>	<b>Aquifoliaceae</b>		
Yaupon	<i>Ilex vomitoria</i>	N	P
<b>Palm Family</b>	<b>Arecaceae</b>		
Fan palm	<i>Washingtonia</i> sp.		
<b>Milkweed Family</b>	<b>Asclepiadaceae</b>		
Zizotes milkweed	<i>Asclepias oenotheroides</i>	N	P
Swallow-wort	<i>Cynanchum</i> sp.		
Gulf Coast swallow-wort	<i>Cynanchum angustifolium</i>	N	P
<b>Sunflower Family</b>	<b>Asteraceae</b>		
Cuman ragweed	<i>Ambrosia psilostachya</i>	N	P
Arkansas dozedaisy	<i>Aphanostephus skirrhobasis</i>	N	A
Broomweed	<i>Amphiachyris</i> sp.		
Spiny chloracantha	<i>Aster spinosus</i>	N	A
Entireleaf western daisy	<i>Astranthium integrifolium</i>	N	A
Eastern baccharis	<i>Baccharis halimifolia</i>	N	P
Rooseveltweed	<i>Baccharis neglecta</i>	N	P
Bushy seaside tansy	<i>Borrichia frutescens</i>	N	P
Yellow thistle	<i>Cirsium horridulum</i>	N	A
Golden tickseed	<i>Coreopsis tinctoria</i>	N	P
Fiveneedle pricklyleaf	<i>Dyssodia pentachaeta</i>	N	P
Bristleleaf pricklyleaf	<i>Dyssodia tenuiloba</i>	N	A
Corpus Christi fleabane	<i>Erigeron procumbens</i>	N	P
Betonyleaf thoroughwort	<i>Eupatorium betonicifolium</i>	N	P
Yankeeweed	<i>Eupatorium compositifolium</i>	N	P
Jack in the bush	<i>Eupatorium odoratum</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Sticky florestina	<i>Florestina tripteris</i>	N	A
Lanceleaf blanketflower	<i>Gaillardia aestivalis</i>	N	P
Indian blanket	<i>Gaillardia pulchella</i>	N	A
Common sunflower	<i>Helianthus annuus</i>	N	A
Silverleaf sunflower	<i>Helianthus argophyllus</i>	N	A
Cucumberleaf sunflower	<i>Helianthus debilis</i>	N	A
Camphorweed	<i>Heterotheca latifolia</i>	N	A
Camphorweed	<i>Heterotheca subaxillaris</i>	N	A
Narrowleaf marsh elder	<i>Iva angustifolia</i>	N	A
Annual marsh elder	<i>Iva annua</i>	N	A
Marsh elder	<i>Iva</i> sp.		
Pinkscale blazing star	<i>Liatris elegans</i>	N	P
Pinkscale blazing star	<i>Liatris elegans</i> var. <i>carizzana</i>	N	P
Camphor daisy	<i>Machaeranthera phyllocephala</i>	N	A
Shiny goldenrod	<i>Oligoneuron nitidum</i>	N	P
Texas palafox	<i>Palafoxia texana</i>	N	A
Sweetscent	<i>Pluchea purpurascens</i>	N	A
Upright prairie conflower	<i>Ratibida columnifera</i>	N	P
Blackeyed susan	<i>Rudbeckia hirta</i>	N	P
Mexican bonebract	<i>Sclerocarpus uniserialis</i>	N	A
Riddell's ragwort	<i>Senecio riddellii</i>	N	P
Anisescented goldenrod	<i>Solidago odora</i>	N	P
Sowthistle	<i>Sonchus</i> sp.		
Rio Grande greenthread <sup>1</sup>	<i>Thelesperma nuecense</i>	N	A
<b>Saltwort Family</b>	<b>Bataceae</b>		
Turtleweed	<i>Batis maritime</i>	N	P
<b>Borage Family</b>	<b>Boraginaceae</b>		
Salt heliotrope	<i>Heliotropium curassavicum</i>	N	P
Indian heliotrope	<i>Heliotropium indicum</i>	N	P
<b>Cactus Family</b>	<b>Cactaceae</b>		
Texas pricklypear	<i>Opuntia engelmannii</i> var. <i>lindheimeri</i>	N	P
Twistspine pricklypear	<i>Opuntia macrorhiza</i>	N	P
<b>Bellflower Family</b>	<b>Campanulaceae</b>		
Clasping Venus' looking-glass	<i>Triodanis perfoliata</i>	N	A
<b>Caper Family</b>	<b>Capparaceae</b>		
Large clammyweed	<i>Polanisia erosa</i>	N	A
Large clammyweed <sup>1</sup>	<i>Polanisia erosa</i> ssp. <i>breviglandulosa</i>	N	A
<b>Pink Family</b>	<b>Caryophyllaceae</b>		
Salt sandspurry	<i>Spergularia salina</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Goosefoot Family</b>	<b>Chenopodiaceae</b>		
Crested saltbush	<i>Atriplex cristata</i>	N	A
Matamoros saltbush	<i>Atriplex matamorensis</i>	N	A
Mexican tea	<i>Chenopodium ambrosioides</i>	I	A
Virginia glasswort	<i>Salicornia depressa</i>	N	P
Pickleweed	<i>Salicornia</i> sp.		
Annual seepweed	<i>Suaeda linearis</i>	N	A
<b>Rockrose Family</b>	<b>Cistaceae</b>		
Georgia frostweed	<i>Helianthemum georgianum</i>	N	P
Hairy pinweed	<i>Lechea mucronata</i>	N	P
San Saba pinweed <sup>1</sup>	<i>Lechea san-sabeana</i>	N	P
<b>Dayflower Family</b>	<b>Commelinaceae</b>		
Whitemouth dayflower	<i>Commelina erecta</i>	N	P
Hairyflower spiderwort	<i>Tradescantia hirsutiflora</i>	N	P
Texas spiderwort	<i>Tradescantia humilis</i>	N	P
<b>Morningglory Family</b>	<b>Convolvulaceae</b>		
Tievine	<i>Ipomaea trichocarpa</i>	N	P
<b>Cucumber Family</b>	<b>Cucurbitaceae</b>		
Guadeloupe cucumber	<i>Melothria pendula</i>	N	P
<b>Manatee-grass Family</b>	<b>Cymodoceaceae</b>		
Shoalweed	<i>Halodule wrightii</i>	N	P
<b>Sedge Family</b>	<b>Cyperaceae</b>		
Densetuft hairsedge	<i>Bulbostylis capillaris</i>	N	A
Jointed flatsedge	<i>Cyperus articulatus</i>	N	P
Globe flatsedge	<i>Cyperus echinatus</i>	N	P
Royal flatsedge	<i>Cyperus elegans</i>	N	P
Haspan flatsedge	<i>Cyperus haspan</i>	N	P
Globe flatsedge	<i>Cyperus ovularis</i>	N	P
Manyspike flatsedge	<i>Cyperus polystachyos</i>	N	A
Texan flatsedge	<i>Cyperus polystachyos</i> var. <i>texensis</i>	N	A
Oneflower flatsedge	<i>Cyperus retroflexus</i>	N	P
Strawcolored flatsedge	<i>Cyperus strigosus</i>	N	P
Tropical flatsedge	<i>Cyperus surinamensis</i>	N	P
Flatsedge	<i>Cyperus</i> sp.		
Starrush whitetop	<i>Dichromena colorata</i>	N	P
Canada spikesedge	<i>Eleocharis caribaea</i>	N	A
Sand spikerush	<i>Eleocharis montevidensis</i>	N	P
Spikesedge	<i>Eleocharis</i> spp.		
Carolina fimbry	<i>Fimbristylis caroliniana</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Marsh fimbry	<i>Fimbristylis castanea</i>	N	P
Coastal plain umbrella-sedge	<i>Fuirena longa</i>	N	P
One-head porcupine-sedge	<i>Fuirena scirpoidea</i>	N	P
Western umbrella-sedge	<i>Fuirena simplex</i>	N	P
Starrush whitetop	<i>Rhynchospora colorata</i>	N	P
Spreading beaksedge	<i>Rhynchospora divergens</i>	N	A
Harvey's beaksedge	<i>Rhynchospora harveyii</i>	N	P
Smallseed breakrush	<i>Rhynchospora microcarpa</i>	N	P
Fringed nutrush	<i>Scleria ciliata</i>	N	P
Whip nutrush	<i>Scleria triglomerata</i>	N	P
Sturdy bulrush	<i>Schoenoplectus robustus</i>	N	P
Bulrush	<i>Scirpus</i> spp.		
<b>Spurge Family</b>	<b>Euphorbiaceae</b>		
Cardinal's feather	<i>Acalypha radians</i>	N	P
Texas bullnettle	<i>Cnidocolus texanus</i>	N	P
Healing croton	<i>Croton argyranthemus</i>	N	P
Hogwort	<i>Croton capitatus</i>	N	A
Vente conmigo	<i>Croton glandulosus</i>	N	A
Parks' croton <sup>1</sup>	<i>Croton parksii</i>	N	A
Croton	<i>Croton</i> sp.		
Spurge	<i>Euphorbia</i> sp.		
Drummond's leaf-flower	<i>Phyllanthus abnormis</i>	N	A
Queen's-delight	<i>Stillingia sylvatica</i>	N	P
Chinese tallow	<i>Triadica sebifera</i>	I	P
<b>Pea Family</b>	<b>Fabaceae</b>		
Sweet acacia	<i>Acacia smallii</i>	N	P
Longbract wild indigo	<i>Baptisia bracteata</i>	N	P
Spurred butterfly pea	<i>Centrosema virginianum</i>	N	P
Partridge pea	<i>Chamaecrista fasciculata</i>	N	A
Shakeshake	<i>Crotalaria incana</i>	I	A
Wedgeleaf prairie clover	<i>Dalea emarginata</i>	N	A
Pussyfoot <sup>1</sup>	<i>Dalea obovata</i>	N	P
Redcardinal	<i>Erythrina herbacea</i>	N	P
Coastal indigo	<i>Indigofera miniata</i>	N	P
Anil de pasto	<i>Indigofera suffruticosa</i>	N	P
White leadtree	<i>Leucaena leucocephala</i>	I	P
Popinac	<i>Leucaena pulverulenta</i>	N	P
White sweetclover	<i>Melilotus albus</i>	I	A
Annual yellow sweetclover	<i>Melilotus indicus</i>	I	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Kairn's sensitive-briar	<i>Mimosa latidens</i>	N	P
Tropical puff	<i>Neptunia pubescens</i>	N	P
Jerusalem thorn	<i>Parkinsonia aculeata</i>	N	P
Gulf Indian breadroot	<i>Pediomelum rhombifolium</i>	N	P
Honey mesquite	<i>Prosopis glandulosa</i>	N	P
Tornillo	<i>Prosopis reptans</i>	N	P
American stoutbean	<i>Rhynchosia americana</i>	N	P
Bigpod sesbania	<i>Sesbania herbacea</i>	N	A
Sidebeak pencilflower	<i>Stylosanthes biflora</i>	N	P
Multibloom hoarypea	<i>Tephrosia onobrychoides</i>	N	P
Leavenworth's vetch	<i>Vicia ludoviciana ssp. leavenworthii</i>	N	A
Viperina	<i>Zornia bracteata</i>	N	A
<b>Beech Family</b>	<b>Fagaceae</b>		
Laurel oak	<i>Quercus laurifolia</i>	N	P
Live oak	<i>Quercus virginiana</i>	N	P
<b>Fumitory Family</b>	<b>Fumariaceae</b>		
Smallflower fumewort	<i>Corydalis micrantha</i>	N	A
<b>Gentian Family</b>	<b>Gentianaceae</b>		
Arizona centaury	<i>Centaurium calycosum</i>	N	A
Catchfly prairie gentian	<i>Eustoma exaltatum</i>	N	A
Texas star	<i>Sabatia campestris</i>	N	A
<b>Tape-grass Family</b>	<b>Hydrocharitaceae</b>		
Engelmann's seagrass	<i>Halophila engelmannii</i>	N	P
<b>Waterleaf Family</b>	<b>Hydrophyllaceae</b>		
Sand phacelia	<i>Phacelia patuliflora</i>	N	A
Sand phacelia	<i>Phacelia patuliflora var. austrotexana</i>	N	A
<b>St. John's Wort Family</b>	<b>Hypericaceae</b>		
St. Andrew's cross	<i>Ascyrum hypericoides</i>	N	P
Nits and lice	<i>Hypericum drummondii</i>	N	A
Orangegrass	<i>Hypericum gentianoides</i>	N	A
<b>Iris Family</b>	<b>Iridaceae</b>		
Propeller flower	<i>Alophia drummondii</i>	N	P
Wiry blue-eyed grass	<i>Sisyrinchium biforme</i>	N	P
Blue-eyed grassi	<i>Sisyrinchium sp.</i>		
<b>Rush Family</b>	<b>Juncaceae</b>		
Toad rush	<i>Juncus bufonius</i>	N	A
Grassleaf rush	<i>Juncus marginatus</i>	N	P
Bighead rush	<i>Juncus megacephalus</i>	N	P
Roundhead rush	<i>Juncus validus</i>	N	P



COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Krameria Family</b>	<b>Krameriaceae</b>		
Trailing krameria	<i>Krameria lanceolata</i>	N	P
<b>Mint Family</b>	<b>Lamiaceae</b>		
Spotted beebalm	<i>Monarda punctata</i>	N	A
Drummond skullcap	<i>Scutellaria drummondii</i>	N	P
Canada germander	<i>Teucrium canadense</i>	N	P
Small coastal germander	<i>Teucrium cubense</i>	N	A
<b>Laurel Family</b>	<b>Lauraceae</b>		
Redbay	<i>Persea borbonia</i>	N	P
<b>Lily Family</b>	<b>Liliaceae</b>		
Crowpoison	<i>Nothoscordum bivalve</i>	N	P
Saw greenbrier	<i>Smilax bona-nox</i>	N	P
Buckley's yucca	<i>Yucca constricta</i>	N	P
Yucca	<i>Yucca</i> sp.		
<b>Stickleaf Family</b>	<b>Loasaceae</b>		
Chickenthief	<i>Mentzelia oligosperma</i>	N	P
<b>Logania Family</b>	<b>Loganiaceae</b>		
Juniper leaf	<i>Polypremum procumbens</i>	N	A
<b>Loosestrife Family</b>	<b>Lythraceae</b>		
Winged	<i>Lythrum alatum</i> var. <i>lanceolatum</i>	N	P
<b>Mallow Family</b>	<b>Malvaceae</b>		
Bladdermallow	<i>Herissantia crispa</i>	N	A
Indian Valley false mallow	<i>Malvastrum americanum</i>	N	A
False mallow	<i>Malvastrum</i> sp.		
Fanpetals	<i>Sida</i> sp.		
Woolly globemallow <sup>1</sup>	<i>Sphaeralcea lindheimeri</i>	N	P
<b>Mahogany Family</b>	<b>Meliaceae</b>		
Chinaberrytree	<i>Melia azedarach</i>	I	P
<b>Sweetgale Family</b>	<b>Myriacaceae</b>		
Wax myrtle	<i>Morella cerifera</i>	N	P
<b>Evening primrose Family</b>	<b>Onagraceae</b>		
Yellow sundrops	<i>Calylophus serrulatus</i>	N	P
Velvetweed	<i>Gaura mollis</i>	N	A
Cylindricfruit primrose-willow	<i>Ludwigia glandulosa</i>	N	P
Narrowleaf primrose-willow	<i>Ludwigia linearis</i>	N	P
Beach evening primrose	<i>Oenothera drummondii</i>	N	P
Showy evening primrose	<i>Oenothera grandis</i>	N	A
Downy evening primrose	<i>Oenothera laciniata</i>	N	P
Pinkladies	<i>Oenothera speciosa</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Orchid Family</b>	<b>Orchidaceae</b>		
Spring lady's tresses	<i>Spiranthes vernalis</i>	N	P
<b>Woodsorrel Family</b>	<b>Oxalidaceae</b>		
Drummond's woodsorrel	<i>Oxalis drummondii</i>	N	P
<b>Passionflower Family</b>	<b>Passifloraceae</b>		
Cottonleaf passionflower	<i>Passiflora foetida</i> var. <i>gossypifolia</i>	N	A
<b>Pokeweed Family</b>	<b>Phytolaccaceae</b>		
American pokeweed	<i>Phytolacca americana</i>	N	P
Rougeplant	<i>Rivina humilis</i>	N	P
<b>Plantain Family</b>	<b>Plantaginaceae</b>		
California plantain	<i>Plantago hookeriana</i>	N	A
Redseed plantain	<i>Plantago rhodosperma</i>	N	A
<b>Leadwort Family</b>	<b>Plumbaginaceae</b>		
Lavender thrift	<i>Limonium carolinianum</i>	N	P
<b>Grass Family</b>	<b>Poaceae (Gramineae)</b>		
Big bluestem	<i>Andropogon gerardii</i>	N	P
Bushy bluestem	<i>Andropogon glomeratus</i>	N	P
Threeawn	<i>Aristida</i> sp.		
Purple threeawn	<i>Aristida purpurea</i>	N	A
Red threeawn	<i>Aristida longiseta</i>	N	P
Slimspike threeawn	<i>Aristida longespica</i> . var. <i>geniculata</i>	N	A
Giant reed	<i>Arundo donax</i>	I	P
King Ranch bluestem	<i>Bothriochloa ischaemum</i>	N	P
Silver beardgrass	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	N	P
Hairy grama	<i>Bouteloua hirsuta</i>	N	P
Fringed signalgrass	<i>Brachiaria ciliatissima</i>	N	P
Coastal sandbur	<i>Cenchrus spinifex</i>	N	A
Slimspike windmill grass	<i>Chloris andropogonoides</i>	N	P
Hooded windmillgrass	<i>Chloris cucullata</i>	N	P
Shortspike windmill grasss	<i>Chloris subdolichostachya</i>	N	P
Tumble windmillgrass	<i>Chloris verticillata</i>	N	P
Cylinder jointtail grass	<i>Coelorachis cylindrica</i>	N	P
Bermudagrass	<i>Cynodon dactylon</i>	I	P
Egyptiangrass	<i>Dactyloctenium aegyptium</i>	I	A
Needleleaf rosette grass	<i>Dichantherium aciculare</i>	N	P
Cypress panicgrass	<i>Dichantherium dichotomum</i>	N	P
Heller's rosette grass	<i>Dichantherium oligosanthes</i>	N	P
Roundseed panicgrass	<i>Dichantherium sphaerocarpon</i>	N	P
Kleberg's bluestem	<i>Dichanthium annulatum</i>	I	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Angelton bluestem	<i>Dichanthium aristatum</i>	I	P
Silky bluestem	<i>Dichanthium sericeum</i>	I	P
Fall witchgrass	<i>Digitaria cognata</i>	N	P
Texas crabgrass <sup>1</sup>	<i>Digitaria texana</i>	N	P
Saltgrass	<i>Distichlis spicata</i>	N	P
Pan American balsamscale	<i>Elionurus tripsacoides</i>	N	P
Red lovegrass	<i>Eragrostis secundiflora</i>	N	P
Red lovegrass	<i>Eragrostis secundiflora</i> ssp. <i>oxylepis</i>	N	P
Purple lovegrass	<i>Eragrostis spectabilis</i>	N	P
Praire cupgrass	<i>Eriochloa contracta</i>	N	A
Pinewoods fingergrass	<i>Eustachys petraea</i>	N	P
Mexican sprangletop	<i>Leptochloa fusca</i> var. <i>uninervia</i>	N	A
Fall witchgrass	<i>Leptoloma cognata</i>	N	P
Ozark grass	<i>Limnodea arkansana</i>	N	A
Shoregrass	<i>Monanthochloe littoralis</i>	N	P
Gulfhairawn muhly	<i>Muhlenbergia filipes</i>	N	P
Texas signalgrass	<i>Panicum texana</i>	N	A
Switchgrass	<i>Panicum virgatum</i>	N	P
Longtom	<i>Paspalum denticulatum</i>	N	P
Gulfdune paspalum	<i>Paspalum monostachyum</i>	N	P
Brownseed paspalum	<i>Paspalum plicatulum</i>	N	P
Thin paspalum	<i>Paspalum setaceum</i>	N	P
Vasey's grass	<i>Paspalum urvillei</i>	I	P
Buffelgrass	<i>Pennisetum ciliare</i>	I	P
Annual rabbitsfoot grass	<i>Polypogon monspeliensis</i>	I	A
Shore little bluestem	<i>Schizachyrium littorale</i>	N	P
Little bluestem	<i>Schizachyrium scoparium</i>	N	P
Knotroot bristlegrass	<i>Setaria geniculata</i>	N	P
Streambed bristlegrass	<i>Setaria leucopila</i>	N	P
Marsh bristlegrass	<i>Setaria parviflora</i>	N	P
Indiangrass	<i>Sorghastrum nutans</i>	N	P
Johnsongrass	<i>Sorghum halepense</i>	I	P
Smooth cordgrass	<i>Spartina alterniflora</i>	N	P
Saltmeadow cordgrass	<i>Spartina patens</i>	N	P
Gulf cordgrass	<i>Spartina spartinae</i>	N	P
Spike dropseed	<i>Sporobolus cryptandrus</i>	N	P
Smut grass	<i>Sporobolus indicus</i>	N	A
Madagascardropseed	<i>Sporobolus pyramidatus</i>	N	P
Seashore dropseed	<i>Sporobolus virginicus</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
St. Augustine grass	<i>Stenotaphrum secundatum</i>	N	P
Purple sandgrass	<i>Triplasis purpurea</i>	N	A
Browntop signalgrass	<i>Urochloa fusca</i>	N	A
Guineagrass	<i>Urochloa maxima</i>	I	P
Panic liverseed grass	<i>Urochloa panicoides</i>	I	A
Texas signal grass	<i>Urochloa texana</i>	N	A
Texasgrass <sup>1</sup>	<i>Vaseyochloa multinervosa</i>	N	P
<b>Phlox Family</b>	<b>Polemoniaceae</b>		
Annual phlox	<i>Phlox drummondii</i>	N	A
Rio Grande phlox	<i>Phlox glabriflora</i>	N	A
<b>Buckwheat Family</b>	<b>Polygonaceae</b>		
Heartsepal buckwheat	<i>Eriogonum multiflorum</i>	N	A
October flower	<i>Polygonella polygama</i>	N	P
Knotweed	<i>Polygonum</i> sp.		
Bushy knotweed	<i>Polygonum ramosissimum</i>	N	A
<b>Purslane Family</b>	<b>Portulacaceae</b>		
Kiss me quick	<i>Portulaca mundula</i>	N	P
<b>Primrose Family</b>	<b>Primulaceae</b>		
Scarlet pimpernel	<i>Anagallis arvensis</i>	I	A
Chaffweed	<i>Anagallis minima</i>	N	A
Limewater brookweed	<i>Samolus ebracteatus</i>	N	P
<b>Rose Family</b>	<b>Rosaceae</b>		
Southern dewberry	<i>Rubus trivialis</i>	N	P
<b>Madder Family</b>	<b>Rubiaceae</b>		
Common buttonbush	<i>Cephalanthus occidentalis</i>	N	P
Poorjoe	<i>Diodia teres</i>	N	A
Diamondflowers	<i>Hedyotis nigricans</i>	N	P
Tropical Mexican clover	<i>Richardia brasiliensis</i>	N	A
<b>Ditch-grass Family</b>	<b>Ruppiaceae</b>		
Widgeongrass	<i>Ruppia maritima</i>	N	P
<b>Citrus Family</b>	<b>Rutaceae</b>		
Texas Hercules' club	<i>Zanthoxylum hirsutum</i>	N	P
<b>Willow Family</b>	<b>Salicaceae</b>		
Eastern cottonwood	<i>Populus deltoides</i>	N	P
Black willow	<i>Salix nigra</i>	N	P
<b>Figwort Family</b>	<b>Scrophulariaceae</b>		
Prairie false foxglove	<i>Agalinis heterophylla</i>	N	A
Saltmarsh false foxglove	<i>Agalinis maritima</i>	N	A
Gerardia	<i>Agalinis</i> sp.		

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Herb of grace	<i>Bacopa monnieri</i>	N	P
Yellowseed false pimpernel	<i>Lindernia dubia</i>	N	A
Gray-woolly twintip	<i>Stemodia lanata</i>	N	P
<b>Potato Family</b>	<b>Solanaceae</b>		
Berlandier's wolfberry	<i>Lycium berlandieri</i>	N	P
Carolina desert-thorn	<i>Lycium carolinianum</i>	N	P
Groundcherry	<i>Physalis</i> sp.		
Smallflower groundcherry	<i>Physalis cinerascens</i> var. <i>spatulifolia</i>	N	P
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	N	P
West Indian nightshade	<i>Solanum ptycanthum</i>	N	A
<b>Tamarix Family</b>	<b>Tamaricaceae</b>		
Tamarisk	<i>Tamarix</i> sp.	I	P
<b>Cattail Family</b>	<b>Typhaceae</b>		
Southern cattail	<i>Typha domingensis</i>	N	P
<b>Elm Family</b>	<b>Ulmaceae</b>		
Sugarberry	<i>Celtis laevigata</i>	N	P
<b>Nettle Family</b>	<b>Urticaceae</b>		
Pennsylvania pellitory	<i>Parietaria pennsylvanica</i>	N	A
<b>Vervain Family</b>	<b>Verbenaceae</b>		
Black mangrove	<i>Avicennia germinans</i>	N	P
Common lantana	<i>Lantana horrida</i>	N	P
Hairy fogfruit	<i>Phyla canescens</i>	N	P
Fogfruit	<i>Phyla</i> sp.		
Texas vervain	<i>Verbena halei</i>	N	P
<b>Grape Family</b>	<b>Vitaceae</b>		
Sorrelvine	<i>Cissus trifoliata</i>	N	P
Mustang grape	<i>Vitis mustangensis</i>	N	P
<b>Yellow-eyed grass family</b>	<b>Xyridaceae</b>		
Richard's yelloweyed grass	<i>Xyris jupicai</i>	N	A

<sup>1</sup> Texas endemic plant species (Wolfe et al. 1998)

Notes: I = invasive, introduced, or exotic species; N = native species; A = annual; P = perennial; Common and scientific names generally follow the USDA PLANTS Database naming convention (USDA NRCS 2013); species for which only the genera is listed are not categorized as invasive, native, annual or perennial species due to the variability that could occur within the genera.

Sources: U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) 2013, Woodin et al. 2010, Hickman et al. 2007, Wiemers et al. 2007, Navy 2006b, Wolfe et al. 1998, and Texas Parks & Wildlife Department (TPWD) 1992

This page intentionally left blank.

**Table E-2. Flora of NOLF Cabaniss.**

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Acanthus Family</b>	<b>Acanthaceae</b>		
Violet wild petunia	<i>Ruellia nudiflora</i>	N	P
Wild petunia	<i>Ruellia</i> sp.		
<b>Achatocarpus Family</b>	<b>Achatocarpaceae</b>		
Devilqueen	<i>Phaulothamnus spinescens</i>	N	P
<b>Amaryllis Family</b>	<b>Amaryllidaceae</b>		
Evening rainlily	<i>Cooperia drummondii</i>	N	P
<b>Cashew Family</b>	<b>Anacardiaceae</b>		
Brazilian peppertree	<i>Schinus terebinthifolius</i>	I	P
<b>Carrot Family</b>	<b>Apiaceae</b>		
Butler's sandparsley	<i>Ammoselinum butleri</i>	N	A
Plains sandparsley	<i>Ammoselinum popei</i>	N	A
Hairyfruit chervil	<i>Chaerophyllum tainturieri</i>	N	A
Marsh parsley	<i>Cyclospermum leptophyllum</i>	I	A
American wild carrot	<i>Daucus pusillus</i>	N	A
<b>Milkweed Family</b>	<b>Asclepiadaceae</b>		
Slim milkweed	<i>Asclepias linearis</i>	N	P
Fringed twinevine	<i>Funastrum cynanchoides</i>	N	P
<b>Sunflower Family</b>	<b>Asteraceae</b>		
Featherleaf desertpeony	<i>Acourtia runcinata</i>	N	P
Cuman ragweed	<i>Ambrosia psilostachya</i>	N	P
Great ragweed	<i>Ambrosia trifida</i>	N	A
Spiny chloracantha	<i>Aster spinosus</i>	N	A
Rooseveltweed	<i>Baccharis neglecta</i>	N	P
Prairie false willow	<i>Baccharis texana</i>	N	P
Bushy seaside tansy	<i>Borrchia frutescens</i>	N	P
Texas thistle	<i>Cirsium texanum</i>	N	P
Golden tickseed	<i>Coreopsis tinctoria</i>	N	P
Bristleleaf pricklyleaf	<i>Dyssodia tenuiloba</i>	N	A
Jack in the bush	<i>Eupatorium odoratum</i>	N	P
Spring pygmycudweed	<i>Evax verna</i>	N	A
Pink thoroughwort	<i>Fleischmannia incarnata</i>	N	P
Indian blanket	<i>Gaillardia pulchella</i>	N	A
Littlehead gumweed	<i>Grindelia microcephala</i>	N	A
Gumweed	<i>Grindelia</i> sp.		
Common sunflower	<i>Helianthus annuus</i>	N	A
Drummond's goldenbush	<i>Isocoma drummondii</i>	N	P
Annual marsh elder	<i>Iva annua</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Santa Maria feverfew	<i>Parthenium hysterophorus</i>	I	A
Smallflower desert-chicory	<i>Pyrrhopappus pauciflorus</i>	N	A
Upright prairie conflower	<i>Ratibida columnifera</i>	N	P
Blackeyed susan	<i>Rudbeckia hirta</i>	N	P
Sowthistle	<i>Sonchus</i> sp.		
Bahaman aster	<i>Symphyotrichum bahamense</i>	N	A
Eastern annual saltmarsh aster	<i>Symphyotrichum subulatum</i>	N	A
Texas crownbeard	<i>Verbesina microptera</i>	N	P
Hairy wedelia	<i>Wedelia texana</i>	N	P
Rough cocklebur	<i>Xanthium strumarium</i>	N	A
Texas desert goldenrod	<i>Xylothamia palmeri</i>	N	P
<b>Barberry Family</b>	<b>Berberidaceae</b>		
Algerita	<i>Mahonia trifoliolata</i>	N	P
<b>Mustard Family</b>	<b>Brassicaceae</b>		
Virgin pepperweed	<i>Lepidium virginicum</i>	N	A
Silver bladderpod	<i>Lesquerella argyraea</i>	N	P
Lindheimer's bladderpod	<i>Lesquerella lindheimeri</i>	N	A
<b>Cactus Family</b>	<b>Cactaceae</b>		
Christmas cactus	<i>Cylindropuntia leptocaulis</i>	N	P
Texas pricklypear	<i>Opuntia engelmannii</i> var. <i>lindheimeri</i>	N	P
Pricklypear	<i>Opuntia</i> sp.		
<b>Bellflower Family</b>	<b>Campanulaceae</b>		
Clasping Venus' looking-glass	<i>Triodanis perfoliata</i>	N	A
Venus' looking-glass	<i>Triodanis</i> sp.		
<b>Pink Family</b>	<b>Caryophyllaceae</b>		
Sleepy silene	<i>Silene antirrhina</i>	N	A
<b>Bittersweet Family</b>	<b>Celastraceae</b>		
Florida mayten	<i>Maytenus phyllanthoides</i>	N	P
<b>Goosefoot Family</b>	<b>Chenopodiaceae</b>		
Pickleweed	<i>Salicornia</i> sp.		
Annual seepweed	<i>Suaeda linearis</i>	N	A
<b>Dayflower Family</b>	<b>Commelinaceae</b>		
Whitemouth dayflower	<i>Commelina erecta</i>	N	P
Buckley's spiderwort <sup>1</sup>	<i>Tradescantia buckleyi</i>	N	P
<b>Morningglory Family</b>	<b>Convolvulaceae</b>		
Cusp dodder	<i>Cuscuta cuspidata</i>	N	P
Tievine	<i>Ipomaea trichocarpa</i>	N	P
<b>Sedge Family</b>	<b>Cyperaceae</b>		
Britton's sedge	<i>Carex tetrastachya</i>	N	P



Naval Air Station Corpus Christi  
Integrated Natural Resources Management Plan

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Tapertip flatsedge	<i>Cyperus acuminatus</i>	N	A
Royal flatsedge	<i>Cyperus elegans</i>	N	P
Pond flatsedge	<i>Cyperus ochraceus</i>	N	P
Oneflower flatsedge	<i>Cyperus retroflexus</i>	N	P
Pale spikerush	<i>Eleocharis macrostachya</i>	N	P
Sand spikerush	<i>Eleocharis montevidensis</i>	N	P
Cosmopolitan bulrush	<i>Schoenoplectus maritimus</i>	N	P
Sturdy bulrush	<i>Schoenoplectus robustus</i>	N	P
<b>Spurge Family</b>	<b>Euphorbiaceae</b>		
Warty spurge	<i>Euphorbia spathulata</i>	N	A
Leatherstem	<i>Jatropha dioica</i>	N	P
Smartweed leaf-flower	<i>Phyllanthus polygonoides</i>	N	P
Branched noseburn	<i>Tragia ramosa</i>	N	P
Chinese tallow	<i>Triadica sebifera</i>	I	P
<b>Pea Family</b>	<b>Fabaceae</b>		
Blackbrush acacia	<i>Acacia rigidula</i>	N	P
Acacia	<i>Acacia</i> sp.		
Sweet acacia	<i>Acacia smallii</i>	N	P
Brazos milkvetch	<i>Astragalus brazoensis</i>	N	A
Wild tantan	<i>Desmanthus virgatus</i>	N	P
Haujillo	<i>Havardia pallens</i>	N	P
Coastal indigo	<i>Indigofera miniata</i>	N	P
Tiny pea	<i>Lathyrus pusillus</i>	N	A
Popinac	<i>Leucaena pulverulenta</i>	N	P
Leadtree	<i>Leucaena</i> sp.		
Burclover	<i>Medicago polymorpha</i>	I	A
White sweetclover	<i>Melilotus albus</i>	I	A
Annual yellow sweetclover	<i>Melilotus indicus</i>	I	A
Kairn's sensitive-briar	<i>Mimosa latidens</i>	N	P
Tropical puff	<i>Neptunia pubescens</i>	N	P
Jerusalem thorn	<i>Parkinsonia aculeata</i>	N	P
Honey mesquite	<i>Prosopis glandulosa</i>	N	P
Texas snoutbean	<i>Rhynchosia senna</i> var. <i>texana</i>	N	P
Leavenworth's vetch	<i>Vicia ludoviciana</i> ssp. <i>leavenworthii</i>	N	A
<b>Geranium Family</b>	<b>Geraniaceae</b>		
Texas geranium	<i>Geranium texanum</i>	N	A
<b>Waterleaf Family</b>	<b>Hydrophyllaceae</b>		
Coastal phacelia <sup>2</sup>	<i>Phacelia laxa</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Iris Family</b>	<b>Iridaceae</b>		
Roadside blue-eyed grass	<i>Sisyrinchium langloisii</i>	N	P
<b>Mint Family</b>	<b>Lamiaceae</b>		
Lemon beebalm	<i>Monarda citriodora</i>	N	A
Spotted beebalm	<i>Monarda punctata</i>	N	A
Blood sage	<i>Salvia coccinea</i>	N	A
Mousesear	<i>Stachys crenata</i>	N	A
Canada germander	<i>Teucrium canadense</i>	N	P
<b>Lily Family</b>	<b>Liliaceae</b>		
Don Quixote's lace	<i>Yucca treculeana</i>	N	P
<b>Loosestrife Family</b>	<b>Lythraceae</b>		
Winged lythrum	<i>Lythrum alatum</i> var. <i>lanceolatum</i>	N	P
<b>Barbados Cherry Family</b>	<b>Malpighiaceae</b>		
Wild crapemyrtle	<i>Malpighia glabra</i>	N	P
<b>Mallow Family</b>	<b>Malvaceae</b>		
Indian mallow	<i>Abutilon</i> sp.		
Pelotazo	<i>Abutilon incanum</i>	N	P
Wright's false mallow	<i>Malvastrum aurantiacum</i>	N	P
Threelobe false mallow	<i>Malvastrum coromandelianum</i>	I	A
False mallow	<i>Malvustrum</i> sp.		
Buffpetal	<i>Rhynchosida physocalyx</i>	N	P
Prickly fanpetals	<i>Sida spinosa</i>	N	A
Wissadula	<i>Wissadula</i> sp.		
<b>Mahogany Family</b>	<b>Meliaceae</b>		
Chinaberrytree	<i>Melia azedarach</i>	I	P
<b>Four O'Clock Family</b>	<b>Nyctaginaceae</b>		
Berlandier's trumpets	<i>Acleisanthes obtusa</i>	N	P
Scarlet spiderling	<i>Boerhavia coccinea</i>	N	P
White four o'clock	<i>Mirabilis albida</i>	N	P
<b>Olive Family</b>	<b>Oleaceae</b>		
Narrowleaf elbowbrush	<i>Forestiera angustifolia</i>	N	P
Mexican ash	<i>Fraxinus berlandieriana</i>	N	P
<b>Evening primrose Family</b>	<b>Onagraceae</b>		
Velvetweed	<i>Gaura mollis</i>	N	A
Beeblossom	<i>Gaura</i> sp.		
Kunth's evening primrose	<i>Oenothera kunthiana</i>	N	A
Pinkladies	<i>Oenothera speciosa</i>	N	P
<b>Orchid Family</b>	<b>Orchidaceae</b>		
Spring lady's tresses	<i>Spiranthes vernalis</i>	N	P

Naval Air Station Corpus Christi  
Integrated Natural Resources Management Plan

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Woodsorrel Family</b>	<b>Oxalidaceae</b>		
Slender yellow woodsorrel	<i>Oxalis dillenii</i>	N	P
Drummond's woodsorrel	<i>Oxalis drummondii</i>	N	P
<b>Plantain Family</b>	<b>Plantaginaceae</b>		
Redseed plantain	<i>Plantago rhodosperma</i>	N	A
<b>Grass Family</b>	<b>Poaceae (Gramineae)</b>		
Big bluestem	<i>Andropogon gerardii</i>	N	P
Bushy bluestem	<i>Andropogon glomeratus</i>	N	P
Purple threeawn	<i>Aristida purpurea</i>	N	A
King Ranch bluestem	<i>Bothriochloa ischaemum</i>	N	P
Silver bluestem	<i>Bothriochloa saccharoides</i>	N	P
Texas grama	<i>Bouteloua rigidisetia</i>	N	P
Fringed signalgrass	<i>Brachiaria ciliatissima</i>	N	P
Rescuegrass	<i>Bromus catharticus</i>	I	A
Buffalograss	<i>Bouteloua dactyloides</i>	N	P
Coastal sandbur	<i>Cenchrus spinifex</i>	N	A
Fringed windmill grass	<i>Chloris ciliata</i>	N	A
Rhodes grass	<i>Chloris gayana</i>	I	P
Feather fingrass	<i>Chloris virgata</i>	N	A
Bermudagrass	<i>Cynodon dactylon</i>	I	P
Kleberg's bluestem	<i>Dichanthium annulatum</i>	I	P
Angleton bluestem	<i>Dichanthium aristatum</i>	I	P
Silky bluestem	<i>Dichanthium sericeum</i>	I	P
Saltgrass	<i>Distichlis spicata</i>	N	P
Prairie cupgrass	<i>Eriochloa contracta</i>	N	A
Louisiana cupgrass	<i>Eriochloa punctata</i>	N	A
Little barley	<i>Hordeum pusillum</i>	N	A
Bearded sprangletop	<i>Leptochloa fusca</i>	N	A
Ozark grass	<i>Limnodea arkansana</i>	N	A
Shoregrass	<i>Monanthochloe littoralis</i>	N	P
Texas wintergrass	<i>Nassella leucotricha</i>	N	P
Vine mesquite	<i>Panicum obtusum</i>	N	P
Buffelgrass	<i>Pennisetum ciliare</i>	I	P
Knotroot bristlegrass	<i>Setaria geniculata</i>	N	P
Streambed bristlegrass	<i>Setaria leucopila</i>	N	P
Bristlegrass	<i>Setaria sp.</i>		
Johnsongrass	<i>Sorghum halepense</i>	I	P
Gulf cordgrass	<i>Spartina spartinae</i>	N	P
Seashore dropseed	<i>Sporobolus virginicus</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Browntop signalgrass	<i>Urochloa fusca</i>	N	A
Guineagrass	<i>Urochloa maxima</i>	I	P
Sprawling signalgrass	<i>Urochloa reptans</i>	I	A
<b>Buckwheat Family</b>	<b>Polygonaceae</b>		
Amamastla	<i>Rumex chrysocarpus</i>	N	P
<b>Primrose Family</b>	<b>Primulaceae</b>		
Scarlet pimpernel	<i>Anagallis arvensis</i>	I	A
<b>Pomegranate Family</b>	<b>Punicaceae</b>		
Pomegranate	<i>Punica granatum</i>	I	P
<b>Buckthorn Family</b>	<b>Rhamnaceae</b>		
Brazilian bluewood	<i>Condalia hookeri</i>	N	P
Coyotillo	<i>Karwinskia humboldtiana</i>	N	P
Lotebush	<i>Ziziphus obtusifolia</i>	N	P
<b>Rose Family</b>	<b>Rosaceae</b>		
Southern dewberry	<i>Rubus trivialis</i>	N	P
<b>Madder Family</b>	<b>Rubiaceae</b>		
Stickywilly	<i>Galium aparine</i>	N	A
Southwestern bedstraw	<i>Galium virgatum</i>	N	A
Diamondflowers	<i>Hedyotis nigricans</i>	N	P
<b>Ditch-grass Family</b>	<b>Ruppiaceae</b>		
Widgeongrass	<i>Ruppia maritima</i>		
<b>Citrus Family</b>	<b>Rutaceae</b>		
Texas torchwood	<i>Amyris texana</i>	N	P
Colima	<i>Zanthoxylum fagara</i>	N	P
<b>Sapodilla Family</b>	<b>Sapotaceae</b>		
La coma	<i>Bumelia celastrina</i>	N	P
<b>Figwort Family</b>	<b>Scrophulariaceae</b>		
Prairie false foxglove	<i>Agalinis heterophylla</i>	N	A
<b>Potato Family</b>	<b>Solanaceae</b>		
Berlandier's wolfberry	<i>Lycium berlandieri</i>	N	P
Carolina wolfberry	<i>Lycium carolinianum</i>	N	P
Groundcherry	<i>Physalis sp.</i>		
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	N	P
Texas nightshade	<i>Solanum triquetrum</i>	N	P
<b>Cacao Family</b>	<b>Sterculiaceae</b>		
Pyramidflower	<i>Melochia pyramidata</i>	N	A
<b>Tamarix Family</b>	<b>Tamaricaceae</b>		
Athel tamarisk	<i>Tamarix aphylla</i>	I	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Cattail Family</b>	<b>Typhaceae</b>		
Cattail	<i>Typha</i> sp.		
Southern cattail	<i>Typha domingensis</i>	N	P
<b>Elm Family</b>	<b>Ulmaceae</b>		
Granjeno	<i>Celtis ehrenbergiana</i>	N	P
Sugarberry	<i>Celtis</i> sp.	N	P
Netleaf hackberry	<i>Celtis laevigata</i> var. <i>reticulate</i>	N	P
<b>Vervain Family</b>	<b>Verbenaceae</b>		
Whitebrush	<i>Aloysia gratissima</i>	N	P
Common lantana	<i>Lantana horrida</i>	N	P
Turkey tangle fogfruit	<i>Phyla nodiflora</i>	N	P
Brazilian vervain	<i>Verbena brasiliensis</i>	I	A
Texas vervain	<i>Verbena halei</i>	N	P
Vervain	<i>Verbena</i> sp.		
Gulf vervain	<i>Verbena xutha</i>	N	A
<b>Grape Family</b>	<b>Vitaceae</b>		
Ivy treebine	<i>Cissus incisa</i>	N	P
Sorrelvine	<i>Cissus trifoliata</i>	N	P
<b>Creosote-bush Family</b>	<b>Zygophyllaceae</b>		
Texas lignum-vitae	<i>Guaiacum angustifolium</i>	N	P

<sup>1</sup> Listed as rare, threatened, or endangered species (see Table E-13)

<sup>2</sup> Identified as Texas endemic plant species (Wolfe et al. 1998)

Notes: I = invasive, introduced, or exotic species; N = native species; A = annual; P = perennial; Common and scientific names generally follow the USDA PLANTS Database naming convention (USDA NRCS 2013); species for which only the genera is listed are not categorized as invasive, native, annual or perennial species due to the variability that could occur within the genera.

Sources: USDA NRCS 2013, Wiemers et al. 2007, Navy 2006b, Wolfe et al. 1998, and TPWD 1992

This page intentionally left blank.

**Table E-3. Flora of NOLF Waldron.**

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Carpetweed Family</b>	<b>Aizoaceae</b>		
Green carpetweed	<i>Mollugo verticillata</i>	N	A
<b>Amaranth Family</b>	<b>Amaranthaceae</b>		
Plains snakecotton	<i>Froelichia floridana</i>	N	A
<b>Cashew Family</b>	<b>Anacardiaceae</b>		
Brazilian peppertree	<i>Schinus terebinthifolius</i>	I	P
<b>Carrot Family</b>	<b>Apiaceae</b>		
Butler's sandparsley	<i>Ammoselinum butleri</i>	N	A
Spadeleaf	<i>Centella asiatica</i>	I	P
Marsh parsley	<i>Cyclospermum leptophyllum</i>	I	A
Button eryngo	<i>Eryngium yuccifolium</i>	N	P
Largeleaf pennywort	<i>Hydrocotyle bonariensis</i>	N	P
<b>Holly Family</b>	<b>Aquifoliaceae</b>		
Yaupon	<i>Ilex vomitoria</i>	N	P
<b>Milkweed Family</b>	<b>Asclepiadaceae</b>		
Zizotes milkweed	<i>Asclepias oenotheroides</i>	N	P
Bearded swallow-wart	<i>Cynanchum barbigerum</i>	N	P
<b>Sunflower Family</b>	<b>Asteraceae</b>		
Cuman ragweed	<i>Ambrosia psilostachya</i>	N	P
Arkansas dozedaisy	<i>Aphanostephus skirrhobasis</i>	N	A
Dozedaisy	<i>Aphanostephus</i> sp.		
Sagebrush	<i>Artemisia</i> sp.		
Rooseveltweed	<i>Baccharis neglecta</i>	N	P
Bushy seaside tansy	<i>Borrchia frutescens</i>	N	P
Spiny chloracantha	<i>Chloracantha spinosa</i>	N	P
Soft goldenaster	<i>Chrysopsis pilosa</i>	N	A
Yellow thistle	<i>Cirsium horridulum</i>	N	A
Canadian horseweed	<i>Conyza canadensis</i>	N	A
American burnweed	<i>Erechtites hieraciifolia</i>	N	A
Corpus Christi fleabane	<i>Erigeron procumbens</i>	N	P
Betonyleaf thoroughwort	<i>Eupatorium betonicifolium</i>	N	P
Yankeeweed	<i>Eupatorium compositifolium</i>	N	P
Lateflowering thoroughwort	<i>Eupatorium serotinum</i>	N	P
Lanceleaf blanketflower	<i>Gaillardia aestivalis</i>	N	P
Indian blanket	<i>Gaillardia pulchella</i>	N	A
Pennsylvania everlasting	<i>Gamochaeta pensylvanica</i>	N	A
Silverleaf sunflower	<i>Helianthus argophyllus</i>	N	A
Cucumberleaf sunflower	<i>Helianthus debilis</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Camphorweed	<i>Heterotheca subaxillaris</i>	N	A
Narrowleaf marsh elder	<i>Iva angustifolia</i>	N	A
Seacoast marsh elder	<i>Iva imbricata</i>	N	P
Broomweed	<i>Amphiachyris</i> sp.		
Pinkscale blazing star	<i>Liatris elegans</i> var. <i>carizzana</i>	N	P
Climbing hempvine	<i>Mikania scandens</i>	N	P
Texas palafox	<i>Palafoxia texana</i>	N	A
Sweetscent	<i>Pluchea purpurascens</i>	N	A
Blackeyed susan	<i>Rudbeckia hirta</i>	N	P
Aniscented goldenrod	<i>Solidago odora</i>	N	P
Seaside goldenrod	<i>Solidago sempervirens</i>	N	P
Rio Grande greenthread <sup>1</sup>	<i>Thelesperma nuecense</i> <sup>1</sup>	N	A
Giveneedle pricklyleaf	<i>Thymophylla pentachaeta</i>	N	P
<b>Borage Family</b>	<b>Boraginaceae</b>		
Salt heliotrope	<i>Heliotropium curassavicum</i>	N	P
<b>Cactus Family</b>	<b>Cactaceae</b>		
Texas pricklypear	<i>Opuntia engelmannii</i> var. <i>lindheimeri</i>	N	P
<b>Bellflower Family</b>	<b>Campanulaceae</b>		
Clasping Venus' looking-glass	<i>Triodanis perfoliata</i>	N	A
<b>Caper Family</b>	<b>Capparaceae</b>		
Large clammyweed	<i>Polanisia erosa</i>	N	A
Large clammyweed <sup>1</sup>	<i>Polanisia erosa</i> ssp. <i>breviglandulosa</i> <sup>1</sup>	N	A
<b>Pink Family</b>	<b>Caryophyllaceae</b>		
Drummon's nailwort	<i>Paronychia drummondii</i>	N	A
Jones' nailwort	<i>Paronychia jonesii</i>	N	A
Prostrate starwort	<i>Stellaria prostrata</i>	N	A
<b>Rockrose Family</b>	<b>Cistaceae</b>		
Georgia frostweed	<i>Helianthemum georgianum</i>	N	P
Hairy pinweed	<i>Lechea mucronata</i>	N	P
San Saba pinweed <sup>1</sup>	<i>Lechea san-sabeana</i> <sup>1</sup>	N	P
<b>Mangosteen Family</b>	<b>Clusiaceae</b>		
Fewflower St. Johnswort	<i>Hypericum pauciflorum</i>	N	P
<b>Dayflower Family</b>	<b>Commelinaceae</b>		
Whitemouth dayflower	<i>Commelina erecta</i>	N	P
Hairyflower spiderwort	<i>Tradescantia hirsutiflora</i>	N	P
Texas spiderwort	<i>Tradescantia humilis</i>	N	P
<b>Morningglory Family</b>	<b>Convolvulaceae</b>		
Tievine	<i>Ipomaea trichocarpa</i>	N	P
Hairy dawnflower	<i>Stylisma villosa</i>	N	P



COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Cucumber Family</b>	<b>Cucurbitaceae</b>		
Guadeloupe cucumber	<i>Melothria pendula</i>	N	P
<b>Sedge Family</b>	<b>Cyperaceae</b>		
Densetuft hairsedge	<i>Bulbostylis capillaris</i>	N	A
Tapertip flatsedge	<i>Cyperus acuminatus</i>	N	A
Baldwin's flatsedge	<i>Cyperus croceus</i>	N	P
Globe flatsedge	<i>Cyperus echinatus</i>	N	P
Haspan flatsedge	<i>Cyperus haspan</i>	N	P
Pine barren flatsedge	<i>Cyperus retrorsus</i>	N	P
Starrush whitetop	<i>Dichromena colorata</i>	N	P
Canada spikesege	<i>Eleocharis caribaea</i>	N	A
Gulf Coast spikerush	<i>Eleocharis cellulosa</i>	N	P
Wright's spikerush	<i>Eleocharis diandra</i>	N	A
Sand spikerush	<i>Eleocharis montevidensis</i>	N	P
Common spikerush	<i>Eleocharis palustris</i>	N	P
Slender fimbry	<i>Fimbristylis autumnalis</i>	N	A
Carolina fimbry	<i>Fimbristylis caroliniana</i>	N	P
One-head porcupine-sedge	<i>Fuirena scirpoidea</i>	N	P
Western umbrella-sedge	<i>Fuirena simplex</i>	N	P
Starrush whitetop	<i>Rhynchospora colorata</i>	N	P
Spreading beaksedge	<i>Rhynchospora divergens</i>	N	A
Globe beaksedge	<i>Rhynchospora globularis</i>	N	A
Harvey's beaksedge	<i>Rhynchospora harveyi</i>	N	P
Smallseed breakrush	<i>Rhynchospora microcarpa</i>	N	P
Chairmaker's bulrush	<i>Schoenoplectus americanus</i>	N	P
Sharpscale bulrush	<i>Schoenoplectus erectus</i> var. <i>raynalii</i>	N	P
Fringed nutrush	<i>Scleria iliata</i> var. <i>ciliata</i>	N	P
Whip nutrush	<i>Scleria triglomerata</i>	N	P
Sharpscale bulrush	<i>Scirpus wilkensis</i>	N	P
<b>Sundew Family</b>	<b>Droseraceae</b>		
Dwarf sundew	<i>Drosera brevifolia</i>	N	A
<b>Spurge Family</b>	<b>Euphorbiaceae</b>		
Cardinal's feather	<i>Acalypha radians</i>	N	P
Dixie sandmat	<i>Chamaesyce bombensis</i>	N	A
Hartleaf sandmat	<i>Chamaesyce cordifolia</i>	N	A
Healing croton	<i>Croton argyranthemus</i>	N	P
Hogwort	<i>Croton capitatus</i>	N	A
Vente conmigo	<i>Croton glandulosus</i>	N	A
Drummond's leaf-flower	<i>Phyllanthus abnormis</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Queen's-delight	<i>Stillingia sylvatica</i>	N	P
Chinese tallow	<i>Triadica sebifera</i>	I	P
<b>Pea Family</b>	<b>Fabaceae</b>		
Sticky jointvetch	<i>Aeschynomene viscidula</i>	N	P
Longbract wild indigo	<i>Baptisia bracteata</i>	N	P
Spurred butterfly pea	<i>Centrosema virginianum</i>	N	P
Partridge pea	<i>Chamaecrista fasciculata</i>	N	A
Arrowhead rattlebox	<i>Crotalaria sagittalis</i>	N	A
Wedgeleaf prairie clover	<i>Dalea emarginata</i>	N	A
Coastal indigo	<i>Indigofera miniata</i>	N	P
Anil de pasto	<i>Indigofera suffruticosa</i>	N	P
White leadtree	<i>Leucaena leucocephala</i>	I	P
Kairn's sensitive-briar	<i>Mimosa latidens</i>	N	P
Honey mesquite	<i>Prosopis glandulosa</i>	N	P
American stoutbean	<i>Rhynchosia americana</i>	N	P
Sesbania	<i>Sesbania</i> sp.		
Sidebeak pencilflower	<i>Stylosanthes biflora</i>	N	P
Multibloom hoarypea	<i>Tephrosia onobrychoides</i>	N	P
Louisiana vetch	<i>Vicia ludoviciana</i>	N	A
<b>Beech Family</b>	<b>Fagaceae</b>		
Darlington oak	<i>Quercus hemisphaerica</i>	N	P
Laurel oak	<i>Quercus laurifolia</i>	N	P
Blackjack oak	<i>Quercus marilandica</i>	N	P
Oak	<i>Quercus</i> sp.		
Post oak	<i>Quercus stellata</i>	N	P
Live oak	<i>Quercus virginiana</i>	N	P
<b>Gentian Family</b>	<b>Gentianaceae</b>		
Texas star	<i>Sabatia campestris</i>	N	A
<b>Waterleaf Family</b>	<b>Hydrophyllaceae</b>		
Coastal phacelia <sup>1</sup>	<i>Phacelia laxa</i>	N	A
Bristly nama	<i>Nama hispidum</i>	N	A
<b>Mangosteen Family</b>	<b>Clusiaceae</b>		
St. Andrew's cross	<i>Ascyrum hypericoides</i>	N	P
<b>Iris Family</b>	<b>Iridaceae</b>		
Propeller flower	<i>Alophia drummondii</i>	N	P
<b>Rush Family</b>	<b>Juncaceae</b>		
Grassleaf rush	<i>Juncus marginatus</i>	N	P
Bighead rush	<i>Juncus megacephalus</i>	N	P
Needlepod rush	<i>Juncus scirpoides</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Roundhead rush	<i>Juncus validus</i>	N	P
<b>Krameria Family</b>	<b>Krameriaceae</b>		
Trailing krameria	<i>Krameria lanceolata</i>	N	P
<b>Mint Family</b>	<b>Lamiaceae</b>		
Spotted beebalm	<i>Monarda punctata</i>	N	A
Drummond skullcap	<i>Scutellaria drummondii</i>	N	P
<b>Laurel Family</b>	<b>Lauraceae</b>		
Redbay	<i>Persea borbonia</i>	N	P
<b>Duckweed Family</b>	<b>Lemnaceae</b>		
Duckweed	<i>Lemna</i> sp.		
<b>Bladderwort Family</b>	<b>Lentibulariaceae</b>		
Zigzag bladderwort	<i>Utricularia subulata</i>	N	A
<b>Lily Family</b>	<b>Liliaceae</b>		
Crowpoison	<i>Nothoscordum bivalve</i>	N	P
Saw greenbrier	<i>Smilax bona-nox</i>	N	P
Buckley's yucca	<i>Yucca constricta</i>	N	P
<b>Logania Family</b>	<b>Loganiaceae</b>		
Juniper leaf	<i>Polypremum procumbens</i>	N	A
<b>Loosestrife Family</b>	<b>Lythraceae</b>		
Winged lythrum	<i>Lythrum alatum</i> var. <i>lanceolatum</i>	N	P
Lowland rotala	<i>Rotala ramosior</i>	N	A
<b>Mallow Family</b>	<b>Malvaceae</b>		
Showy fanpetals	<i>Sida lindheimeri</i>	N	P
<b>Water-clover Family</b>	<b>Marsileaceae</b>		
Waterclover	<i>Marsilea</i> sp.		
<b>Mahogany Family</b>	<b>Meliaceae</b>		
Chinaberrytree	<i>Melia azedarach</i>	I	P
<b>Sweetgale Family</b>	<b>Myriacaceae</b>		
Wax myrtle	<i>Morella cerifera</i>	N	P
<b>Evening primrose Family</b>	<b>Onagraceae</b>		
Berlandier's sundrops	<i>Calylophus berlandieri</i>	N	P
Cylindricfruit primrose-willow	<i>Ludwigia glandulosa</i>	N	P
Showy evening primrose	<i>Oenothera grandis</i>	N	A
Downy evening primrose	<i>Oenothera laciniata</i>	N	P
<b>Orchid Family</b>	<b>Orchidaceae</b>		
Spring lady's tresses	<i>Spiranthes vernalis</i>	N	P
<b>Passionflower Family</b>	<b>Passifloraceae</b>		
Cottonleaf passionflower	<i>Passiflora foetida</i> var. <i>gossypifolia</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Plantain Family</b>	<b>Plantaginaceae</b>		
California plantain	<i>Plantago hookeriana</i>	N	A
<b>Grass Family</b>	<b>Poaceae (Gramineae)</b>		
Chalky bluestem	<i>Andropogon capillipes</i>	N	P
Big bluestem	<i>Andropogon gerardii</i>	N	P
Bushy bluestem	<i>Andropogon glomeratus</i>	N	P
Slimspike threeawn	<i>Aristida longespica</i> , var. <i>geniculata</i>	N	A
King Ranch bluestem	<i>Bothriochloa ischaemum</i>	N	P
Yellow bluestem	<i>Bothriochloa ischaemum</i> var. <i>songarica</i>	I	P
Silver beardgrass	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	N	P
Texas grama	<i>Bouteloua rigidiseta</i>	N	P
Rescuegrass	<i>Bromus catharticus</i>	I	A
Coastal sandbur	<i>Cenchrus spinifex</i>	N	A
Fringed windmill grass	<i>Chloris ciliata</i>	N	A
Western panicgrass	<i>Dichanthelium acuminatum</i> var. <i>fasciculatum</i>	N	P
Needleleaf rosette grass	<i>Dichanthelium aciculare</i>	N	P
Cypress panicgrass	<i>Dichanthelium dichotomum</i>	N	P
Heller's rosette grass	<i>Dichanthelium oligosanthes</i>	N	P
Roundseed panicgrass	<i>Dichanthelium sphaerocarpon</i>	N	P
Kleberg's bluestem	<i>Dichanthium annulatum</i>	I	P
Silky bluestem	<i>Dichanthium sericeum</i>	I	P
Texas crabgrass <sup>1</sup>	<i>Digitaria texana</i>	N	P
Red lovegrass	<i>Eragrostis secundiflora</i>	N	P
Red lovegrass	<i>Eragrostis secundiflora</i> ssp. <i>oxylepis</i>	N	P
Purple lovegrass	<i>Eragrostis spectabilis</i>	N	P
Pinewoods fingergrass	<i>Eustachys petraea</i>	N	P
Hairawn muhly	<i>Muhlenbergia capillaris</i>	N	P
Gulfhairawn muhly	<i>Muhlenbergia filipes</i>	N	P
Gaping grass	<i>Panicum hians</i>	N	P
Switchgrass	<i>Panicum virgatum</i>	N	P
Knotgrass	<i>Paspalum distichum</i>	N	P
Gulfdune paspalum	<i>Paspalum monostachyum</i>	N	P
Brownseed paspalum	<i>Paspalum plicatulum</i>	N	P
Thin paspalum	<i>Paspalum setaceum</i>	N	P
Shore little bluestem	<i>Schizachyrium littorale</i>	N	P
Little bluestem	<i>Schizachyrium scoparium</i>	N	P
Knotroot bristlegrass	<i>Setaria geniculata</i>	N	P
Indiangrass	<i>Sorghastrum nutans</i>	N	P
Silveus' grass	<i>Trichoneura elegans</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Purple sandgrass	<i>Triplasis purpurea</i>	N	A
Guineagrass	<i>Urochloa maxima</i>	I	P
Texasgrass <sup>1</sup>	<i>Vaseyochloa multinervosa</i>	N	P
Sixweeks fescue	<i>Vulpia octoflora</i>	N	A
<b>Phlox Family</b>	<b>Polemoniaceae</b>		
Annual phlox	<i>Phlox drummondii</i>	N	A
<b>Buckwheat Family</b>	<b>Polygonaceae</b>		
Heartsepal buckwheat	<i>Eriogonum multiflorum</i>	N	A
Procession flower	<i>Polygala incarnata</i>	N	A
October flower	<i>Polygonella polygama</i>	N	P
<b>Primrose Family</b>	<b>Primulaceae</b>		
Scarlet pimpernel	<i>Anagallis arvensis</i>	I	A
Chaffweedi	<i>Anagallis minima</i>	N	A
Limewater brookweed	<i>Samolus ebracteatus</i>	N	P
<b>Rose Family</b>	<b>Rosaceae</b>		
Southern dewberry	<i>Rubus trivialis</i>	N	P
<b>Madder Family</b>	<b>Rubiaceae</b>		
Poorjoe	<i>Diodia teres</i>	N	A
Southwestern bedstraw	<i>Galium virgatum</i>	N	A
Diamondflowers	<i>Hedyotis nigricans</i>	N	P
Greenman's bluet	<i>Houstonia parviflora</i>	N	A
Bosc's mille grains	<i>Oldenlandia boscii</i>	N	P
Tropical Mexican clover	<i>Richardia brasiliensis</i>	N	A
<b>Citrus Family</b>	<b>Rutaceae</b>		
Lime pricklyash	<i>Zanthoxylum fagara</i>	N	P
Texas Hercules' club	<i>Zanthoxylum hirsutum</i>	N	P
<b>Willow Family</b>	<b>Salicaceae</b>		
Black willow	<i>Salix nigra</i>	N	P
<b>Figwort Family</b>	<b>Scrophulariaceae</b>		
Stiffleaf false foxglove	<i>Agalinis strictifolia</i>	N	A
Herb of grace	<i>Bacopa monnieri</i>	N	P
American bluehearts	<i>Buchnera americana</i>	N	A
Texas toadflax	<i>Nuttallanthus texanus</i>	N	A
Gray-woolly twintip	<i>Stemodia lanata</i>	N	P
<b>Potato Family</b>	<b>Solanaceae</b>		
Carolina wolfberry	<i>Lycium carolinianum</i>	N	P
Groundcherry	<i>Physalis</i> sp.		
Smallflower groundcherry	<i>Physalis cinerascens</i> var. <i>spathulifolia</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Cattail Family</b>	<b>Typhaceae</b>		
Cattail	<i>Typha</i> sp.		
Southern cattail	<i>Typha domingensis</i>	N	P
<b>Elm Family</b>	<b>Ulmaceae</b>		
Spiny hackberry	<i>Celtis ehrenbergiana</i>	N	P
<b>Nettle Family</b>	<b>Urticaceae</b>		
Pennsylvania pellitory	<i>Parietaria pennsylvanica</i>	N	A
Heartleaf nettle	<i>Urtica chamaedryoides</i>	N	A
<b>Vervain Family</b>	<b>Verbenaceae</b>		
American beautyberry	<i>Callicarpa americana</i>	N	P
Lanceleaf fogfruit	<i>Phyla lanceolata</i>	N	P
Turkey tangle fogfruit	<i>Phyla nodiflora</i>	N	P
Texas vervain	<i>Verbena halei</i>	N	P
<b>Grape Family</b>	<b>Vitaceae</b>		
Sorrelvine	<i>Cissus trifoliata</i>	N	P
Mustang grape	<i>Vitis mustangensis</i>	N	P
<b>Yellow-eyed grass family</b>	<b>Xyridaceae</b>		
Richard's yelloweyed grass	<i>Xyris jupicai</i>	N	A

<sup>1</sup> Identified as Texas endemic plant species (Wolfe et al. 1998)

Notes: I = invasive, introduced, or exotic species; N = native species; A = annual; P = perennial; Common and scientific names generally follow the USDA PLANTS Database naming convention (USDA NRCS 2013); species for which only the genera is listed are not categorized as invasive, native, annual or perennial species due to the variability that could occur within the genera.

Sources: USDA NRCS 2013, Woodin et al. 2010, Hickman et al. 2007, Wiemers et al. 2007, Navy 2006b, Wolfe et al. 1998, and TPWD 1992

**Table E-4. Flowering Plants Known to Occur at NOLF Goliad<sup>1</sup>.**

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Acanthus Family</b>	<b>Acanthaceae</b>		
Polkadots	<i>Dyschoriste linearis</i>	N	P
Corzo's wild petunia	<i>Ruellia corzoi</i>	N	P
Gregg's tube tongue	<i>Siphonoglossa greggii</i>	N	P
<b>Century-Plant Family</b>	<b>Agavaceae</b>		
Don Quixote's lace	<i>Yucca treculeana</i>	N	P
<b>Amaranth Family</b>	<b>Amaranthaceae</b>		
Washerwoman	<i>Alternanthera caracasana</i>	I	P
<b>Sumac Family</b>	<b>Anacardiaceae</b>		
Skunkbush sumac	<i>Rhus trilobata</i>	N	P
<b>Milkweed Family</b>	<b>Asclepiadaceae</b>		
Spider milkweed	<i>Asclepias asperula</i>	N	P
Emory's milkweed	<i>Asclepias emoryi</i>	N	P
Green antelopehorn	<i>Asclepias viridis</i>	N	P
Bearded swallow-wort	<i>Cynanchum barbigerum</i>	N	P
Netted milkvine	<i>Matelea reticulata</i>	N	P
<b>Sunflower Family</b>	<b>Asteraceae</b>		
Huisache daisy	<i>Amblyolepis setigera</i>	N	A
Weakleaf bur ragweed	<i>Ambrosia confertiflora</i>	N	P
Rooseveltweed	<i>Baccharis neglecta</i>	N	P
American star-thistle	<i>Centaurea americana</i>	N	A
Jack in the bush	<i>Chromolaena odorata</i>	N	P
Yellow thistle	<i>Cirsium horridulum</i>	N	A
Slender scratchdaisy	<i>Croptilon divaricatum</i>	N	A
Stiffleaf scratchdaisy	<i>Croptilon rigidifolium</i>	N	A
Fiveneedle pricklyleaf	<i>Dyssodia pentachaeta</i>	N	P
Bristleleaf pricklyleaf	<i>Dyssodia tenuiloba</i>	N	A
Texas snakeweed	<i>Gutierrezia texana</i>	N	A
Gumhead	<i>Gymnosperma glutinosum</i>	N	P
Cretanweed	<i>Hedynois cretica</i>	I	A
Sneezeweed	<i>Helenium amarum</i>	N	A
Common sunflower	<i>Helianthus annuus</i>	N	A
Hoary false goldenaster	<i>Heterotheca canescens</i>	N	P
Camphorweed	<i>Heterotheca subaxillaris</i>	N	A
Blazing star	<i>Liatris</i> sp.		
Texas skeletonplant	<i>Lygodesmia texana</i>	N	P
Texas palafox	<i>Palafoxia texana</i>	N	A
Sweetcent	<i>Pluchea purpurascens</i>	N	A

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Green prairie coneflower	<i>Ratibida tagetes</i>	N	P
Blackeyed Susan	<i>Rudbeckia hirta</i>	N	A
Awnless bushsunflower	<i>Simsia calva</i>	N	A
Canada goldenrod	<i>Solidago altissima</i>	N	P
White heath aster	<i>Symphyotrichum ericoides</i>	N	P
Golden crownbeard	<i>Verbesina encelioides</i>	N	A
Texas crownbeard	<i>Verbesina microptera</i>	N	P
Hairy wedelia	<i>Wedelia texana</i>	N	P
<b>Barberry Family</b>	<b>Berberidaceae</b>		
Agarito	<i>Berberis trifoliolata</i>	N	P
<b>Borage Family</b>	<b>Boraginaceae</b>		
Texas manjack	<i>Cordia podoccephala</i>	N	P
Knockaway	<i>Ehretia anacua</i>	N	P
Texas heliotrope	<i>Heliotropium texanum</i>	N	A
Narrowleaf stoneseed	<i>Lithospermum incisum</i>	N	P
Largeseed forget-me-not	<i>Myosotis macrosperma</i>	N	A
<b>Mustard Family</b>	<b>Brassicaceae</b>		
Wedgeleaf draba	<i>Draba cuneifolia</i>	N	A
Silver bladderpod	<i>Lesquerella argyraea</i>	N	P
<b>Airplant Family</b>	<b>Bromeliaceae</b>		
Small ballmoss	<i>Tillandsia recurvate</i>	N	P
<b>Butterfly-Bush Family</b>	<b>Buddlejaceae</b>		
Juniper leaf	<i>Polypremum procumbens</i>	N	A
<b>Cactus Family</b>	<b>Cactaceae</b>		
Cactus apple	<i>Opuntia engelmannii</i>	N	P
<b>Spiderwort Family</b>	<b>Commelinaceae</b>		
Whitemouth dayflower	<i>Commelina erecta</i> var. <i>angustifolia</i>	N	P
<b>Cypress Family</b>	<b>Cupressaceae</b>		
Eastern red cedar	<i>Juniperus virginiana</i>	N	P
<b>Dodder Family</b>	<b>Cuscutaceae</b>		
Cusp dodder	<i>Cuscuta cuspidata</i>	N	P
<b>Sedge Family</b>	<b>Cyperaceae</b>		
Finger flatsedge	<i>Cyperus digitatus</i>	N	P
Sharpscale flatsedge	<i>Cyperus oxylepis</i>	N	P
<b>Spurge Family</b>	<b>Euphorbiaceae</b>		
Low silverbush	<i>Argythamnia humilis</i>	N	P
Hogwort	<i>Croton capitatus</i>	N	A
Twocolor croton	<i>Croton leucophyllus</i>	N	A
Prairie tea	<i>Croton monanthogynus</i>	N	A



COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Heller's spurge	<i>Euphorbia helleri</i>	N	A
Drummond's leaf-flower	<i>Phyllanthus abnormis</i>	N	A
<b>Pea Family</b>	<b>Fabaceae</b>		
Sweet acacia	<i>Acacia farnesiana</i>	N	P
Blackbrush acacia	<i>Acacia rigidula</i>	N	P
Shakeshake	<i>Crotalaria incana</i>	I	A
Kairn's sensitive-briar	<i>Mimosa latidens</i>	N	P
Tropical puff	<i>Neptunia pubescens</i>	N	P
Mesquite	<i>Prosopis sp.</i>		
American snoutbean	<i>Rhynchosia americana</i>	N	P
<b>Beech Family</b>	<b>Fagaceae</b>		
Bluejack oak	<i>Quercus incana</i>	N	P
Blackjack oak	<i>Quercus marilandica</i>	N	P
Post oak	<i>Quercus stellata</i>	N	P
Live oak	<i>Quercus virginiana</i>	N	P
<b>Geranium Family</b>	<b>Geraniaceae</b>		
Carolina germanium	<i>Geranium carolinianum</i>	N	A
<b>Rush Family</b>	<b>Juncaceae</b>		
Common rush	<i>Juncus effusus</i>	N	P
<b>Mint Family</b>	<b>Lamiaceae</b>		
Lemon beebalm	<i>Monarda citriodora</i>	N	A
Texas sage	<i>Salvia texana</i>	N	P
Rio Grande skullcap	<i>Scutellaria muriculata</i>	N	A
Small coastal germander	<i>Teucrium cubense</i>	N	A
<b>Lily Family</b>	<b>Liliaceae</b>		
Orinoco jute	<i>Corchorus hirtus</i>	N	A
Texas sacahuista	<i>Nolina texana</i>	N	P
Crowpoison	<i>Nothoscordum bivalve</i>	N	P
<b>Flax Family</b>	<b>Linaceae</b>		
Winged flax	<i>Linum alatum</i>	N	A
<b>Loosestrife Family</b>	<b>Lythraceae</b>		
Winged lythrum	<i>Lythrum alatum var. lanceolatum</i>	N	P
<b>Barbados Cherry Family</b>	<b>Malpighiaceae</b>		
Narrowleaf goldshower	<i>Galphimia angustifolia</i>	N	P
<b>Mallow Family</b>	<b>Malvaceae</b>		
Texas Indian mallow	<i>Abutilon fruticosum</i>	N	P
Wax mallow	<i>Malvaviscus drummondii</i>	N	P
Arrowleaf mallow	<i>Malvella sagittifolia</i>	N	P
Buffpetal	<i>Rhynchosida physocalyx</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
Spreading fanpetals	<i>Sida abutilifolia</i>	I	A
Prickly fanpetals	<i>Sida spinosa</i>	N	A
<b>Carpetweed Family</b>	<b>Molluginaceae</b>		
Spreading sweetjuice	<i>Glinus radiatus</i>	N	A
<b>Olax Family</b>	<b>Oleaceae</b>		
Texas swampprivet	<i>Forestiera angustifolia</i>	N	P
Low menodora	<i>Menodora heterophylla</i>	N	P
<b>Wood-sorrel Family</b>	<b>Oxalidaceae</b>		
Drummond's woodsorrel	<i>Oxalis drummondii</i>	N	P
<b>Passion-flower Family</b>	<b>Passifloraceae</b>		
Fetid passionflower	<i>Passiflora foetida</i>	N	A
<b>Grass Family</b>	<b>Poaceae</b>		
Purple bluestem	<i>Andropogon glomeratus</i>	N	P
Silver beardgrass	<i>Bothriochloa laguroides</i>	N	P
Buffelgrass	<i>Cenchrus ciliaris</i>	I	P
Fringed windmill grass	<i>Chloris ciliata</i>	N	A
Hooded windmill grass	<i>Chloris cucullata</i>	N	P
Bermudagrass	<i>Cynodon dactylon</i>	I	P
Kleberg's bluestem	<i>Dichanthium annulatum</i>	I	P
Louisiana cupgrass	<i>Eriochloa punctata</i>	N	A
Creeping lovegrass	<i>Neeragrostis reptans</i>	N	A
Slender panicgrass	<i>Panicum capillarioides</i>	N	P
Brownseed paspalum	<i>Paspalum plicatulum</i>	N	P
Marsh bristlegrass	<i>Setaria parviflora</i>	N	P
Barbed bristlegrass	<i>Setaria viridis</i>	I	A
Johnsongrass	<i>Sorghum halepense</i>	I	P
Texas signalgrass	<i>Urochloa texana</i>	N	A
<b>Milkwort Family</b>	<b>Polygalaceae</b>		
White milkwort	<i>Polygala alba</i>	N	P
Glandular milkwort	<i>Polygala glandulosa</i>	N	P
<b>Buckwheat Family</b>	<b>Polygonaceae</b>		
Curlytop knotweed	<i>Polygonum lapathifolium</i>	N	A
Pennsylvania smartweed	<i>Polygonum pensylvanicum</i>	N	A
Curly dock	<i>Rumex crispus</i>	I	P
<b>Buttercup Family</b>	<b>Ranunculaceae</b>		
Tenpetal thimbleweed	<i>Anemone berlandieri</i>	N	P
Carolina anemone	<i>Anemone caroliniana</i>	N	P
Drummond's clematis	<i>Clematis drummondii</i>	N	P

COMMON NAME	SCIENTIFIC NAME	ORIGIN	TYPE
<b>Buckthron Family</b>	<b>Rhamnaceae</b>		
Texan hogplum	<i>Colubrina texensis</i>	N	O
<b>Rose Family</b>	<b>Rosaceae</b>		
Rio Grande dewberry	<i>Rubus riograndis</i>	N	P
<b>Potato Family</b>	<b>Solanaceae</b>		
Smallflower groundcherry	<i>Physalis cinerascens</i>	N	P
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	N	P
<b>Verbena Family</b>	<b>Verbenaceae</b>		
Dakota mock vervain	<i>Glandularia bipinnatifida</i>	N	A
West Indian shrubverbena	<i>Lantana urticoides</i>	N	P
Turkey tangle fogfruit	<i>Phyla nodiflora</i>	N	P
Brazilian vervain	<i>Verbena brasiliensis</i>	I	A
Gray vervain	<i>Verbena canescens</i>	N	P
<b>Grape Family</b>	<b>Vitaceae</b>		
Summer grape	<i>Vitis aestivalis</i>	N	P

<sup>1</sup> = A survey was conducted for all flowering plant species encountered at NOLF Goliad; however, this survey did not identify shrubs and trees that could occur on the parcel (Texas A&M University – Corpus Christi 2012).

Notes: I = invasive, introduced, or exotic species; N = native species; A = annual; P = perennial; Common and scientific names generally follow the USDA PLANTS Database naming convention (USDA NRCS 2013); species for which only the genera is listed are not categorized as invasive, native, annual or perennial species due to the variability that could occur within the genera.

Sources: Lady Bird Johnson Wildlife Center 2013, USDA NRCS 2013, Texas A&M University – Corpus Christi 2012, and Navy 2001

This page intentionally left blank.

# Birds of NASCC

**Table E-5. Birds Known or with the Potential to Occur at the Main Station.**

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Ducks, Geese, and Swans Family</b>	<b>Anatidae</b>	
Wood duck	<i>Aix sponsa</i>	P
Northern pintail	<i>Anas acuta</i>	O
Greater white-fronted goose	<i>Anser albifrons</i>	P
American wigeon	<i>Anas americana</i>	P
Northern shoveler	<i>Anas clypeata</i>	P
Green-winged teal	<i>Anas crecca</i>	P
Cinnamon teal	<i>Anas cyanoptera</i>	P
Blue-winged teal	<i>Anas discors</i>	P
Mottled duck	<i>Anas fulvigula</i>	O
Mallard	<i>Anas platyrhynchos</i>	P
Gadwall	<i>Anas strepera</i>	P
Lesser scaup	<i>Aythya affinis</i>	O
Redhead	<i>Aythya americana</i>	O
Ring-necked duck	<i>Aythya collaris</i>	P
Greater scaup	<i>Aythya marila</i>	P
Canvasback	<i>Aythya valisineria</i>	P
Canada goose	<i>Branta canadensis</i>	P
Bufflehead	<i>Bucephala albeola</i>	P
Common goldeneye	<i>Bucephala clangula</i>	P
Snow goose	<i>Chen caerulescens</i>	P
Ross's goose	<i>Chen rossii</i>	P
Long-tailed duck	<i>Clangula hyemalis</i>	P
Tundra swan	<i>Cygnus columbianus</i>	P
Black-bellied whistling-duck	<i>Dendrocygna autumnalis</i>	O
Fulvous whistling-duck	<i>Dendrocygna bicolor</i>	P
Hooded merganser	<i>Lophodytes cucullatus</i>	P
Black scoter	<i>Melanitta americana</i>	P
White-winged scoter	<i>Melanitta fusca</i>	P
Surf scoter	<i>Melanitta perspicillata</i>	P
Red-breasted merganser	<i>Mergus serrator</i>	P
Masked duck	<i>Nomonyx dominicus</i>	P
Ruddy duck	<i>Oxyura jamaicensis</i>	P
<b>Pelicans Family</b>	<b>Pelecanidae</b>	
American white pelican	<i>Pelecanus erythrorhynchus</i>	O
Brown pelican <sup>2</sup>	<i>Pelecanus occidentalis</i>	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Anhingas Family</b>	<b>Anhingidae</b>	
Anhinga	<i>Anhinga anhinga</i>	P
<b>Cormorants Family</b>	<b>Phalacrocoracidae</b>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	O
Neotropic cormorant	<i>Phalacrocorax brasilianus</i>	P
<b>Turkey Family</b>	<b>Meleagrididae</b>	
Wild turkey	<i>Meleagris gallopavo</i>	P
<b>Hérons and Egrets Family</b>	<b>Ardeidae</b>	
Great egret	<i>Ardea alba</i>	O
Great blue heron	<i>Ardea herodias</i>	O
American bittern <sup>2</sup>	<i>Botaurus lentiginosus</i>	P
Cattle egret	<i>Bubulcus ibis</i>	O
Green heron	<i>Butorides virescens</i>	P
Little blue heron <sup>2</sup>	<i>Egretta caerulea</i>	O
Reddish egret <sup>2</sup>	<i>Egretta rufescens</i>	O
Snowy egret	<i>Egretta thula</i>	O
Tricolored heron	<i>Egretta tricolor</i>	P
Least bittern <sup>2</sup>	<i>Ixobrychus exilis</i>	P
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	O
Yellow-crowned night-heron	<i>Nycticorax violacea</i>	O
<b>Avocets and Stilts Family</b>	<b>Recurvirostridae</b>	
Black-necked stilt	<i>Himantopus mexicanus</i>	O
American avocet	<i>Recurvirostra americana</i>	P
<b>Ibises Family</b>	<b>Threskiornithidae</b>	
White ibis	<i>Eudocimus albus</i>	O
Roseate spoonbill	<i>Platalea ajaja</i>	O
White-faced ibis <sup>2</sup>	<i>Plegadis chihi</i>	O
<b>Vultures Family</b>	<b>Cathartidae</b>	
Turkey vulture	<i>Cathartes aura</i>	O
Black vulture	<i>Coragyps atratus</i>	P
<b>Hawks and Eagles Family</b>	<b>Accipitridae</b>	
Harris's hawk	<i>Accipiter cooperii</i>	O
Sharp-shinned hawk	<i>Accipiter striatus</i>	O
White-tailed hawk <sup>2</sup>	<i>Buteo albicaudatus</i>	O
Red-tailed hawk	<i>Buteo jamaicensis</i>	O
Rough-legged hawk	<i>Buteo lagopus</i>	P
Red-shouldered hawk	<i>Buteo lineatus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Broad-winged hawk	<i>Buteo platypterus</i>	P
Ferruginous hawk	<i>Buteo regalis</i>	P
Swainson's hawk	<i>Buteo swainsoni</i>	P
Northern harrier	<i>Circus cyaneus</i>	O
Swallow-tailed kite <sup>2</sup>	<i>Elanoides forficatus</i>	P
White-tailed kite	<i>Elanus leucurus</i>	P
Bald eagle <sup>2</sup>	<i>Haliaeetus leucocephalus</i>	P
Mississippi kite	<i>Ictinia mississippiensis</i>	P
Osprey	<i>Pandion haliaetus</i>	O
<b>Falcons Family</b>	<b>Falconidae</b>	
Crested caracara	<i>Caracara cheriway</i>	O
Merlin	<i>Falco columbarius</i>	P
Prairie falcon	<i>Falco mexicanus</i>	P
Peregrine falcon <sup>2</sup>	<i>Falco peregrinus</i>	O
American kestrel	<i>Falco sparverius</i>	O
<b>Rails and Coots Family</b>	<b>Rallidae</b>	
American coot	<i>Fulica americana</i>	O
Common gallinule	<i>Gallinula galeata</i>	P
Purple gallinule	<i>Porphyrio martinicus</i>	P
Sora	<i>Porzana carolina</i>	P
King rail	<i>Rallus elegans</i>	P
Virginia rail	<i>Rallus limicola</i>	P
Clapper rail	<i>Rallus longirostris</i>	P
<b>Cranes Family</b>	<b>Gruidae</b>	
Sandhill crane	<i>Grus canadensis</i>	O
<b>Plovers Family</b>	<b>Charadriidae</b>	
Piping plover <sup>2</sup>	<i>Charadrius melodus</i>	P
Snowy plover <sup>2</sup>	<i>Charadrius nivosus</i>	P
Semipalmated plover	<i>Charadrius semipalmatus</i>	O
Killdeer	<i>Charadrius vociferus</i>	O
Wilson's plover <sup>2</sup>	<i>Charadrius wilsonia</i>	O
American golden-plover	<i>Pluvialis dominica</i>	P
Black-bellied plover	<i>Pluvialis squatarola</i>	O
<b>Sandpipers Family</b>	<b>Scolopacidae</b>	
Spotted sandpiper	<i>Actitis macularius</i>	O
Ruddy turnstone	<i>Arenaria interpres</i>	O
Upland sandpiper <sup>2</sup>	<i>Bartramia longicauda</i>	P



COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Sanderling	<i>Calidris alba</i>	O
Dunlin	<i>Calidris alpina</i>	O
Baird's sandpiper	<i>Calidris bairdii</i>	P
Red knot <sup>2</sup>	<i>Calidris canutus</i>	O
White-rumped sandpiper	<i>Calidris fuscicollis</i>	P
Stilt sandpiper	<i>Calidris himantopus</i>	P
Western sandpiper	<i>Calidris mauri</i>	O
Pectoral sandpiper	<i>Calidris melanotos</i>	P
Least sandpiper	<i>Calidris minutilla</i>	O
Semipalmated sandpiper	<i>Calidris pusilla</i>	O
Wilson's snipe	<i>Gallinago delicata</i>	O
Common snipe	<i>Gallinago gallinago</i>	O
American oystercatcher <sup>2</sup>	<i>Haematopus palliatus</i>	P
Short-billed dowitcher <sup>2</sup>	<i>Limnodromus griseus</i>	O
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	O
Marbled godwit <sup>2</sup>	<i>Limosa fedoa</i>	O
Hudsonian godwit <sup>2</sup>	<i>Limosa haemastica</i>	P
Long-billed curlew <sup>2</sup>	<i>Numenius americanus</i>	O
Whimbrel <sup>2</sup>	<i>Numenius phaeopus</i>	P
American woodcock	<i>Scolopax minor</i>	O
Lesser yellowlegs <sup>2</sup>	<i>Tringa flavipes</i>	O
Greater yellowlegs	<i>Tringa melanoleuca</i>	O
Willet	<i>Tringa semipalmata</i>	O
Solitary sandpiper <sup>2</sup>	<i>Tringa solitaria</i>	P
Buff-breasted sandpiper <sup>2</sup>	<i>Tryngites subruficollis</i>	P
<b>Gulls Family</b>	<b>Laridae</b>	
Black tern	<i>Chlidonias niger</i>	P
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	P
Herring gull	<i>Larus argentatus</i>	O
Laughing gull	<i>Larus atricilla</i>	O
Ring-billed gull	<i>Larus delawarensis</i>	O
Great black-backed gull	<i>Larus marinus</i>	P
Franklin's gull	<i>Leucophaeus pipixcan</i>	P
Black skimmer <sup>2</sup>	<i>Rynchops niger</i>	O
Least tern <sup>2</sup>	<i>Sterna antillarum</i>	O
Caspian tern	<i>Sterna caspia</i>	O
Forster's tern	<i>Sterna forsteri</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Sooty tern <sup>2</sup>	<i>Sterna fuscata</i>	P
Common tern	<i>Sterna hirundo</i>	P
Royal tern	<i>Sterna maxima</i>	O
Gull-billed tern <sup>2</sup>	<i>Sterna nilotica</i>	P
Sandwich tern <sup>2</sup>	<i>Thalasseus sandvicensis</i>	O
<b>Pigeons and Doves Family</b>	<b>Columbidae</b>	
Inca dove	<i>Columbina inca</i>	O
Rock dove	<i>Columba livia</i>	P
Common ground-dove	<i>Columbina passerina</i>	O
Eurasian collared-dove	<i>Streptopelia decaocto</i>	O
White-winged dove	<i>Zenaida asiatica</i>	P
Mourning dove	<i>Zenaida macroura</i>	O
<b>Cuckoos Family</b>	<b>Cuculidae</b>	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	O
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	P
Groove-billed ani	<i>Crotophaga sulcirostris</i>	P
Greater roadrunner	<i>Geococcyx californianus</i>	P
<b>True Owls Family</b>	<b>Strigidae</b>	
Short-eared owl <sup>2</sup>	<i>Asio flammeus</i>	P
Great horned owl	<i>Bubo virginianus</i>	P
Eastern screech-owl	<i>Megascops asio</i>	P
Burrowing owl	<i>Athene cunicularia</i>	P
<b>Nighthawks and Nightjars Family</b>	<b>Caprimulgidae</b>	
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	P
Whip-poor-will	<i>Antrostomus vociferus</i>	P
Lesser nighthawk	<i>Chordeiles acutipennis</i>	P
Common nighthawk	<i>Chordeiles minor</i>	O
Common pauraque	<i>Nyctidromus albicollis</i>	P
Common poorwill	<i>Phalaenoptilus nuttallii</i>	P
<b>Swifts Family</b>	<b>Apodidae</b>	
Chimney swift	<i>Chaetura pelagica</i>	O
<b>Hummingbirds Family</b>	<b>Trochilidae</b>	
Buff-bellied hummingbird	<i>Amazilia yucatanensis</i>	P
Black-chinned hummingbird	<i>Archilochus alexandri</i>	P
Ruby-throated hummingbird	<i>Archilochus colubris</i>	O
Rufous hummingbird	<i>Selasphorus rufus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Kingfishers Family</b>	<b>Alcedinidae</b>	
Belted kingfisher	<i>Megaceryle alcyon</i>	O
<b>Woodpeckers Family</b>	<b>Picidae</b>	
Northern flicker	<i>Colaptes auratus</i>	O
Golden-fronted woodpecker	<i>Melanerpes aurifrons</i>	O
Ladder-backed woodpecker	<i>Picoides scalaris</i>	P
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	P
<b>Flycatchers Family</b>	<b>Tyrannidae</b>	
Olive-sided flycatcher	<i>Contopus cooperi</i>	P
Eastern wood-pewee	<i>Contopus virens</i>	P
Alder flycatcher	<i>Empidonax alnorum</i>	P
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	P
Least flycatcher	<i>Empidonax minimus</i>	P
Willow flycatcher	<i>Empidonax traillii</i>	P
Acadian flycatcher	<i>Empidonax virescens</i>	P
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	P
Great crested flycatcher	<i>Myiarchus crinitus</i>	P
Brown crested flycatcher	<i>Myiarchus tyrannulus</i>	P
Great kiskadee	<i>Pitangus sulphuratus</i>	O
Vermilion flycatcher	<i>Pyrocephalus rubinus</i>	P
Eastern phoebe	<i>Sayornis phoebe</i>	O
Say's phoebe	<i>Sayornis saya</i>	P
Couch's kingbird	<i>Tyrannus couchii</i>	O
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	O
Eastern kingbird	<i>Tyrannus tyrannus</i>	P
Western kingbird	<i>Tyrannus verticalis</i>	P
<b>Shrikes Family</b>	<b>Laniidae</b>	
Loggerhead shrike <sup>2</sup>	<i>Lanius ludovicianus</i>	O
<b>Vireos Family</b>	<b>Vireonidae</b>	
Bell's vireo	<i>Vireo bellii</i>	P
Yellow-throated vireo	<i>Vireo flavifrons</i>	P
Warbling vireo	<i>Vireo gilvus</i>	P
White-eyed vireo	<i>Vireo griseus</i>	O
Red-eyed vireo	<i>Vireo olivaceus</i>	P
Philadelphia vireo	<i>Vireo philadelphicus</i>	P
Blue-headed vireo	<i>Vireo solitarius</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Crows and Jays Family</b>	<b>Corvidae</b>	
Chihuahuan raven	<i>Corvus cryptoleucus</i>	P
Blue jay	<i>Cyanocitta cristata</i>	P
Green jay	<i>Cyanocorax yncas</i>	P
<b>Swallows Family</b>	<b>Hirundinidae</b>	
Barn swallow	<i>Hirundo rustica</i>	O
Cave swallow	<i>Petrochelidon fulva</i>	O
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	P
Purple martin	<i>Progne subis</i>	O
Bank swallow	<i>Riparia riparia</i>	P
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	O
Tree swallow	<i>Tachycineta bicolor</i>	P
<b>Wrens Family</b>	<b>Troglodytidae</b>	
Cactus wren	<i>Campylorhynchus brunneicapillus</i>	P
Marsh wren	<i>Cistothorus palustris</i>	P
Sedge wren <sup>2</sup>	<i>Cistothorus platensis</i>	O
Bewick's wren	<i>Thryomanes bewickii</i>	P
Carolina wren	<i>Thryothorus ludovicianus</i>	P
House wren	<i>Troglodytes aedon</i>	O
Winter wren	<i>Troglodytes hiemalis</i>	P
<b>Titmice and Chickadees Family</b>	<b>Paridae</b>	
Black-crested titmouse	<i>Baeolophus atricristatus</i>	P
Tufted titmouse	<i>Baeolophus bicolor</i>	P
<b>Gnatcatchers and Gnatwrens Family</b>	<b>Poliptilidae</b>	
Blue-gray gnatcatcher	<i>Poliptila caerulea</i>	O
<b>Thrushes Family</b>	<b>Turdidae</b>	
Veery	<i>Catharus fuscescens</i>	P
Hermit thrush	<i>Catharus guttatus</i>	P
Gray-cheeked thrush	<i>Catharus minimus</i>	P
Swainson's thrush	<i>Catharus ustulatus</i>	P
Wood thrush	<i>Hylocichla mustelina</i>	P
Mountain bluebird	<i>Sialia currucoides</i>	P
Eastern bluebird	<i>Sialia sialis</i>	P
American robin	<i>Turdus migratorius</i>	O
<b>Mockingbirds and Thrashers Family</b>	<b>Mimidae</b>	
Gray catbird	<i>Dumetella carolinensis</i>	P
Northern mockingbird	<i>Mimus polyglottos</i>	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Sage thrasher	<i>Oreoscoptes montanus</i>	P
Curve-billed thrasher	<i>Toxostoma curvirostre</i>	P
Long-billed thrasher	<i>Toxostoma longirostre</i>	P
Brown thrasher	<i>Toxostoma rufum</i>	P
<b>Starlings Family</b>	<b>Sturnidae</b>	
European starling	<i>Sturnus vulgaris</i>	O
<b>Wagtails and Pipits Family</b>	<b>Motacillidae</b>	
American pipit	<i>Anthus rubescens</i>	P
Sprague's pipit <sup>2</sup>	<i>Anthus spragueii</i>	O
<b>Wood Warblers Family</b>	<b>Parulidae</b>	
Canada warbler	<i>Cardellina canadensis</i>	P
Wilson's warbler	<i>Cardellina pusilla</i>	P
Magnolia warbler	<i>Dendroica magnolia</i>	P
Black-throated green warbler	<i>Dendroica virens</i>	P
Kentucky warbler	<i>Geothlypis formosa</i>	P
Mourning warbler	<i>Geothlypis philadelphia</i>	P
MacGillibray's warbler	<i>Geothlypis tolmiei</i>	P
Common yellowthroat	<i>Geothlypis trichas</i>	P
Worm-eating warbler	<i>Helmitheros vermivorum</i>	P
Yellow-breasted chat	<i>Icteria virens</i>	P
Black-and-white warbler	<i>Mniotilta varia</i>	P
Connecticut warbler	<i>Oporornis agilis</i>	P
Orange-crowned warbler	<i>Oreothlypis celata</i>	P
Tennessee warbler	<i>Oreothlypis peregrina</i>	O
Nashville warbler	<i>Oreothlypis ruficapilla</i>	O
Louisiana waterthrush	<i>Parkesia motacilla</i>	P
Northern waterthrush	<i>Parkesia noveboracensis</i>	P
Prothonotary warbler <sup>2</sup>	<i>Protonotaria citrea</i>	P
Ovenbird	<i>Seiurus aurocapilla</i>	P
Northern parula	<i>Setophaga americana</i>	P
Black-throated blue warbler	<i>Setophaga caeruleascens</i>	P
Cerulean warbler	<i>Setophaga cerulea</i>	P
Bay-breasted warbler	<i>Setophaga castanea</i>	P
Hooded warbler	<i>Setophaga citrina</i>	P
Yellow-rumped warbler	<i>Setophaga coronata</i>	P
Prairie warbler	<i>Setophaga discolor</i>	P
Yellow-throated warbler	<i>Setophaga dominica</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Blackburnian warbler	<i>Setophaga fusca</i>	P
Magnolia warbler	<i>Setophaga magnolia</i>	P
Black-throated gray warbler	<i>Setophaga nigrescens</i>	P
Palm warbler	<i>Setophaga palmarum</i>	P
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>	P
Yellow warbler	<i>Setophaga petechia</i>	P
Pine warbler	<i>Setophaga pinus</i>	P
American redstart	<i>Setophaga ruticilla</i>	P
Blackpoll warbler	<i>Setophaga striata</i>	P
Cape May warbler	<i>Setophaga tigrina</i>	P
Black-throated green warbler	<i>Setophaga virens</i>	P
Golden-winged warbler	<i>Vermivora chrysoptera</i>	P
Blue-winged warbler	<i>Vermivora cyanoptera</i>	P
<b>Sparrows Family</b>	<b>Emberizidae</b>	
Saltmarsh sparrow	<i>Ammodramus caudacutus</i>	P
Le Conte's sparrow <sup>2</sup>	<i>Ammodramus leconteii</i>	O
Seaside sparrow <sup>2</sup>	<i>Ammodramus maritimus</i>	P
Grasshopper sparrow <sup>2</sup>	<i>Ammodramus savannarum</i>	O
Olive sparrow	<i>Arremonops rufivirgatus</i>	P
Lark bunting	<i>Calamospiza melanocorys</i>	P
Lark sparrow	<i>Chondestes grammacus</i>	O
Swamp sparrow	<i>Melospiza georgiana</i>	P
Lincoln's sparrow	<i>Melospiza lincolni</i>	P
Song sparrow	<i>Melospiza melodia</i>	P
Fox sparrow	<i>Passerella iliaca</i>	P
Savannah sparrow	<i>Passerculus sandwichensis</i>	O
Cassin's sparrow	<i>Peucaea cassinii</i>	P
Green-tailed towhee	<i>Pipilo chlorurus</i>	P
Eastern towhee	<i>Pipilo erythrophthalmus</i>	P
Vesper sparrow	<i>Pooecetes gramineus</i>	O
Clay-colored sparrow	<i>Spizella pallida</i>	P
Chipping sparrow	<i>Spizella passerina</i>	P
Field sparrow	<i>Spizella pusilla</i>	P
White-throated sparrow	<i>Zonotrichia albicollis</i>	P
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	P
<b>Cardinals and Grosbeaks Family</b>	<b>Cardinalidae</b>	
Northern cardinal	<i>Cardinalis cardinalis</i>	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	P
Lazuli bunting	<i>Passerina amoena</i>	P
Blue grosbeak	<i>Passerina caerulea</i>	P
Painted bunting <sup>2</sup>	<i>Passerina ciris</i>	O
Indigo bunting	<i>Passerina cyanea</i>	O
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	P
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	P
Western tanager	<i>Piranga ludoviciana</i>	P
Scarlet tanager	<i>Piranga olivacea</i>	P
Summer tanager	<i>Piranga rubra</i>	P
Dickcissel <sup>2</sup>	<i>Spiza americana</i>	P
<b>Blackbirds and Orioles Family</b>	<b>Icteridae</b>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	O
Bobolink	<i>Dolichonyx oryzivorus</i>	P
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	P
Northern oriole	<i>Icterus galbula</i>	P
Orchard oriole	<i>Icterus spurius</i>	P
Bronzed cowbird	<i>Molothrus aeneus</i>	P
Brown-headed cowbird	<i>Molothrus ater</i>	P
Boat-tailed grackle	<i>Quiscalus major</i>	O
Great-tailed grackle	<i>Quiscalus mexicanus</i>	O
Common grackle	<i>Quiscalus quiscula</i>	P
Eastern meadowlark	<i>Sturnella magna</i>	O
Western meadowlark	<i>Sturnella neglecta</i>	O
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	P
<b>Old World Sparrows Family</b>	<b>Passeridae</b>	
House sparrow	<i>Passer domesticus</i>	O
<b>Larks Family</b>	<b>Alaudidae</b>	
Horned lark	<i>Eremophila alpestris</i>	P
<b>Loons Family</b>	<b>Gaviidae</b>	
Common loon	<i>Gavia immer</i>	P
Red-throated loon	<i>Gavia stellata</i>	P
<b>Grebes Family</b>	<b>Podicipedidae</b>	
Western grebe	<i>Aechmophorus occidentalis</i>	P
Horned grebe	<i>Podiceps auritus</i>	P
Eared grebe	<i>Podiceps nigricollis</i>	P
Pied-billed grebe	<i>Podilymbus podiceps</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Least grebe	<i>Tachybaptus dominicus</i>	P
<b>Frigatebirds Family</b>	<b>Fregatidae</b>	
Magnificent frigatebird	<i>Fregata magnificens</i>	P
<b>Storks Family</b>	<b>Ciconiidae</b>	
Wood stork <sup>2</sup>	<i>Mycteria americana</i>	P
<b>New World Quails Family</b>	<b>Odontophoridae</b>	
Northern bobwhite	<i>Colinus virginianus</i>	P
<b>Barn Owls Family</b>	<b>Tytonidae</b>	
Barn owl	<i>Tyto alba</i>	P
<b>Penduline Tits Family</b>	<b>Remisidae</b>	
Verdin	<i>Auriparus flaviceps</i>	P
<b>Nuthatches Family</b>	<b>Sittidae</b>	
Red-breasted nuthatch	<i>Sitta canadensis</i>	P
<b>Treecreepers Family</b>	<b>Certhiidae</b>	
Brown creeper	<i>Certhia americana</i>	P
<b>Golden-crests and Kinglets Family</b>	<b>Regulidae</b>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	P
Golden-crowned kinglet	<i>Regulus satrapa</i>	P
<b>Waxwings Family</b>	<b>Bombycillidae</b>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	P
<b>Finches Family</b>	<b>Fringillidae</b>	
House finch	<i>Haemorhous mexicanus</i>	P
Pine siskin	<i>Spinus pinus</i>	P
American goldfinch	<i>Spinus tristis</i>	P
<b>Boobies and Gannets Family</b>	<b>Sulidae</b>	
Northern gannet	<i>Morus bassanus</i>	P
Masked booby	<i>Sula dactylatra</i>	P
<b>Skuas Family</b>	<b>Stercorariidae</b>	
Parasitic jaeger	<i>Stercorarius parasiticus</i>	P
Pomarine jaeger	<i>Stercorarius pomarinus</i>	P

<sup>1</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>2</sup> Listed as rare, threatened, or endangered species; or U.S. Fish and Wildlife Service (USFWS) bird of conservation concern (see Table E-13)

Notes: Common and scientific names generally follow the Cornell University Lab of Ornithology (Cornell University 2012).

Sources: Cornell University 2012, Woodin et al. 2010, Hickman et al. 2007, Coastal Bend Audubon Society 2000, and Wolfe et al. 1998



**Table E-6. Birds Known or with the Potential to Occur at NOLF Cabaniss.**

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Ducks, Geese, and Swans Family</b>	<b>Anatidae</b>	
Wood duck	<i>Aix sponsa</i>	P
Northern pintail	<i>Anas acuta</i>	P
Greater white-fronted goose	<i>Anser albifrons</i>	P
American wigeon	<i>Anas americana</i>	P
Northern shoveler	<i>Anas clypeata</i>	P
Green-winged teal	<i>Anas crecca</i>	P
Cinnamon teal	<i>Anas cyanoptera</i>	P
Blue-winged teal	<i>Anas discors</i>	P
Mottled duck	<i>Anas fulvigula</i>	P
Mallard	<i>Anas platyrhynchos</i>	P
Gadwall	<i>Anas strepera</i>	P
Lesser scaup	<i>Aythya affinis</i>	P
Redhead	<i>Aythya americana</i>	P
Ring-necked duck	<i>Aythya collaris</i>	P
Greater scaup	<i>Aythya marila</i>	P
Canvasback	<i>Aythya valisineria</i>	P
Canada goose	<i>Branta canadensis</i>	P
Bufflehead	<i>Bucephala albeola</i>	P
Common goldeneye	<i>Bucephala clangula</i>	P
Snow goose	<i>Chen caerulescens</i>	P
Ross's goose	<i>Chen rossii</i>	P
Long-tailed duck	<i>Clangula hyemalis</i>	P
Tundra swan	<i>Cygnus columbianus</i>	P
Black-bellied whistling-duck	<i>Dendrocygna autumnalis</i>	O
Fulvous whistling-duck	<i>Dendrocygna bicolor</i>	P
Hooded merganser	<i>Lophodytes cucullatus</i>	P
Black scoter	<i>Melanitta americana</i>	P
White-winged scoter	<i>Melanitta fusca</i>	P
Surf scoter	<i>Melanitta perspicillata</i>	P
Red-breasted merganser	<i>Mergus serrator</i>	P
Masked duck	<i>Nomonyx dominicus</i>	P
Ruddy duck	<i>Oxyura jamaicensis</i>	P
<b>Pelicans Family</b>	<b>Pelecanidae</b>	
American white pelican	<i>Pelecanus erythrorhynchus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Brown pelican <sup>2</sup>	<i>Pelecanus occidentalis</i>	P
<b>Aningas Family</b>	<b>Anhingidae</b>	
Anhinga	<i>Anhinga anhinga</i>	P
<b>Cormorants Family</b>	<b>Phalacrocoracidae</b>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	P
Neotropic cormorant	<i>Phalacrocorax brasilianus</i>	P
<b>Turkey Family</b>	<b>Meleagrididae</b>	
Wild turkey	<i>Meleagris gallopavo</i>	O
<b>Hérons and Egrets Family</b>	<b>Ardeidae</b>	
Great egret	<i>Ardea alba</i>	O
Great blue heron	<i>Ardea herodias</i>	P
American bittern <sup>2</sup>	<i>Botaurus lentiginosus</i>	P
Cattle egret	<i>Bubulcus ibis</i>	P
Green heron	<i>Butorides virescens</i>	O
Little blue heron <sup>2</sup>	<i>Egretta caerulea</i>	P
Reddish egret <sup>2</sup>	<i>Egretta rufescens</i>	P
Snowy egret	<i>Egretta thula</i>	P
Tricolored heron	<i>Egretta tricolor</i>	P
Least bittern <sup>2</sup>	<i>Ixobrychus exilis</i>	P
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	O
Yellow-crowned night-heron	<i>Nycticorax violacea</i>	P
<b>Avocets and Stilts Family</b>	<b>Recurvirostridae</b>	
Black-necked stilt	<i>Himantopus mexicanus</i>	P
American avocet	<i>Recurvirostra americana</i>	P
<b>Ibises Family</b>	<b>Threskiornithidae</b>	
White ibis	<i>Eudocimus albus</i>	P
Roseate spoonbill	<i>Platalea ajaja</i>	P
White-faced ibis <sup>2</sup>	<i>Plegadis chihi</i> <sup>2</sup>	P
<b>Vultures Family</b>	<b>Cathartidae</b>	
Turkey vulture	<i>Cathartes aura</i>	O
Black vulture	<i>Coragyps atratus</i>	P
<b>Hawks and Eagles Family</b>	<b>Accipitridae</b>	
Harris's hawk	<i>Accipiter cooperii</i>	O
Sharp-shinned hawk	<i>Accipiter striatus</i>	P
White-tailed hawk <sup>2</sup>	<i>Buteo albicaudatu</i>	P
Red-tailed hawk	<i>Buteo jamaicensis</i>	P
Rough-legged hawk	<i>Buteo lagopus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Red-shouldered hawk	<i>Buteo lineatus</i>	P
Broad-winged hawk	<i>Buteo platypterus</i>	P
Ferruginous hawk	<i>Buteo regalis</i>	P
Swainson's hawk	<i>Buteo swainsoni</i>	P
Northern harrier	<i>Circus cyaneus</i>	P
Swallow-tailed kite <sup>2</sup>	<i>Elanoides forficatus</i>	P
White-tailed kite	<i>Elanus leucurus</i>	P
Bald eagle <sup>2</sup>	<i>Haliaeetus leucocephalus</i>	P
Mississippi kite	<i>Ictinia mississippiensis</i>	P
Osprey	<i>Pandion haliaetus</i>	P
<b>Falcons Family</b>	<b>Falconidae</b>	
Crested caracara	<i>Caracara cheriway</i>	O
Merlin	<i>Falco columbarius</i>	P
Prairie falcon	<i>Falco mexicanus</i>	P
Peregrine falcon <sup>2</sup>	<i>Falco peregrinus</i>	P
American kestrel	<i>Falco sparverius</i>	P
<b>Rails and Coots Family</b>	<b>Rallidae</b>	
American coot	<i>Fulica americana</i>	P
Common gallinule	<i>Gallinula galeata</i>	P
Purple gallinule	<i>Porphyrio martinicus</i>	P
Sora	<i>Porzana carolina</i>	P
King rail	<i>Rallus elegans</i>	P
Virginia rail	<i>Rallus limicola</i>	P
Clapper rail	<i>Rallus longirostris</i>	P
<b>Cranes Family</b>	<b>Gruidae</b>	
Sandhill crane	<i>Grus canadensis</i>	P
<b>Plovers Family</b>	<b>Charadriidae</b>	
Piping plover <sup>2</sup>	<i>Charadrius melodus</i>	P
Snowy plover <sup>2</sup>	<i>Charadrius nivosus</i>	P
Semipalmated plover	<i>Charadrius semipalmatus</i>	P
Killdeer	<i>Charadrius vociferus</i>	O
Wilson's plover <sup>2</sup>	<i>Charadrius wilsonia</i>	P
American golden-plover	<i>Pluvialis dominica</i>	P
Black-bellied plover	<i>Pluvialis squatarola</i>	P
<b>Sandpipers Family</b>	<b>Scolopacidae</b>	
Spotted sandpiper	<i>Actitis macularius</i>	P
Ruddy turnstone	<i>Arenaria interpres</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Upland sandpiper <sup>2</sup>	<i>Bartramia longicauda</i>	P
Sanderling	<i>Calidris alba</i>	P
Dunlin	<i>Calidris alpina</i>	P
Baird's sandpiper	<i>Calidris bairdii</i>	P
Red knot <sup>2</sup>	<i>Calidris canutus</i>	P
White-rumped sandpiper	<i>Calidris fuscicollis</i>	P
Stilt sandpiper	<i>Calidris himantopus</i>	P
Western sandpiper	<i>Calidris mauri</i>	P
Pectoral sandpiper	<i>Calidris melanotos</i>	P
Least sandpiper	<i>Calidris minutilla</i>	P
Semipalmated sandpiper	<i>Calidris pusilla</i>	P
Common snipe	<i>Gallinago gallinago</i>	P
American oystercatcher <sup>2</sup>	<i>Haematopus palliatus</i>	P
Short-billed dowitcher <sup>2</sup>	<i>Limnodromus griseus</i>	P
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	P
Marbled godwit <sup>2</sup>	<i>Limosa fedoa</i>	P
Hudsonian godwit <sup>2</sup>	<i>Limosa haemastica</i>	P
Long-billed curlew <sup>2</sup>	<i>Numenius americanus</i>	P
Whimbrel <sup>2</sup>	<i>Numenius phaeopus</i>	P
American woodcock	<i>Scolopax minor</i>	P
Lesser yellowlegs <sup>2</sup>	<i>Tringa flavipes</i>	P
Greater yellowlegs	<i>Tringa melanoleuca</i>	P
Willet	<i>Tringa semipalmata</i>	P
Solitary sandpiper <sup>2</sup>	<i>Tringa solitaria</i>	P
Buff-breasted sandpiper <sup>2</sup>	<i>Tryngites subruficollis</i>	P
<b>Gulls Family</b>	<b>Laridae</b>	
Black tern	<i>Chlidonias niger</i>	P
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	P
Herring gull	<i>Larus argentatus</i>	P
Laughing gull	<i>Larus atricilla</i>	O
Ring-billed gull	<i>Larus delawarensis</i>	P
Great black-backed gull	<i>Larus marinus</i>	P
Franklin's gull	<i>Leucophaeus pipixcan</i>	P
Black skimmer <sup>2</sup>	<i>Rynchops niger</i>	P
Least tern <sup>2</sup>	<i>Sterna antillarum</i>	P
Caspian tern	<i>Sterna caspia</i>	P
Forster's tern	<i>Sterna forsteri</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Sooty tern	<i>Sterna fuscata</i>	P
Common tern	<i>Sterna hirundo</i>	P
Royal tern	<i>Sterna maxima</i>	P
Gull-billed tern <sup>2</sup>	<i>Sterna nilotica</i>	P
Sandwich tern <sup>2</sup>	<i>Thalasseus sandvicensis</i>	P
<b>Pigeons and Doves Family</b>	<b>Columbidae</b>	
Inca dove	<i>Columbina inca</i>	P
Rock dove	<i>Columba livia</i>	O
Common ground-dove	<i>Columbina passerina</i>	P
White-winged dove	<i>Zenaida asiatica</i>	P
Mourning dove	<i>Zenaida macroura</i>	P
<b>Cuckoos Family</b>	<b>Cuculidae</b>	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	O
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	P
Groove-billed ani	<i>Crotophaga sulcirostris</i>	P
Greater roadrunner	<i>Geococcyx californianus</i>	P
<b>True Owls Family</b>	<b>Strigidae</b>	
Short-eared owl <sup>2</sup>	<i>Asio flammeus</i>	P
Burrowing owl	<i>Athene cunicularia</i>	P
Great horned owl	<i>Bubo virginianus</i>	O
Eastern screech-owl	<i>Megascops asio</i>	P
<b>Nighthawks and Nightjars Family</b>	<b>Caprimulgidae</b>	
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	P
Whip-poor-will	<i>Antrostomus vociferus</i>	P
Lesser nighthawk	<i>Chordeiles acutipennis</i>	O
Common nighthawk	<i>Chordeiles minor</i>	O
Common pauraque	<i>Nyctidromus albicollis</i>	O
Common poorwill	<i>Phalaenoptilus nuttallii</i>	P
<b>Swifts Family</b>	<b>Apodidae</b>	
Chimney swift	<i>Chaetura pelagica</i>	O
<b>Hummingbirds Family</b>	<b>Trochilidae</b>	
Buff-bellied hummingbird	<i>Amazilia yucatanensis</i>	P
Black-chinned hummingbird	<i>Archilochus alexandri</i>	P
Ruby-throated hummingbird	<i>Archilochus colubris</i>	O
Rufous hummingbird	<i>Selasphorus rufus</i>	P
<b>Kingfishers Family</b>	<b>Alcedinidae</b>	
Green kingfisher	<i>Chloroceryle americana</i>	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Woodpeckers Family</b>	<b>Picidae</b>	
Northern flicker	<i>Colaptes auratus</i>	P
Golden-fronted woodpecker	<i>Melanerpes aurifrons</i>	O
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	O
Ladder-backed woodpecker	<i>Picoides scalaris</i>	P
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	P
<b>Flycatchers Family</b>	<b>Tyrannidae</b>	
Olive-sided flycatcher	<i>Contopus cooperi</i>	P
Eastern wood-pewee	<i>Contopus virens</i>	P
Alder flycatcher	<i>Empidonax alnorum</i>	P
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	P
Least flycatcher	<i>Empidonax minimus</i>	P
Willow flycatcher	<i>Empidonax traillii</i>	P
Acadian flycatcher	<i>Empidonax vireescens</i>	P
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	O
Great crested flycatcher	<i>Myiarchus crinitus</i>	O
Brown crested flycatcher	<i>Myiarchus tyrannulus</i>	P
Great kiskadee	<i>Pitangus sulphuratus</i>	O
Vermilion flycatcher	<i>Pyrocephalus rubinus</i>	P
Eastern phoebe	<i>Sayornis phoebe</i>	P
Say's phoebe	<i>Sayornis saya</i>	P
Couch's kingbird	<i>Tyrannus couchii</i>	P
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	O
Eastern kingbird	<i>Tyrannus tyrannus</i>	P
Western kingbird	<i>Tyrannus verticalis</i>	O
<b>Shrikes Family</b>	<b>Laniidae</b>	
Loggerhead shrike <sup>2</sup>	<i>Lanius ludovicianus</i>	P
<b>Vireos Family</b>	<b>Vireonidae</b>	
Bell's vireo	<i>Vireo bellii</i>	P
Yellow-throated vireo	<i>Vireo flavifrons</i>	P
Warbling vireo	<i>Vireo gilvus</i>	P
White-eyed vireo	<i>Vireo griseus</i>	O
Red-eyed vireo	<i>Vireo olivaceus</i>	P
Philadelphia vireo	<i>Vireo philadelphicus</i>	P
Blue-headed vireo	<i>Vireo solitarius</i>	P
<b>Crows and Jays Family</b>	<b>Corvidae</b>	
Chihuahuan raven	<i>Corvus cryptoleucus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Blue jay	<i>Cyanocitta cristata</i>	P
Green jay	<i>Cyanocorax yncas</i>	O
<b>Swallows Family</b>	<b>Hirundinidae</b>	
Barn swallow	<i>Hirundo rustica</i>	P
Cave swallow	<i>Petrochelidon fulva</i>	P
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	O
Purple martin	<i>Progne subis</i>	P
Bank swallow	<i>Riparia riparia</i>	P
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	P
Tree swallow	<i>Tachycineta bicolor</i>	P
<b>Wrens Family</b>	<b>Troglodytidae</b>	
Cactus wren	<i>Campylorhynchus brunneicapillus</i>	P
Marsh wren	<i>Cistothorus palustris</i>	P
Sedge wren <sup>2</sup>	<i>Cistothorus platensis</i>	P
Bewick's wren	<i>Thryomanes bewickii</i>	P
Carolina wren	<i>Thryothorus ludovicianus</i>	P
House wren	<i>Troglodytes aedon</i>	P
Winter wren	<i>Troglodytes hiemalis</i>	P
<b>Titmice and Chickadees Family</b>	<b>Paridae</b>	
Black-crested titmouse	<i>Baeolophus atricristatus</i>	O
Tufted titmouse	<i>Baeolophus bicolor</i>	O
<b>Gnatcatchers and Gnatwrens Family</b>	<b>Poliptilidae</b>	
Blue-gray gnatcatcher	<i>Poliptila caerulea</i>	P
<b>Thrushes Family</b>	<b>Turdidae</b>	
Veery	<i>Catharus fuscescens</i>	P
Hermit thrush	<i>Catharus guttatus</i>	P
Gray-cheeked thrush	<i>Catharus minimus</i>	P
Swainson's thrush	<i>Catharus ustulatus</i>	P
Wood thrush	<i>Hylocichla mustelina</i>	P
Mountain bluebird	<i>Sialia currucoides</i>	P
Eastern bluebird	<i>Sialia sialis</i>	P
American robin	<i>Turdus migratorius</i>	P
<b>Mockingbirds and Thrashers Family</b>	<b>Mimidae</b>	
Gray catbird	<i>Dumetella carolinensis</i>	P
Northern mockingbird	<i>Mimus polyglottos</i>	O
Sage thrasher	<i>Oreoscoptes montanus</i>	P
Curve-billed thrasher	<i>Toxostoma curvirostre</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Long-billed thrasher	<i>Toxostoma longirostre</i>	P
Brown thrasher	<i>Toxostoma rufum</i>	P
<b>Starlings Family</b>	<b>Sturnidae</b>	
European starling	<i>Sturnus vulgaris</i>	O
<b>Wagtails and Pipits Family</b>	<b>Motacillidae</b>	
American pipit	<i>Anthus rubescens</i>	P
Sprague's pipit <sup>2</sup>	<i>Anthus spragueii</i>	P
<b>Wood Warblers Family</b>	<b>Parulidae</b>	
Canada warbler	<i>Cardellina canadensis</i>	P
Wilson's warbler	<i>Cardellina pusilla</i>	P
Magnolia warbler	<i>Dendroica magnolia</i>	P
Black-throated green warbler	<i>Dendroica virens</i>	P
Kentucky warbler	<i>Geothlypis formosa</i>	P
Mourning warbler	<i>Geothlypis philadelphia</i>	P
MacGillibray's warbler	<i>Geothlypis tolmiei</i>	P
Common yellowthroat	<i>Geothlypis trichas</i>	P
Worm-eating warbler	<i>Helmitheros vermivorum</i>	P
Yellow-breasted chat	<i>Icteria virens</i>	P
Black-and-white warbler	<i>Mniotilta varia</i>	P
Connecticut warbler	<i>Oporornis agilis</i>	P
Orange-crowned warbler	<i>Oreothlypis celata</i>	P
Tennessee warbler	<i>Oreothlypis peregrina</i>	O
Nashville warbler	<i>Oreothlypis ruficapilla</i>	O
Louisiana waterthrush	<i>Parkesia motacilla</i>	P
Northern waterthrush	<i>Parkesia noveboracensis</i>	P
Prothonotary warbler <sup>2</sup>	<i>Protonotaria citrea</i>	P
Ovenbird	<i>Seiurus aurocapilla</i>	P
Northern parula	<i>Setophaga americana</i>	P
Black-throated blue warbler	<i>Setophaga caerulea</i>	P
Bay-breasted warbler	<i>Setophaga castanea</i>	P
Cerulean warbler	<i>Setophaga cerulea</i>	P
Hooded warbler	<i>Setophaga citrina</i>	P
Yellow-rumped warbler	<i>Setophaga coronata</i>	P
Prairie warbler	<i>Setophaga discolor</i>	P
Yellow-throated warbler	<i>Setophaga dominica</i>	P
Blackburnian warbler	<i>Setophaga fusca</i>	P
Magnolia warbler	<i>Setophaga magnolia</i>	P



COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Black-throated gray warbler	<i>Setophaga nigrescens</i>	P
Palm warbler	<i>Setophaga palmarum</i>	P
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>	P
Yellow warbler	<i>Setophaga petechia</i>	P
Pine warbler	<i>Setophaga pinus</i>	P
American redstart	<i>Setophaga ruticilla</i>	P
Blackpoll warbler	<i>Setophaga striata</i>	P
Cape May warbler	<i>Setophaga tigrina</i>	P
Black-throated green warbler	<i>Setophaga virens</i>	P
Golden-winged warbler	<i>Vermivora chrysoptera</i>	P
Blue-winged warbler	<i>Vermivora cyanoptera</i>	P
<b>Sparrows Family</b>	<b>Emberizidae</b>	
Saltmarsh sparrow	<i>Ammodramus caudacutus</i>	P
Le Conte's sparrow <sup>2</sup>	<i>Ammodramus leconteii</i>	P
Seaside sparrow <sup>2</sup>	<i>Ammodramus maritimus</i>	P
Grasshopper sparrow <sup>2</sup>	<i>Ammodramus savannarum</i>	P
Olive sparrow	<i>Arremonops rufivirgatus</i>	P
Lark bunting	<i>Calamospiza melanocorys</i>	P
Lark sparrow	<i>Chondestes grammacus</i>	P
Swamp sparrow	<i>Melospiza georgiana</i>	P
Lincoln's sparrow	<i>Melospiza lincolnii</i>	P
Song sparrow	<i>Melospiza melodia</i>	P
Fox sparrow	<i>Passerella iliaca</i>	P
Savannah sparrow	<i>Passerculus sandwichensis</i>	P
Cassin's sparrow	<i>Peucaea cassinii</i>	P
Green-tailed towhee	<i>Pipilo chlorurus</i>	P
Eastern towhee	<i>Pipilo erythrophthalmus</i>	P
Vesper sparrow	<i>Pooecetes gramineus</i>	P
Clay-colored sparrow	<i>Spizella pallida</i>	P
Chipping sparrow	<i>Spizella passerina</i>	P
Field sparrow	<i>Spizella pusilla</i>	P
White-throated sparrow	<i>Zonotrichia albicollis</i>	P
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	P
<b>Cardinals and Grosbeaks Family</b>	<b>Cardinalidae</b>	
Northern cardinal	<i>Cardinalis cardinalis</i>	O
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	P
Lazuli bunting	<i>Passerina amoena</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Blue grosbeak	<i>Passerina caerulea</i>	P
Painted bunting <sup>2</sup>	<i>Passerina ciris</i>	O
Indigo bunting	<i>Passerina cyanea</i>	P
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	P
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	P
Western tanager	<i>Piranga ludoviciana</i>	P
Scarlet tanager	<i>Piranga olivacea</i>	P
Summer tanager	<i>Piranga rubra</i>	P
Dickcissel <sup>2</sup>	<i>Spiza americana</i>	P
<b>Blackbirds and Orioles Family</b>	<b>Icteridae</b>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	P
Bobolink	<i>Dolichonyx oryzivorus</i>	P
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	P
Northern oriole	<i>Icterus galbula</i>	P
Orchard oriole	<i>Icterus spurius</i>	P
Great-tailed grackle	<i>Quiscalus mexicanus</i>	O
Boat-tailed grackle	<i>Quiscalus major</i>	O
Common grackle	<i>Quiscalus quiscula</i>	P
Bronzed cowbird	<i>Molothrus aeneus</i>	O
Brown-headed cowbird	<i>Molothrus ater</i>	O
Eastern meadowlark	<i>Sturnella magna</i>	P
Western meadowlark	<i>Sturnella neglecta</i>	P
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	P
<b>Old World Sparrows Family</b>	<b>Passeridae</b>	
House sparrow	<i>Passer domesticus</i>	O
<b>Larks Family</b>	<b>Alaudidae</b>	
Horned lark	<i>Eremophila alpestris</i>	P
<b>Loons Family</b>	<b>Gaviidae</b>	
Common loon	<i>Gavia immer</i>	P
Red-throated loon	<i>Gavia stellata</i>	P
<b>Grebes Family</b>	<b>Podicipedidae</b>	
Western grebe	<i>Aechmophorus occidentalis</i>	P
Horned grebe	<i>Podiceps auritus</i>	P
Eared grebe	<i>Podiceps nigricollis</i>	P
Pied-billed grebe	<i>Podilymbus podiceps</i>	P
Least grebe	<i>Tachybaptus dominicus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Frigatebirds Family</b>	<b>Fregatidae</b>	
Magnificent frigatebird	<i>Fregata magnificens</i>	P
<b>Storks Family</b>	<b>Ciconiidae</b>	
Wood stork <sup>2</sup>	<i>Mycteria americana</i>	P
<b>New World Quails Family</b>	<b>Odontophoridae</b>	
Northern bobwhite	<i>Colinus virginianus</i>	P
<b>Barn Owls Family</b>	<b>Tytonidae</b>	
Barn owl	<i>Tyto alba</i>	P
<b>Penduline Tits Family</b>	<b>Remisidae</b>	
Verdin	<i>Auriparus flaviceps</i>	P
<b>Nuthatches Family</b>	<b>Sittidae</b>	
Red-breasted nuthatch	<i>Sitta canadensis</i>	P
<b>Treecreepers Family</b>	<b>Certhiidae</b>	
Brown creeper	<i>Certhia americana</i>	P
<b>Golden-crests and Kinglets Family</b>	<b>Regulidae</b>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	P
Golden-crowned kinglet	<i>Regulus satrapa</i>	P
<b>Waxwings Family</b>	<b>Bombycillidae</b>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	P
<b>Finches Family</b>	<b>Fringillidae</b>	
House finch	<i>Haemorhous mexicanus</i>	P
Pine siskin	<i>Spinus pinus</i>	P
American goldfinch	<i>Spinus tristis</i>	P
<b>Boobies and Gannets Family</b>	<b>Sulidae</b>	
Northern gannet	<i>Morus bassanus</i>	P
Masked booby	<i>Sula dactylatra</i>	P
<b>Skuas Family</b>	<b>Stercorariidae</b>	
Parasitic jaeger	<i>Stercorarius parasiticus</i>	P
Pomarine jaeger	<i>Stercorarius pomarinus</i>	P

<sup>1</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>2</sup> Listed as rare, threatened, or endangered; or USFWS bird of conservation concern (see Table E-13)

Notes: Common and scientific names generally follow the Cornell University Lab of Ornithology (Cornell University 2012).

Sources: Cornell University 2012, Woodin et al. 2010, Hickman et al. 2007, Coastal Bend Audubon Society 2000, and Wolfe et al. 1998

**Table E-7. Birds Known or with the Potential to Occur at NOLF Waldron.**

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Ducks, Geese, and Swans Family</b>	<b>Anatidae</b>	
Wood duck	<i>Aix sponsa</i>	P
Northern pintail	<i>Anas acuta</i>	P
Greater white-fronted goose	<i>Anser albifrons</i>	P
American wigeon	<i>Anas americana</i>	P
Northern shoveler	<i>Anas clypeata</i>	P
Green-winged teal	<i>Anas crecca</i>	P
Cinnamon teal	<i>Anas cyanoptera</i>	P
Blue-winged teal	<i>Anas discors</i>	P
Mottled duck	<i>Anas fulvigula</i>	O
Mallard	<i>Anas platyrhynchos</i>	P
Gadwall	<i>Anas strepera</i>	P
Lesser scaup	<i>Aythya affinis</i>	P
Redhead	<i>Aythya americana</i>	P
Ring-necked duck	<i>Aythya collaris</i>	P
Greater scaup	<i>Aythya marila</i>	P
Canvasback	<i>Aythya valisineria</i>	P
Bufflehead	<i>Bucephala albeola</i>	P
Common goldeneye	<i>Bucephala clangula</i>	P
Canada goose	<i>Branta canadensis</i>	P
Snow goose	<i>Chen caerulescens</i>	P
Ross's goose	<i>Chen rossii</i>	P
Long-tailed duck	<i>Clangula hyemalis</i>	P
Tundra swan	<i>Cygnus columbianus</i>	P
Black-bellied whistling-duck	<i>Dendrocygna autumnalis</i>	O
Fulvous whistling-duck	<i>Dendrocygna bicolor</i>	P
Hooded merganser	<i>Lophodytes cucullatus</i>	P
Black scoter	<i>Melanitta americana</i>	P
White-winged scoter	<i>Melanitta fusca</i>	P
Surf scoter	<i>Melanitta perspicillata</i>	P
Red-breasted merganser	<i>Mergus serrator</i>	P
Masked duck	<i>Nomonyx dominicus</i>	P
Ruddy duck	<i>Oxyura jamaicensis</i>	P
<b>Pelicans Family</b>	<b>Pelecanidae</b>	
American white pelican	<i>Pelecanus erythrorhynchos</i>	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Brown pelican <sup>2</sup>	<i>Pelecanus occidentalis</i>	P
<b>Anhingas Family</b>	<b>Anhingidae</b>	
Anhinga	<i>Anhinga anhinga</i>	O
<b>Cormorants Family</b>	<b>Phalacrocoracidae</b>	
Double-crested cormorant	<i>Phalacrocorax auritus</i>	P
Neotropic cormorant	<i>Phalacrocorax brasilianus</i>	O
<b>Turkey Family</b>	<b>Meleagrididae</b>	
Wild turkey	<i>Meleagris gallopavo</i>	P
<b>Herons and Egrets Family</b>	<b>Ardeidae</b>	
Great egret	<i>Ardea alba</i>	P
Great blue heron	<i>Ardea herodias</i>	O
American bittern <sup>2</sup>	<i>Botaurus lentiginosus</i>	P
Cattle egret	<i>Bubulcus ibis</i>	P
Green heron	<i>Butorides virescens</i>	P
Little blue heron <sup>2</sup>	<i>Egretta caerulea</i>	P
Reddish egret <sup>2</sup>	<i>Egretta rufescens</i>	P
Snowy egret	<i>Egretta thula</i>	O
Tricolored heron	<i>Egretta tricolor</i>	P
Least bittern <sup>2</sup>	<i>Ixobrychus exilis</i>	P
Black crowned night heron	<i>Nycticorax nycticorax</i>	O
Yellow-crowned night-heron	<i>Nycticorax violacea</i>	P
<b>Avocets and Stilts Family</b>	<b>Recurvirostridae</b>	
Black-necked stilt	<i>Himantopus mexicanus</i>	P
American avocet	<i>Recurvirostra americana</i>	P
<b>Ibises Family</b>	<b>Threskiornithidae</b>	
White ibis	<i>Eudocimus albus</i>	P
Roseate spoonbill	<i>Platalea ajaja</i>	P
White-faced ibis <sup>2</sup>	<i>Plegadis chihi</i>	P
<b>Vultures Family</b>	<b>Cathartidae</b>	
Turkey vulture	<i>Cathartes aura</i>	O
Black vulture	<i>Coragyps atratus</i>	O
<b>Hawks and Eagles Family</b>	<b>Accipitridae</b>	
Harris's hawk	<i>Accipiter cooperii</i>	O
Sharp-shinned hawk	<i>Accipiter striatus</i>	P
White-tailed hawk <sup>2</sup>	<i>Buteo albicaudatus</i>	O
Red-tailed hawk	<i>Buteo jamaicensis</i>	O
Rough-legged hawk	<i>Buteo lagopus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Red-shouldered hawk	<i>Buteo lineatus</i>	P
Broad-winged hawk	<i>Buteo platypterus</i>	P
Ferruginous hawk	<i>Buteo regalis</i>	P
Swainson's hawk	<i>Buteo swainsoni</i>	P
Northern harrier	<i>Circus cyaneus</i>	P
Swallow-tailed kite <sup>2</sup>	<i>Elanoides forficatus</i>	P
White-tailed kite	<i>Elanus leucurus</i>	P
Bald eagle <sup>2</sup>	<i>Haliaeetus leucocephalus</i>	P
Mississippi kite	<i>Ictinia mississippiensis</i>	P
Osprey	<i>Pandion haliaetus</i>	O
<b>Falcons Family</b>	<b>Falconidae</b>	
Crested caracara	<i>Caracara cheriway</i>	O
Merlin	<i>Falco columbarius</i>	P
Prairie falcon	<i>Falco mexicanus</i>	P
Peregrine falcon <sup>2</sup>	<i>Falco peregrinus</i>	P
American kestrel	<i>Falco sparverius</i>	O
<b>Rails and Coots Family</b>	<b>Rallidae</b>	
American coot	<i>Fulica americana</i>	P
Common gallinule	<i>Gallinula galeata</i>	P
Purple gallinule	<i>Porphyrio martinicus</i>	P
Sora	<i>Porzana carolina</i>	P
King rail	<i>Rallus elegans</i>	P
Virginia rail	<i>Rallus limicola</i>	P
Clapper rail	<i>Rallus longirostris</i>	P
<b>Cranes Family</b>	<b>Gruidae</b>	
Sandhill crane	<i>Grus canadensis</i>	O
<b>Plovers Family</b>	<b>Charadriidae</b>	
Piping plover <sup>2</sup>	<i>Charadrius melodus</i>	P
Snowy plover <sup>2</sup>	<i>Charadrius nivosus</i>	P
Semipalmated plover	<i>Charadrius semipalmatus</i>	P
Killdeer	<i>Charadrius vociferus</i>	O
Wilson's plover <sup>2</sup>	<i>Charadrius wilsonia</i>	P
American golden-plover	<i>Pluvialis dominica</i>	P
Black-bellied plover	<i>Pluvialis squatarola</i>	P
<b>Sandpipers Family</b>	<b>Scolopacidae</b>	
Spotted sandpiper	<i>Actitis macularius</i>	P
Ruddy turnstone	<i>Arenaria interpres</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Upland sandpiper <sup>2</sup>	<i>Bartramia longicauda</i>	P
Sanderling	<i>Calidris alba</i>	P
Dunlin	<i>Calidris alpina</i>	P
Baird's sandpiper	<i>Calidris bairdii</i>	P
Red knot <sup>2</sup>	<i>Calidris canutus</i>	P
White-rumped sandpiper	<i>Calidris fuscicollis</i>	P
Stilt sandpiper	<i>Calidris himantopus</i>	P
Western sandpiper	<i>Calidris mauri</i>	P
Pectoral sandpiper	<i>Calidris melanotos</i>	P
Least sandpiper	<i>Calidris minutilla</i>	P
Semipalmated sandpiper	<i>Calidris pusilla</i>	P
Wilson's snipe	<i>Gallinago delicata</i>	O
Common snipe	<i>Gallinago gallinago</i>	P
American oystercatcher <sup>2</sup>	<i>Haematopus palliatus</i>	P
Short-billed dowitcher <sup>2</sup>	<i>Limnodromus griseus</i>	P
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	P
Marbled godwit <sup>2</sup>	<i>Limosa fedoa</i>	P
Hudsonian godwit <sup>2</sup>	<i>Limosa haemastica</i>	P
Long-billed curlew <sup>2</sup>	<i>Numenius americanus</i>	P
Whimbrel <sup>2</sup>	<i>Numenius phaeopus</i>	P
American woodcock	<i>Scolopax minor</i>	P
Lesser yellowlegs <sup>2</sup>	<i>Tringa flavipes</i>	O
Greater yellowlegs	<i>Tringa melanoleuca</i>	P
Willet	<i>Tringa semipalmata</i>	P
Solitary sandpiper <sup>2</sup>	<i>Tringa solitaria</i>	P
Buff-breasted sandpiper <sup>2</sup>	<i>Tryngites subruficollis</i>	P
<b>Gulls Family</b>	<b>Laridae</b>	
Black tern	<i>Chlidonias niger</i>	P
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	P
Laughing gull	<i>Larus atricilla</i>	O
Herring gull	<i>Larus argentatus</i>	P
Ring-billed gull	<i>Larus delawarensis</i>	P
Great black-backed gull	<i>Larus marinus</i>	P
Franklin's gull	<i>Leucophaeus pipixcan</i>	P
Black skimmer <sup>2</sup>	<i>Rynchops niger</i>	P
Least tern <sup>2</sup>	<i>Sterna antillarum</i>	O
Caspian tern	<i>Sterna caspia</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Forster's tern	<i>Sterna forsteri</i>	P
Sooty tern <sup>2</sup>	<i>Sterna fuscata</i>	P
Common tern	<i>Sterna hirundo</i>	P
Royal tern	<i>Sterna maxima</i>	P
Gull-billed tern <sup>2</sup>	<i>Sterna nilotica</i>	P
Sandwich tern <sup>2</sup>	<i>Thalasseus sandvicensis</i> <sup>2</sup>	P
<b>Pigeons and Doves Family</b>	<b>Columbidae</b>	
Inca dove	<i>Columbina inca</i>	P
Rock dove	<i>Columba livia</i>	P
Common ground-dove	<i>Columbina passerina</i>	P
White-winged dove	<i>Zenaida asiatica</i>	P
Mourning dove	<i>Zenaida macroura</i>	O
<b>Cuckoos Family</b>	<b>Cuculidae</b>	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	P
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	P
Groove-billed ani	<i>Crotophaga sulcirostris</i>	P
Greater roadrunner	<i>Geococcyx californianus</i>	P
<b>True Owls Family</b>	<b>Strigidae</b>	
Short-eared owl <sup>2</sup>	<i>Asio flammeus</i>	P
Burrowing owl	<i>Athene cunicularia</i>	P
Great horned owl	<i>Bubo virginianus</i>	P
Eastern screech-owl	<i>Megascops asio</i>	P
<b>Nighthawks and Nightjars Family</b>	<b>Caprimulgidae</b>	
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	P
Whip-poor-will	<i>Antrostomus vociferus</i>	P
Lesser nighthawk	<i>Chordeiles acutipennis</i>	P
Common nighthawk	<i>Chordeiles minor</i>	P
Common pauraque	<i>Nyctidromus albigollis</i>	P
Common poorwill	<i>Phalaenoptilus nuttallii</i>	P
<b>Swifts Family</b>	<b>Apodidae</b>	
Chimney swift	<i>Chaetura pelagica</i>	O
<b>Hummingbirds Family</b>	<b>Trochilidae</b>	
Buff-bellied hummingbird	<i>Amazilia yucatanensis</i>	P
Black-chinned hummingbird	<i>Archilochus alexandri</i>	P
Ruby-throated hummingbird	<i>Archilochus colubris</i>	P
Rufous hummingbird	<i>Selasphorus rufus</i>	P



COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Kingfishers Family</b>	<b>Alcedinidae</b>	
Belted kingfisher	<i>Megaceryle alcyon</i>	P
<b>Woodpeckers Family</b>	<b>Picidae</b>	
Northern flicker	<i>Colaptes auratus</i>	P
Golden-fronted woodpecker	<i>Melanerpes aurifrons</i>	P
Ladder-backed woodpecker	<i>Picoides scalaris</i>	P
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	P
<b>Flycatchers Family</b>	<b>Tyrannidae</b>	
Olive-sided flycatcher	<i>Contopus cooperi</i>	P
Eastern wood-pewee	<i>Contopus virens</i>	P
Alder flycatcher	<i>Empidonax alnorum</i>	P
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	P
Least flycatcher	<i>Empidonax minimus</i>	P
Willow flycatcher	<i>Empidonax traillii</i>	P
Acadian flycatcher	<i>Empidonax virescens</i>	P
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	P
Great crested flycatcher	<i>Myiarchus crinitus</i>	P
Brown crested flycatcher	<i>Myiarchus tyrannulus</i>	P
Vermilion flycatcher	<i>Pyrocephalus rubinus</i>	P
Eastern phoebe	<i>Sayornis phoebe</i>	P
Say's phoebe	<i>Sayornis saya</i>	P
Couch's kingbird	<i>Tyrannus couchii</i>	P
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	O
Eastern kingbird	<i>Tyrannus tyrannus</i>	P
Western kingbird	<i>Tyrannus verticalis</i>	O
<b>Shrikes Family</b>	<b>Laniidae</b>	
Loggerhead shrike <sup>2</sup>	<i>Lanius ludovicianus</i>	P
<b>Vireos Family</b>	<b>Vireonidae</b>	
Bell's vireo	<i>Vireo bellii</i>	P
Yellow-throated vireo	<i>Vireo flavifrons</i>	P
Warbling vireo	<i>Vireo gilvus</i>	P
White-eyed vireo	<i>Vireo griseus</i>	O
Red-eyed vireo	<i>Vireo olivaceus</i>	P
Philadelphia vireo	<i>Vireo philadelphicus</i>	P
Blue-headed vireo	<i>Vireo solitarius</i>	P
<b>Crows and Jays Family</b>	<b>Corvidae</b>	
Chihuahuan raven	<i>Corvus cryptoleucus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Blue jay	<i>Cyanocitta cristata</i>	P
Green jay	<i>Cyanocorax yncas</i>	P
<b>Swallows Family</b>	<b>Hirundinidae</b>	
Barn swallow	<i>Hirundo rustica</i>	O
Cave swallow	<i>Petrochelidon fulva</i>	O
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	P
Purple martin	<i>Progne subis</i>	O
Bank swallow	<i>Riparia riparia</i>	P
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	O
Tree swallow	<i>Tachycineta bicolor</i>	P
<b>Wrens Family</b>	<b>Troglodytidae</b>	
Cactus wren	<i>Campylorhynchus brunneicapillus</i>	P
Marsh wren	<i>Cistothorus palustris</i>	P
Sedge wren <sup>2</sup>	<i>Cistothorus platensis</i>	O
Bewick's wren	<i>Thryomanes bewickii</i>	P
Carolina wren	<i>Thryothorus ludovicianus</i>	P
House wren	<i>Troglodytes aedon</i>	O
Winter wren	<i>Troglodytes hiemalis</i>	P
<b>Titmice and Chickadees Family</b>	<b>Paridae</b>	
Black-crested titmouse	<i>Baeolophus atricristatus</i>	P
Tufted titmouse	<i>Baeolophus bicolor</i>	P
<b>Gnatcatchers and Gnatwrens Family</b>	<b>Poliotilidae</b>	
Blue-gray gnatcatcher	<i>Poliottila caerulea</i>	P
<b>Thrushes Family</b>	<b>Turdidae</b>	
Veery	<i>Catharus fuscescens</i>	P
Hermit thrush	<i>Catharus guttatus</i>	P
Gray-cheeked thrush	<i>Catharus minimus</i>	P
Swainson's thrush	<i>Catharus ustulatus</i>	P
Wood thrush	<i>Hylocichla mustelina</i>	P
Mountain bluebird	<i>Sialia currucoides</i>	P
Eastern bluebird	<i>Sialia sialis</i>	P
American robin	<i>Turdus migratorius</i>	P
<b>Mockingbirds and Thrashers Family</b>	<b>Mimidae</b>	
Gray catbird	<i>Dumetella carolinensis</i>	P
Northern mockingbird	<i>Mimus polyglottos</i>	O
Sage thrasher	<i>Oreoscoptes montanus</i>	P
Curve-billed thrasher	<i>Toxostoma curvirostre</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Long-billed thrasher	<i>Toxostoma longirostre</i>	P
Brown thrasher	<i>Toxostoma rufum</i>	P
<b>Starlings Family</b>	<b>Sturnidae</b>	
European starling	<i>Sturnus vulgaris</i>	P
<b>Wagtails and Pipits Family</b>	<b>Motacillidae</b>	
American pipit	<i>Anthus rubescens</i>	P
Sprague's pipit <sup>2</sup>	<i>Anthus spragueii</i>	O
<b>Wood Warblers Family</b>	<b>Parulidae</b>	
Canada warbler	<i>Cardellina canadensis</i>	P
Wilson's warbler	<i>Cardellina pusilla</i>	P
Yellow-rumped warbler	<i>Dendroica coronata</i>	O
Magnolia warbler	<i>Dendroica magnolia</i>	P
Black-throated green warbler	<i>Dendroica virens</i>	P
Kentucky warbler	<i>Geothlypis formosa</i>	P
Mourning warbler	<i>Geothlypis philadelphia</i>	P
MacGillibray's warbler	<i>Geothlypis tolmiei</i>	P
Common yellowthroat	<i>Geothlypis trichas</i>	P
Worm-eating warbler	<i>Helmitheros vermivorum</i>	P
Yellow-breasted chat	<i>Icteria virens</i>	P
Black-and-white warbler	<i>Mniotilta varia</i>	P
Connecticut warbler	<i>Oporornis agilis</i>	P
Orange-crowned warbler	<i>Oreothlypis celata</i>	P
Tennessee warbler	<i>Oreothlypis peregrina</i>	O
Nashville warbler	<i>Oreothlypis ruficapilla</i>	O
Louisiana waterthrush	<i>Parkesia motacilla</i>	P
Northern waterthrush	<i>Parkesia noveboracensis</i>	P
Prothonotary warbler <sup>2</sup>	<i>Protonotaria citrea</i>	P
Ovenbird	<i>Seiurus aurocapilla</i>	P
Northern parula	<i>Setophaga americana</i>	P
Black-throated blue warbler	<i>Setophaga caerulescens</i>	P
Bay-breasted warbler	<i>Setophaga castanea</i>	P
Cerulean warbler	<i>Setophaga cerulea</i>	P
Hooded warbler	<i>Setophaga citrina</i>	P
Yellow-rumped warbler	<i>Setophaga coronata</i>	P
Prairie warbler	<i>Setophaga discolor</i>	P
Yellow-throated warbler	<i>Setophaga dominica</i>	P
Blackburnian warbler	<i>Setophaga fusca</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Magnolia warbler	<i>Setophaga magnolia</i>	P
Black-throated gray warbler	<i>Setophaga nigrescens</i>	P
Palm warbler	<i>Setophaga palmarum</i>	P
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>	P
Yellow warbler	<i>Setophaga petechia</i>	P
Pine warbler	<i>Setophaga pinus</i>	P
American redstart	<i>Setophaga ruticilla</i>	P
Blackpoll warbler	<i>Setophaga striata</i>	P
Cape May warbler	<i>Setophaga tigrina</i>	P
Black-throated green warbler	<i>Setophaga virens</i>	P
Golden-winged warbler	<i>Vermivora chrysoptera</i>	P
Blue-winged warbler	<i>Vermivora cyanoptera</i>	P
<b>Sparrows Family</b>	<b>Emberizidae</b>	
Saltmarsh sparrow	<i>Ammodramus caudacutus</i>	P
Le Conte's sparrow <sup>2</sup>	<i>Ammodramus leconteii</i>	O
Seaside sparrow <sup>2</sup>	<i>Ammodramus maritimus</i>	P
Grasshopper sparrow <sup>2</sup>	<i>Ammodramus savannarum</i>	O
Olive sparrow	<i>Arremonops rufivirgatus</i>	P
Lark bunting	<i>Calamospiza melanocorys</i>	P
Lark sparrow	<i>Chondestes grammacus</i>	P
Swamp sparrow	<i>Melospiza georgiana</i>	P
Lincoln's sparrow	<i>Melospiza lincolnii</i>	P
Song sparrow	<i>Melospiza melodia</i>	P
Fox sparrow	<i>Passerella iliaca</i>	P
Savannah sparrow	<i>Passerculus sandwichensis</i>	O
Cassin's sparrow	<i>Peucaea cassinii</i>	P
Green-tailed towhee	<i>Pipilo chlorurus</i>	P
Eastern towhee	<i>Pipilo erythrophthalmus</i>	P
Vesper sparrow	<i>Pooecetes gramineus</i>	O
Clay-colored sparrow	<i>Spizella pallida</i>	P
Chipping sparrow	<i>Spizella passerina</i>	P
Field sparrow	<i>Spizella pusilla</i>	P
White-throated sparrow	<i>Zonotrichia albicollis</i>	P
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	P
<b>Cardinals and Grosbeaks Family</b>	<b>Cardinalidae</b>	
Northern cardinal	<i>Cardinalis cardinalis</i>	O
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
Lazuli bunting	<i>Passerina amoena</i>	P
Blue grosbeak	<i>Passerina caerulea</i>	P
Painted bunting <sup>2</sup>	<i>Passerina ciris</i>	P
Indigo bunting	<i>Passerina cyanea</i>	P
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	P
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	P
Western tanager	<i>Piranga ludoviciana</i>	P
Scarlet tanager	<i>Piranga olivacea</i>	P
Summer tanager	<i>Piranga rubra</i>	P
Dickcissel <sup>2</sup>	<i>Spiza americana</i>	P
<b>Blackbirds and Orioles Family</b>	<b>Icteridae</b>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	O
Bobolink	<i>Dolichonyx oryzivorus</i>	P
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	P
Northern oriole	<i>Icterus galbula</i>	P
Orchard oriole	<i>Icterus spurius</i>	P
Bronzed cowbird	<i>Molothrus aeneus</i>	P
Brown-headed cowbird	<i>Molothrus ater</i>	P
Great-tailed grackle	<i>Quiscalus mexicanus</i>	O
Common grackle	<i>Quiscalus quiscula</i>	P
Eastern meadowlark	<i>Sturnella magna</i>	O
Western meadowlark	<i>Sturnella neglecta</i>	O
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	P
<b>Old World Sparrows Family</b>	<b>Passeridae</b>	
House sparrow	<i>Passer domesticus</i>	O
<b>Larks Family</b>	<b>Alaudidae</b>	
Horned lark	<i>Eremophila alpestris</i>	P
<b>Loons Family</b>	<b>Gaviidae</b>	
Common loon	<i>Gavia immer</i>	P
Red-throated loon	<i>Gavia stellata</i>	P
<b>Grebes Family</b>	<b>Podicipedidae</b>	
Western grebe	<i>Aechmophorus occidentalis</i>	P
Horned grebe	<i>Podiceps auritus</i>	P
Eared grebe	<i>Podiceps nigricollis</i>	P
Pied-billed grebe	<i>Podilymbus podiceps</i>	P
Least grebe	<i>Tachybaptus dominicus</i>	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>
<b>Frigatebirds Family</b>	<b>Fregatidae</b>	
Magnificent frigatebird	<i>Fregata magnificens</i>	P
<b>Storks Family</b>	<b>Ciconiidae</b>	
Wood stork <sup>2</sup>	<i>Mycteria americana</i>	P
<b>New World Quails Family</b>	<b>Odontophoridae</b>	
Northern bobwhite	<i>Colinus virginianus</i>	P
<b>Barn Owls Family</b>	<b>Tytonidae</b>	
Barn owl	<i>Tyto alba</i>	P
<b>Penduline Tits Family</b>	<b>Remisidae</b>	
Verdin	<i>Auriparus flaviceps</i>	P
<b>Nuthatches Family</b>	<b>Sittidae</b>	
Red-breasted nuthatch	<i>Sitta canadensis</i>	P
<b>Treecreepers Family</b>	<b>Certhiidae</b>	
Brown creeper	<i>Certhia americana</i>	P
<b>Golden-crests and Kinglets Family</b>	<b>Regulidae</b>	
Ruby-crowned kinglet	<i>Regulus calendula</i>	P
Golden-crowned kinglet	<i>Regulus satrapa</i>	P
<b>Waxwings Family</b>	<b>Bombycillidae</b>	
Cedar waxwing	<i>Bombycilla cedrorum</i>	P
<b>Finches Family</b>	<b>Fringillidae</b>	
House finch	<i>Haemorhous mexicanus</i>	P
Pine siskin	<i>Spinus pinus</i>	P
American goldfinch	<i>Spinus tristis</i>	P
<b>Boobies and Gannets Family</b>	<b>Sulidae</b>	
Northern gannet	<i>Morus bassanus</i>	P
Masked booby	<i>Sula dactylatra</i>	P
<b>Skuas Family</b>	<b>Stercorariidae</b>	
Parasitic jaeger	<i>Stercorarius parasiticus</i>	P
Pomarine jaeger	<i>Stercorarius pomarinus</i>	P

<sup>1</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>2</sup> Listed as rare, threatened, or endangered species; or USFWS bird of conservation concern (see Table E-13)

Notes: Common and scientific names generally follow the Cornell University Lab of Ornithology (Cornell University 2012).

Sources: Cornell University 2012, Woodin et al. 2010, Coastal Bend Audubon Society 2000, and Wolfe et al. 1998

**Table E-8. Birds Known to Occur at NOLF Goliad.**

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
<b>Hawks and Eagles Family</b>	<b>Accipitridae (Order Accipitriformes)</b>
Cooper's hawk	<i>Accipiter cooperii</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
White-tailed kite	<i>Elanus leucurus</i>
<b>Ducks, Geese, and Swans Family</b>	<b>Anatidae (Order Anseriformes)</b>
Black-bellied whistling duck	<i>Dendrocygna autumnalis</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
<b>Herons and Egrets Family</b>	<b>Ardeidae (Order Pelecaniformes)</b>
Great egret	<i>Ardea alba</i>
Great blue heron	<i>Ardea herodias</i>
Green heron	<i>Butorides virescens</i>
Little blue heron <sup>1</sup>	<i>Egretta caerulea</i>
Snowy egret	<i>Egretta thula</i>
<b>Nighthawks and Nightjars Family</b>	<b>Caprimulgidae (Order Caprimulgiformes)</b>
Common nighthawk	<i>Chordeiles minor</i>
Common pauraque	<i>Nyctidromus albicollis</i>
<b>Cardinals and Grosbeaks Family</b>	<b>Cardinalidae (Order Passeriformes)</b>
Northern cardinal	<i>Cardinalis cardinalis</i>
Painted bunting <sup>1</sup>	<i>Passerina ciris</i>
<b>Vultures Family</b>	<b>Cathartidae (Order Accipitriformes)</b>
Turkey vulture	<i>Cathartes aura</i>
<b>Plovers, Dotterels, and Lapwings Family</b>	<b>Charadriidae (Order Charadriiformes)</b>
Killdeer	<i>Charadrius vociferus</i>
<b>Pigeons and Doves Family</b>	<b>Columbidae (Order Columbiformes)</b>
Inca dove	<i>Columbina inca</i>
Mourning dove	<i>Zenaida macroura</i>
<b>Crows and Jays Family</b>	<b>Corvidae (Order Passeriformes)</b>
American crow	<i>Corvus brachyrhynchos</i>
Green jay	<i>Cyanocorax yncas</i>
<b>Sparrows Family</b>	<b>Emberizidae (Order Passeriformes)</b>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Vesper sparrow	<i>Poocetes gramineus</i>
<b>Falcons Family</b>	<b>Falconidae (Order Falconiformes)</b>
Crested caracara	<i>Caracara cheriway</i>
American kestrel	<i>Falco sparverius</i>
<b>Finches Family</b>	<b>Fringillidae (Order Passeriformes)</b>
Lesser goldfinch	<i>Spinus psaltria</i>

<b>Swallows Family</b>	<b>Hirundinidae (Order Passeriformes)</b>
Barn swallow	<i>Hirundo rustica</i>
<b>Blackbirds and Orioles Family</b>	<b>Icteridae (Order Passeriformes)</b>
Red-wing blackbird	<i>Agelaius phoeniceus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Western meadowlark	<i>Sturnella neglecta</i>
<b>Shrikes Family</b>	<b>Laniidae (Order Passeriformes)</b>
Loggerhead shrike <sup>1</sup>	<i>Lanius ludovicianus</i>
<b>Mockingbirds and Thrashers Family</b>	<b>Mimidae (Order Passeriformes)</b>
Northern mockingbird	<i>Mimus polyglottos</i>
Sage thrasher	<i>Oreoscoptes montanus</i>
Long-billed thrasher	<i>Toxostoma longirostre</i>
<b>Wagtails and Pipits Family</b>	<b>Motacillidae (Order Passeriformes)</b>
American pipit	<i>Anthus rubescens</i>
<b>New World Quails Family</b>	<b>Odontophoridae (Order Galliformes)</b>
Northern bobwhite	<i>Colinus virginianus</i>
<b>Cormorants Family</b>	<b>Phalacrocoracidae (Order Suliformes)</b>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
<b>Pheasants, Partridges, and Turkeys Family</b>	<b>Phasianidae (Order Galliformes)</b>
Wild turkey	<i>Meleagris gallopavo</i>
<b>Grebes Family</b>	<b>Podicipedidae (Order Podicipediformes)</b>
Pied-billed grebe	<i>Podilymbus podiceps</i>
<b>Rails and Coots Family</b>	<b>Rallidae (Order Gruiformes)</b>
American coot	<i>Fulica americana</i>
<b>Avocets and Stilts Family</b>	<b>Recurvirostridae (Order Charadriiformes)</b>
American avocet	<i>Recurvirostra americana</i>
<b>Sandpipers Family</b>	<b>Scolopacidae (Order Charadriiformes)</b>
Sanderling	<i>Calidris alba</i>
Lesser yellowlegs	<i>Tringa flavipes</i>
Willet	<i>Tringa semipalmata</i>
<b>Ibises Family</b>	<b>Threskiornithidae (Order Pelicaniformes)</b>
Roseate spoonbill	<i>Platalea ajaja</i>
<b>Flycatchers Family</b>	<b>Tyrannidae (Order Passeriformes)</b>
Eastern phoebe	<i>Sayornis phoebe</i>
Scissor-tailed flycatcher <sup>1</sup>	<i>Tyrannus forficatus</i>
Western kingbird	<i>Tyrannus verticalis</i>
<b>Barn Owls Family</b>	<b>Tytonidae (Order of Strigiformes)</b>
Barn owl	<i>Tyto alba</i>

<sup>1</sup> Listed as rare, threatened, or endangered species; or USFWS bird of conservation concern (see Table E-13)

Notes: Common and scientific names generally follow the Cornell University Lab of Ornithology (Cornell University 2012)

Sources: Cornell University 2012 and Texas A&M University – Corpus Christi 2012



# Fish, Amphibians, and Terrestrial Reptiles of NASCC

**Table E-9. Fish, Amphibians, and Terrestrial Reptiles Known or with the Potential to Occur in Nueces County.**

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
<b>FISHES</b>				
<b>Carp Family</b>	<b>Cyprinidae (Order Cypriniformes)</b>			
Common carp	<i>Cyprinus carpio</i>		O	
<b>Pupfishes Family</b>	<b>Cyprinodontidae (Order Cypriniformes)</b>			
Sheepshead minnow	<i>Cyprinodon variegatus</i>	O		
<b>Livebearers Family</b>	<b>Poeciliidae (Order Cyprinodontiformes)</b>			
Mosquito fish	<i>Gambusia</i> sp.	O		
Sailfin molly	<i>Poecilia latipinna</i>	O		
<b>Gar Family</b>	<b>Lepisosteidae (Order Lepisosteiformes)</b>			
Alligator gar	<i>Atractosteus spatula</i>		O	
<b>Mullets Family</b>	<b>Mugilidae (Order Mugiliformes)</b>			
White mullet	<i>Mugil curema</i>	O		
<b>Sunfish Family</b>	<b>Centrarchidae (Order Perciformes)</b>			
Sunfish	<i>Lepomis</i> sp.	O		
<b>Cichlids Family</b>	<b>Cichlidae (Order Perciformes)</b>			
Rio Grande cichlid	<i>Cichlosoma cyanoguttata</i>	O		
<b>Drum Family</b>	<b>Sciaenidae (Order Perciformes)</b>			
Red drum	<i>Sciaenops ocellatus</i>	O		
<b>Sleepers Family</b>	<b>Eleotridae (Order Pleuronectiformes)</b>			
Fat sleeper	<i>Dormitator maculatus</i>	O		
<b>AMPHIBIANS</b>				
<b>Tree Frogs Family</b>	<b>Hylidae (Order Anura)</b>			
Blanchard's cricket frog	<i>Acris crepitans</i> ssp. <i>blanchardi</i>	P	P	P
Green tree frog	<i>Hyla cinerea</i>	P	P	P
Spotted chorus frog	<i>Pseudacris clarkii</i>	P	P	P
Cajun chorus frog	<i>Pseudacris fouquettei</i>	P	P	P
<b>True Frogs Family</b>	<b>Ranidae (Order Anura)</b>			
Rio Grande leopard frog	<i>Lithobates berlandieri</i> <sup>2</sup>	P	P	P
Southern leopard frog	<i>Lithobates sphenoccephalus</i> <sup>2</sup>	O	P	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
American bull frog	<i>Lithobates catesbeianus</i>	O	P	P
<b>True Toads Family</b>	<b>Bufonidae (Order Anura)</b>			
Eastern green toad	<i>Anaxyrus debilis</i> ssp. <i>debilis</i> <sup>2</sup>	P	P	P
Texas toad	<i>Anaxyrus speciosus</i> <sup>2</sup>	O	P	P
Coastal Plain toad	<i>Incilius nebulifer</i>	O	P	P
<b>Narrow Mouth Toads Family</b>	<b>Microhylidae (Order Anura)</b>			
Great Plains narrowmouth toad	<i>Gastrophryne olivacea</i>	O	P	P
Sheep frog <sup>3</sup>	<i>Hypopachus variolosus</i>	P	P	P
<b>Spadefoot Toads Family</b>	<b>Scaphiopodidae (Order Anura)</b>			
Couch's spadefoot	<i>Scaphiopus couchi</i>	P	P	P
Plains spadefoot	<i>Spea bombifrons</i>	O	P	P
Hurter's spadefoot	<i>Scaphiopus hurterii</i>	O	P	P
<b>Mole Salamanders Family</b>	<b>Ambystomatidae (Order Caudata)</b>			
Barred tiger salamander	<i>Ambystoma mavortium</i> <sup>2</sup>	P	P	P
<b>True Salamanders Family</b>	<b>Salamandridae (Order Caudata)</b>			
Black-spotted newt <sup>3</sup>	<i>Notophthalmus meridionalis</i>	P	P	P
<b>Aquatic Salamanders Family</b>	<b>Sirenidae (Order Caudata)</b>			
Rio Grande lesser siren	<i>Siren intermedia</i> ssp. <i>texana</i>	P	P	P
<b>REPTILES</b>				
<b>Sea Turtles Family</b>	<b>Cheloniidae (Order Testudines)</b>			
Loggerhead sea turtle <sup>3</sup>	<i>Caretta caretta</i>	P	P	P
Green sea turtle <sup>3</sup>	<i>Chelonia mydas</i> <sup>2</sup>	P	P	P
Atlantic hawksbill turtle <sup>3</sup>	<i>Eretmochelys imbricata</i> ssp. <i>imbricata</i>	P	P	P
Kemp's ridley sea turtle <sup>3</sup>	<i>Lepidochelys kempii</i>	P	P	P
<b>Snapping Turtles Family</b>	<b>Chelydridae (Order Testudines)</b>			
Common snapping turtle	<i>Chelydra serpentina</i> ssp. <i>serpentina</i>	P	O	P
<b>Leatherback Turtles Family</b>	<b>Dermochelyidae (Order Testudines)</b>			
Leatherback sea turtle <sup>3</sup>	<i>Dermochelys coriacea</i>	P	P	P
<b>Box and Water Turtles Family</b>	<b>Emydidae (Order Testudines)</b>			
Texas diamondback terrapin <sup>3</sup>	<i>Malaclemys terrapin</i> ssp. <i>littoralis</i>	P	P	P
Ornate box turtle <sup>3</sup>	<i>Terrapene ornata</i> ssp. <i>ornata</i>	P	P	P
Red-eared slider	<i>Trachemys scripta</i> ssp. <i>elegans</i>	O	O	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
<b>Mud and Musk Turtles Family</b>	<b>Kinosternidae (Order Testudines)</b>			
Yellow mud turtle	<i>Kinosternon flavescens</i> <sup>2</sup>	P	P	P
<b>Soft Shell Turtles Family</b>	<b>Trionychidae (Order Testudines)</b>			
Guadalupe spiny soft-shelled turtle	<i>Trionyx spiniferus</i> ssp. <i>guadalupensis</i>	P	O	P
<b>Tortoise Family</b>	<b>Testudinidae (Order Testudines)</b>			
Texas tortoise <sup>3</sup>	<i>Gopherus berlandieri</i>	O	P	O
<b>Alligators and Caimans Family</b>	<b>Alligatoridae (Order Crocodylia)</b>			
American alligator	<i>Alligator mississippiensis</i>	P	P	P
<b>Alligator Lizards Family</b>	<b>Anguidae (Order Squamata)</b>			
Western slender glass lizard	<i>Ophisaurus attenuatus</i> ssp. <i>attenuatus</i>	O	P	O
<b>Coral Snakes Family</b>	<b>Elapidae (Order Squamata)</b>			
Texas coral snake	<i>Micrurus fulvius</i> ssp. <i>tenere</i>	O	P	P
<b>Geckos Family</b>	<b>Gekkonidae (Order Squamata)</b>			
Mediterranean house gecko	<i>Hemidactylus turcicus</i>	P	P	P
<b>Spiny Lizards Family</b>	<b>Phrynosomatidae (Order Squamata)</b>			
Texas earless lizard	<i>Cophosaurus texanus</i> ssp. <i>texanus</i>	P	P	P
Southern earless lizard	<i>Holbrookia lacerata</i> ssp. <i>subcaudalis</i>	P	P	P
Northern keeled earless lizard <sup>3</sup>	<i>Holbrookia propinqua</i> ssp. <i>propinqua</i>	P	P	P
Texas horned lizard <sup>3</sup>	<i>Phrynosoma cornutum</i>	O	P	P
Southern prairie lizard	<i>Sceloporus consobrinus</i>	P	P	P
Texas spiny lizard	<i>Sceloporus olivaceus</i>	P	P	P
Rose-bellied lizard	<i>Sceloporus variabilis</i> ssp. <i>marmoratus</i>	P	O	P
<b>Anoloid Lizards Family</b>	<b>Polychrotidae (Order Squamata)</b>			
Green anole	<i>Anolis carolinensis</i>	P	O	P
<b>Skinks Family</b>	<b>Scincidae (Order Squamata)</b>			
Great Plains skink	<i>Eumeces obsoletus</i>	P	P	P
Four-lined skink	<i>Eumeces tetragrammus</i> ssp. <i>tetragrammus</i>	P	P	P
Ground skink	<i>Scincella lateralis</i>	P	O	O

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
<b>Ground Lizards, New World Runners, Racerunners, Whiptails, Ameivas Family</b>	<b>Teiidae (Order Squamata)</b>			
Texas spotted whiptail	<i>Cnemidophorus gularis</i> ssp. <i>gularis</i>	P	O	P
Six-lined race runner	<i>Cnemidophorus sexlineatus</i> ssp. <i>sexlineatus</i>	O	O	O
Prairie racerunner	<i>Cnemidophorus sexlineatus</i> ssp. <i>viridis</i>	O	P	O
<b>Colubrids Family</b>	<b>Colubridae (Order Squamata)</b>			
Texas glossy snake	<i>Arizona elegans</i> ssp. <i>arenicola</i>	P	P	P
Texas scarlet snake <sup>3</sup>	<i>Cemophora coccinea</i> ssp. <i>lineri</i>	P	P	P
Eastern yellowbellied racer	<i>Coluber constrictor</i> ssp. <i>flaviventris</i>	P	P	O
Mexican racer	<i>Coluber constrictor</i> ssp. <i>oaxaca</i>	P	P	P
Texas indigo snake <sup>3</sup>	<i>Drymarchon melanurus</i> ssp. <i>erebennus</i>	P	P	P
Texas rat snake	<i>Elaphe obsoleta</i> <sup>2</sup>	P	P	P
Western mud snake	<i>Farancia abacura</i> ssp. <i>reinwardtii</i>	P	P	P
Eastern hog-nosed snake	<i>Heterodon platirhinos</i>	P	P	P
Prairie king snake	<i>Lampropeltis calligaster</i> ssp. <i>calligaster</i>	P	P	P
Desert king snake	<i>Lampropeltis getula</i> ssp. <i>splendida</i>	P	P	P
Mexican milk snake	<i>Lampropeltis triangulum</i> ssp. <i>annulata</i>	P	P	P
Western coachwhip	<i>Masticophis flagellum</i> ssp. <i>testaceus</i>	O	P	O
Gulf salt marsh snake <sup>3</sup>	<i>Nerodia clarkii</i> ssp. <i>clarkii</i>	P	P	P
Blotched water snake	<i>Nerodia erythrogaster</i> ssp. <i>transversa</i>	P	P	P
Broad-banded water snake	<i>Nerodia fasciata</i> ssp. <i>confluens</i>	P	P	P
Diamondback water snake	<i>Nerodia rhombifer</i> ssp. <i>rhombifer</i>	O	O	P
Rough green snake	<i>Opheodrys aestivus</i>	P	O	O
Great Plains rat snake	<i>Pantherophis emoryi</i>	O	P	P
Bullsnake	<i>Pituophis catenifer</i> ssp. <i>sayi</i>	P	P	P
Texas longnose snake	<i>Rhinocheilus lecontei</i> ssp. <i>tessellatus</i>	P	P	P
Flat-headed snake	<i>Tantilla gracilis</i>	O	P	O
Checkered garter snake	<i>Thamnophis marcianus</i> ssp. <i>marcianus</i>	P	P	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
Gulf Coast ribbon snake	<i>Thamnophis proximus ssp. orarius</i>	O	P	P
Rough earth snake	<i>Virginia striatula</i>	O	P	P
<b>Slender Blind Snakes Family</b>	<b>Leptotyphlopidae (Order Squamata)</b>			
Plains blind snake	<i>Leptotyphlops dulcis ssp. dulcis</i>	P	P	P
<b>Vipers and Pit Vipers Family</b>	<b>Viperidae (Order Squamata)</b>			
Western cottonmouth	<i>Agkistrodon piscivorus ssp. leucostoma</i>	P	P	P
Western diamondback rattlesnake <sup>3</sup>	<i>Crotalus atrox</i>	O	O	P
Desert massasauga	<i>Sistrurus catenatus ssp. edwardsii</i>	P	P	P

<sup>1</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>2</sup> Taxonomy from the Integrated Taxonomic Information System (ITIS) (ITIS 2012)

<sup>3</sup> Listed as rare, threatened, or endangered species (see Table E-13)

<sup>4</sup> Name change from species listed in Long and Henke 2004 (*Elaphe guttata meahllmorum*) based on taxonomical name changes that have placed most of the North American *Elaphe* species into the new genus *Pantherophis* (The Reptile Database 2012).

Sources: TPWD 2013, ITIS 2012, LaBella 2011, Navy 2011, Navy 2009a, Hickman et al. 2007, Navy 2006b, and Wolfe et al. 1998

**Table E-10. Fish, Amphibians, and Terrestrial Reptiles Known or with the Potential to Occur at NOLF Goliad.**

COMMON NAME	SCIENTIFIC NAME <sup>1</sup>	Occurrence <sup>2</sup>
<b>FISHES</b>		
<b>Minnnows and Carps Family</b>	<b>Cyprinidae (Order Cypriniformes)</b>	
Golden shiner	<i>Notemigonus crysoleucas</i>	O
<b>Sunfish Family</b>	<b>Centrarchidae (Order Perciformes)</b>	
Green sunfish	<i>Lepomis cyanellus</i>	O
<b>Catfish Family</b>	<b>Ictaluridae (Order Siluriformes)</b>	
Black bullhead	<i>Ameiurus melas</i>	O
<b>AMPHIBIANS</b>		
<b>True Toads Family</b>	<b>Bufoidea (Order Anura)</b>	
Green toad	<i>Anaxyrus debilis</i> <sup>1</sup>	P
Eastern green toad	<i>Anaxyrus debilis debilis</i> <sup>1</sup>	P <sup>3</sup>
Texas toad	<i>Anaxyrus speciosus</i> <sup>1</sup>	O
Woodhouse's toad <sup>1, 4</sup>	<i>Anaxyrus woodhousii</i> <sup>1</sup>	P <sup>3</sup>
Gulf Coast toad	<i>Incilius valliceps</i> <sup>1</sup>	O
	<b>Eleutherodactylidae (Order Anura)</b>	
Rio Grande chirping frog	<i>Eleutherodactylus cystignathoides campi</i>	P <sup>3</sup>
<b>Tree Frogs Family</b>	<b>Hylidae (Order Anura)</b>	
Blanchard's cricket frog	<i>Acris blanchardi</i> <sup>1</sup>	P <sup>3</sup>
Northern cricket frog	<i>Acris crepitans</i>	P
Green tree frog	<i>Hyla cinerea</i>	O
Squirrel tree frog	<i>Hyla squirella</i>	P <sup>3</sup>
Gray tree frog	<i>Hyla versicolor</i>	P
Spotted chorus frog	<i>Pseudacris clarki</i>	P <sup>3</sup>
Southeastern chorus frog	<i>Pseudacris feriarum</i> <sup>1</sup>	P <sup>3</sup>
Strecker's chorus frog	<i>Pseudacris streckeri</i>	P <sup>3</sup>
<b>Narrow Mouth Toads Family</b>	<b>Microhylidae (Order Anura)</b>	
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>	P <sup>3</sup>
Great Plains narrow-mouthed toad	<i>Gastrophryne olivacea</i>	O
Sheep frog <sup>1</sup>	<i>Hypopachus variolosus</i> <sup>1</sup>	P
<b>True Frogs Family</b>	<b>Ranidae (Order Anura)</b>	
Rio Grande leopard frog	<i>Lithobates berlandieri</i> <sup>1</sup>	O
American bull frog	<i>Lithobates catesbeianus</i> <sup>1</sup>	O
Southern leopard frog	<i>Lithobates sphenocephalus</i> <sup>1</sup>	O
<b>American Spadefoot Toad Family</b>	<b>Scaphiopodidae (Order Anura)</b>	
Couch's spadefoot	<i>Scaphiopus couchii</i>	P <sup>3</sup>
Hurter's spadefoot	<i>Scaphiopus hurteri</i>	P <sup>3</sup>

COMMON NAME	SCIENTIFIC NAME <sup>1</sup>	Occurrence <sup>2</sup>
<b>REPTILES</b>		
<b>Mole Salamanders Family</b>	<b>Ambystomatidae (Order Caudata)</b>	
Small-mouthed salamander	<i>Ambystoma texanum</i>	P <sup>3</sup>
<b>Salamanders Family</b>	<b>Salamandridae (Order Caudata)</b>	
Black-spotted newt <sup>4</sup>	<i>Notophthalmus meridionalis</i>	P <sup>3</sup>
Central newt	<i>Notophthalmus viridescens</i> ssp. <i>louisianensis</i>	P <sup>3</sup>
<b>Sirens Family</b>	<b>Sirenidae (Order Caudata)</b>	
Lesser siren	<i>Siren intermedia</i>	P <sup>3</sup>
<b>Alligators Family</b>	<b>Alligatoridae (Order Crocolia)</b>	
American alligator	<i>Alligator mississippiensis</i>	P
<b>Alligator Lizards Family</b>	<b>Anguidae (Order Squamata)</b>	
Slender glass lizard	<i>Ophisaurus attenuatus</i>	P <sup>3</sup>
<b>Colubrids Family</b>	<b>Colubridae (Order Squamata)</b>	
Glossy snake	<i>Arizona elegans</i>	P
Texas glossy snake	<i>Arizona elegans</i> ssp. <i>arenicola</i>	P <sup>3</sup>
Racer	<i>Coluber constrictor</i>	P
Eastern yellowbelly racer	<i>Coluber constrictor</i>	P <sup>3</sup>
Indigo snake	<i>Drymarchon corais</i>	P
Texas indigo snake <sup>4</sup>	<i>Drymarchon melanurus</i> ssp. <i>erebennus</i> <sup>1</sup>	P <sup>3</sup>
Corn snake	<i>Elaphe guttata</i>	P
Rat snake	<i>Elaphe obsoleta</i>	P
Texas rat snake	<i>Elaphe obsoleta</i> ssp. <i>lindheimerii</i>	P <sup>3</sup>
Western mud snake	<i>Farancia abacura</i> ssp. <i>reinwardtii</i>	P <sup>3</sup>
Mexican hook-nosed snake	<i>Ficimia streckeri</i>	P <sup>3</sup>
Eastern hog-nosed snake	<i>Heterodon platirhinos</i>	P
Prairie kingsnake	<i>Lampropeltis calligaster</i> ssp. <i>calligaster</i>	P <sup>3</sup>
Common kingsnake	<i>Lampropeltis getula</i>	P
Desert kingsnake	<i>Lampropeltis getula</i> ssp. <i>splendida</i>	P <sup>3</sup>
Louisiana milk snake	<i>Lampropeltis triangulum</i> ssp. <i>amaura</i>	P <sup>3</sup>
Coachwhip	<i>Masticophis flagellum</i>	P
Western coachwhip	<i>Masticophis flagellum</i> ssp. <i>testaceus</i>	P <sup>3</sup>
Schott's whipsnake	<i>Masticophis schotti</i>	P
Green water snake	<i>Nerodia cyclopion</i>	P <sup>3</sup>
Plain-bellied water snake	<i>Nerodia erythrogaster</i>	P
Blotched water snake	<i>Nerodia erythrogaster</i> ssp. <i>transversa</i>	P <sup>3</sup>
Broad-banded water snake	<i>Nerodia fasciata</i> ssp. <i>confluens</i>	P <sup>3</sup>
Diamondback water snake	<i>Nerodia rhombifer</i>	O
Rough green snake	<i>Opheodrys aestivus</i>	P
Gopher snake	<i>Pituophis catenifer</i>	P
Bullsnake	<i>Pituophis catenifer</i> ssp. <i>sayi</i>	P <sup>3</sup>
Graham's crayfish snake	<i>Regina grahamii</i>	P <sup>3</sup>



COMMON NAME	SCIENTIFIC NAME <sup>1</sup>	Occurrence <sup>2</sup>
Texas long-nosed snake	<i>Rhinocheilus lecontei</i> ssp. <i>tessellatus</i>	P <sup>3</sup>
Texas patchnose snake	<i>Salvadora grahamiae</i> ssp. <i>lineata</i>	O
Texas brown snake	<i>Storeria dekayi</i> ssp. <i>texana</i>	P <sup>3</sup>
Flat-headed snake	<i>Tantilla gracilis</i>	P
Plains black-headed snake	<i>Tantilla nigriceps</i> ssp. <i>nigriceps</i>	P <sup>3</sup>
Checkered garter snake	<i>Thamnophis marcianus</i>	O
Ribbon snake	<i>Thamnophis proximus</i>	O
Texas garter snake	<i>Thamnophis sirtalis</i> ssp. <i>annectens</i>	P <sup>3</sup>
Lined snake	<i>Tropidoclonion lineatum</i> <sup>1</sup>	P <sup>3</sup>
Rough earth snake	<i>Virginia striatula</i>	O
<b>Coral Snakes Family</b>	<b>Elapidae (Order Squamata)</b>	
Northern coral snake	<i>Micrurus fulvius</i>	P
<b>Geckos Family</b>	<b>Gekkonidae (Order Squamata)</b>	
Mediterranean gecko	<i>Hemidactylus turcicus</i>	P <sup>3</sup>
<b>Slender Blind Snakes Family</b>	<b>Leptotyphlopidae (Order Squamata)</b>	
Texas slender blind snake	<i>Leptotyphlops dulcis</i>	P
Plains blind snake	<i>Leptotyphlops</i> ssp. <i>dulcis</i>	P <sup>3</sup>
<b>North American Spiny Lizards Family</b>	<b>Phrynosomatidae (Order Squamata)</b>	
Spot-tailed earless lizard <sup>4</sup>	<i>Holbrookia lacerata</i>	P
Southern earless lizard	<i>Holbrookia lacerata</i> ssp. <i>subcaudalis</i>	P <sup>3</sup>
Northern keeled earless lizard <sup>4</sup>	<i>Holbrookia propinqua</i> ssp. <i>propinqua</i>	P <sup>3</sup>
Texas earless lizard	<i>Holbrookia texana</i> ssp. <i>texana</i> <sup>1</sup>	P <sup>3</sup>
Texas horned lizard <sup>4</sup>	<i>Phrynosoma cornutum</i>	P
Northern mesquite lizard	<i>Sceloporus grammicus</i> ssp. <i>microlepidotus</i>	P <sup>3</sup>
Texas spiny lizard	<i>Sceloporus olivaceus</i>	P
Eastern fence lizard	<i>Sceloporus undulatus</i>	P
Southern prairie lizard	<i>Sceloporus undulatus</i> ssp. <i>consobrinus</i>	P <sup>3</sup>
Rose-bellied lizard	<i>Sceloporus variabilis</i> ssp. <i>marmoratus</i>	P <sup>3</sup>
<b>Anoloid Lizards Family</b>	<b>Polychrotidae (Order Squamata)</b>	
Green anole	<i>Anolis carolinensis</i>	P
<b>Skinks Family</b>	<b>Scincidae (Order Squamata)</b>	
Five-lined skink	<i>Eumeces fasciatus</i>	P
Broad-headed skink	<i>Eumeces laticeps</i>	P <sup>3</sup>
Southern prairie skink	<i>Eumeces septentrionalis</i> ssp. <i>obtusirostris</i>	P <sup>3</sup>
Ground skink	<i>Scincella lateralis</i>	O
<b>Ground Lizards Family</b>	<b>Teiidae (Order Squamata)</b>	
Texas spotted whiptail	<i>Cnemidophorus gularis</i>	P
Six-lined racerunner	<i>Cnemidophorus sexlineatus</i>	P
<b>Vipers and Pit Vipers Family</b>	<b>Viperidae (Order Squamata)</b>	
Copperhead	<i>Agkistrodon contortrix</i>	P
Broad-banded copperhead	<i>Agkistrodon contortrix</i> ssp. <i>laticinctus</i>	P <sup>3</sup>

COMMON NAME	SCIENTIFIC NAME <sup>1</sup>	Occurrence <sup>2</sup>
Cottonmouth	<i>Agkistrodon piscivorus</i>	P
Western cottonmouth	<i>Agkistrodon piscivorus ssp. leucostoma</i>	P <sup>3</sup>
Western diamondback rattlesnake <sup>4</sup>	<i>Crotalus atrox</i>	O
Timber rattlesnake <sup>4</sup>	<i>Crotalus horridus ssp. atricaudatus</i>	P <sup>3</sup>
Western massasauga	<i>Sistrurus catenatus ssp. tergeminus</i>	P <sup>3</sup>
Western pigmy rattlesnake	<i>Sistrurus miliarius ssp. streckeri</i>	P <sup>3</sup>
<b>Snapping Turtles Family</b>	<b>Chelydridae (Order Testudines)</b>	
Common snapping turtle	<i>Chelydra serpentina ssp. serpentina</i>	P <sup>3</sup>
<b>Box and Water Turtles Family</b>	<b>Emydidae (Order Testudines)</b>	
Cagle's map turtle	<i>Graptemys caglei</i>	P <sup>3</sup>
Texas diamondback terrapin <sup>4</sup>	<i>Malaclemys terrapin ssp. littoralis</i>	P <sup>3</sup>
Texas cooter	<i>Pseudemys texana</i>	P <sup>3</sup>
Three-toed box turtle	<i>Terrapene carolina ssp. triunguis</i>	P <sup>3</sup>
Ornate box turtle <sup>4</sup>	<i>Terrapene ornata</i>	P
Red-eared slider	<i>Trachemys scripta ssp. elegans</i>	O
<b>Mud Turtles Family</b>	<b>Kinosternidae (Order Testudines)</b>	
Yellow mud turtle	<i>Kinosternon flavescens ssp. flavescens</i>	P
Mississippi mud turtle	<i>Kinosternon subrubrum ssp. hippocrepis</i>	P <sup>3</sup>
Common musk turtle	<i>Sternotherus odoratus</i>	P <sup>3</sup>
<b>Tortoises Family</b>	<b>Testudinidae (Order Testudines)</b>	
Texas tortoise <sup>4</sup>	<i>Gopherus berlandieri</i>	P
<b>Softshell Turtles Family</b>	<b>Trionychidae (Order Testudines)</b>	
Guadalupe spiny softshell turtle	<i>Apalone spinifera ssp. guadalipensis</i>	P <sup>3</sup>

<sup>1</sup> Taxonomy from the Integrated Taxonomic Information System (ITIS 2012)

<sup>2</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>3</sup> Potentially occurs in one or more counties that surround Goliad County

<sup>4</sup> Listed as rare, threatened, or endangered species (see Table E-13)

# Terrestrial Mammals of NASCC

**Table E-11. Terrestrial Mammals Known or with the Potential to Occur in Nueces County.**

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
<b>American Opossum Family</b>	<b>Didelphidae (Order</b>			
Virginia opossum	<i>Didelphis virginiana</i>	O	O	P
<b>Deer Family</b>	<b>Cervidae (Order Artiodactyla)</b>			
White-tailed deer	<i>Odocoileus virginianus</i>	O	P	O
<b>Pig and Hog Family</b>	<b>Suidae (Order Artiodactyla)</b>			
Wild hog	<i>Sus scrofa</i>	P	P	O
<b>Peccary Family</b>	<b>Tayassuidae (Order Artiodactyla)</b>			
Javelina/Peccary	<i>Tayassu tajacu</i>	P	O	P
<b>Dog Family</b>	<b>Canidae (Order Carnivora)</b>			
Feral dog	<i>Canis lupus</i>	P	P	P
Coyote	<i>Canis latrans</i>	O	O	P
Red wolf <sup>2</sup>	<i>Canis rufus</i>	P	P	P
Gray fox	<i>Urocyon cinereoargenteus</i>	O	P	P
<b>Cat Family</b>	<b>Felidae (Order Carnivora)</b>			
Feral cat	<i>Felis catus</i>	O	P	P
Cougar	<i>Felis concolor</i>	P	P	P
Gulf Coast jaguarundi <sup>2</sup>	<i>Puma yagouaroundi</i> ssp. <i>cacomitli</i>	P	P	P
Ocelot <sup>1</sup>	<i>Leopardus pardalis</i> <sup>1</sup>	P	P	P
Bobcat	<i>Lynx rufus</i>	P	O	O
Mountain lion	<i>Puma concolor</i>	P	P	P
<b>Skunk Family</b>	<b>Mephitidae (Order Carnivora)</b>			
Striped skunk	<i>Mephitis mephitis</i>	O	P	P
Eastern spotted skunk	<i>Spilogale putorius</i>	P	P	P
Plains spotted skunk <sup>2</sup>	<i>Spilogale putorius</i> ssp. <i>interrupta</i>	P	P	P
<b>Badger, Otter, Weasel Family</b>	<b>Mustelidae (Order Carnivora)</b>			
Long-tailed weasel	<i>Mustela frenata</i>	P	P	P
American badger	<i>Taxidea taxus</i>	P	P	P
<b>Raccoon and Coati Family</b>	<b>Procyonidae (Order Carnivora)</b>			
White-nosed coati <sup>2</sup>	<i>Nasua narica</i>	P	P	P
Raccoon	<i>Procyon lotor</i>	O	O	P
<b>Free-tailed Bat Family</b>	<b>Molossidae (Order Chiroptera)</b>			
Big free-tailed bat	<i>Nyctinomops macrotis</i>	P	P	P
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	P	P	P
<b>Common Bat Family</b>	<b>Vespertilionidae (Order Chiroptera)</b>			
Eastern red bat	<i>Lasiurus borealis</i>	P	P	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
Southern yellow bat <sup>2</sup>	<i>Lasiurus ega</i>	O	P	P
Northern yellow bat	<i>Lasiurus intermedius</i>	P	P	P
Evening bat	<i>Nycticeius humeralis</i>	P	P	P
Eastern pipistrelle	<i>Pipistrellus subflavus</i>	P	P	P
<b>Armadillo Family</b>	<b>Dasypodidae (Order Cingulata)</b>			
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	P	O	P
<b>Hare and Rabbit Family</b>	<b>Leporidae (Order Lagomorpha)</b>			
Black-tailed jackrabbit	<i>Lepus californicus</i>	O	P	P
Eastern cottontail rabbit	<i>Sylvilagus floridanus</i>	O	P	P
<b>Beaver Family</b>	<b>Castoridae (Order Rodentia)</b>			
Beaver	<i>Castor canadensis</i>	P	P	P
<b>Pocket Gopher Family</b>	<b>Geomyidae (Order Rodentia)</b>			
Plains pocket gopher	<i>Geomys bursarius</i>	P	P	P
South Texas pocket gopher	<i>Geomys personatus</i>	P	P	P
Maritime pocket gopher <sup>2</sup>	<i>Geomys personatus ssp. maritimus</i>	O	P	P
<b>Kangaroo Rats and Pocket</b>	<b>Heteromyidae (Order Rodentia)</b>			
Hispid pocket mouse	<i>Chaetodipus hispidus</i>	P	P	P
Ord's kangaroo rat	<i>Dipodomys compactus</i>	P	P	P
Merriam's pocket mouse	<i>Perognathus merriami</i>	P	P	P
<b>New World Mice and Rats</b>	<b>Muridae (Order Rodentia)</b>			
Northern pygmy mouse	<i>Baiomys taylori</i>	O	O	O
House mouse	<i>Mus musculus</i>	O	O	P
Southern plains woodrat	<i>Neotoma micropus</i>	O	P	O
Northern grasshopper mouse	<i>Onychomys leucogaster</i>	P	P	P
Marsh rice rat	<i>Oryzomys palustris</i>	P	P	P
White footed mouse	<i>Peromyscus leucopus</i>	P	P	P
Deer mouse	<i>Peromyscus maniculatus</i>	P	P	O
Fulvous harvest mouse	<i>Reithrodontomys fulvescens</i>	O	O	O
Hispid cotton rat	<i>Sigmodon hispidus</i>	O	O	O
<b>Old World Mice and Rats</b>	<b>Murinae (Order Rodentia)</b>			
Norway rat	<i>Rattus norvegicus</i>	P	P	P
Roof rat	<i>Rattus rattus</i>	O	P	P
<b>Coypus and Nutria Family</b>	<b>Myocastoridae (Order Rodentia)</b>			
Nutria	<i>Myocaster coypus</i>	P	P	P
<b>Squirrel Family</b>	<b>Sciuridae (Order Rodentia)</b>			
Fox squirrel	<i>Sciurus niger</i>	P	P	P

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE <sup>1</sup>		
		MAIN STATION	NOLF CABANISS	NOLF WALDRON
Mexican ground squirrel	<i>Spermophilus mexicanus</i>	O	P	P
Spotted ground squirrel	<i>Spermophilus spilosoma</i>	P	P	P
<b>Shrew Family</b>	<b>Soricidae (Order Soricomorpha)</b>			
North American least shrew	<i>Cryptotis parva</i>	P	P	P
Desert shrew	<i>Notiosorex crawfordi</i>	P	P	P
<b>Mole and Desman Family</b>	<b>Talpidae (Order Soricomorpha)</b>			
Eastern mole	<i>Scalopus aquaticus</i>	P	P	O

<sup>1</sup> Occurrence: P = Potential to occur; O = Occurrence confirmed

<sup>2</sup> Listed as rare, threatened, or endangered species (see Table E-13)

Sources: Henke et al. 2010, Hickman et al. 2007, Navy 2006b, and Wolfe et al. 1998

**Table E-12. Terrestrial Mammals Known to Occur at NOLF Goliad.**

COMMON NAME	SCIENTIFIC NAME
<b>Cattle Family</b>	<b>Bovidae (Order Artiodactyla)</b>
Cow	<i>Bos taurus</i>
<b>Pig and Hog Family</b>	<b>Suidae (Order Artiodactyla)</b>
Feral hog	<i>Sylvilagus floridanus</i>
<b>Deer Family</b>	<b>Cervidae (Order Artiodactyla)</b>
White-tailed deer	<i>Odocoileus virginianus</i>
<b>Dog Family</b>	<b>Canidae (Order Carnivora)</b>
Coyote	<i>Canis latrans</i>
<b>Cat Family</b>	<b>Felidae (Order Carnivora)</b>
Bobcat	<i>Lynx rufus</i>
<b>Raccoon and Coati Family</b>	<b>Procyonidae (Order Carnivora)</b>
Northern raccoon	<i>Procyon lotor</i>
<b>Free-tailed Bat Family</b>	<b>Molossidae (Order Chiroptera)</b>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
<b>Hare and Rabbit Family</b>	<b>Leporidae (Order Lagomorpha)</b>
Black-tailed jackrabbit	<i>Lepus californicus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
<b>New World Mice and Rats Family</b>	<b>Muridae (Order Rodentia)</b>
Northern pygmy mouse	<i>Baiomys taylori</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Fulvous harvest mouse	<i>Reithrodontomys fulvescens</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
<b>Armadillo Family</b>	<b>Dasypodidae (Order Xenarthra)</b>
Nine-banded armadillo	<i>Dasybus novemcinctus</i>

Source: Texas A&M University – Corpus Christi 2012

This page intentionally left blank.



# Rare, Threatened, and Endangered Species of NASCC

**Table E-13. Rare, Threatened, and Endangered Species Known or with the Potential to Occur at NASCC.**

COMMON NAME	SPECIES NAME	STATUS AND OCCURRENCE		OCCURRENCE	
		FEDERAL <sup>1</sup>	STATE <sup>1,2</sup>	COUNTY <sup>3</sup>	NASCC <sup>4</sup>
<b>PLANTS<sup>5</sup></b>					
Elmendorf's onion	<i>Allium elmendorffii</i>	NL	S2	N	P
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	E	E, S2	N	P
Texas windmill grass	<i>Chloris texensis</i>	NL	S2	N	P
Chandler's craglily (Lila de los llanos)	<i>Echeandia chandleri</i>	NL	S2S3	N	P
Plains gumweed	<i>Grindelia oolepis</i>	NL	S2	N	P
Fewleaf sunflower (Shinner's sunflower)	<i>Helianthus occidentalis</i> ssp. <i>plantagineus</i>	NL	S2S3	G	P
Mexican mudplantain	<i>Heteranthera mexicana</i>	NL	S1	N	P
Slender rushpea	<i>Hoffmannseggia tenella</i>	E	E, S1	N	P
Runyon's water-willow	<i>Justicia runyonii</i>	NL	S2	G	P
Bracted blazing star (Coastal gay-feather)	<i>Liatris bracteata</i>	NL	S2S3	G	P
Bristle nailwort	<i>Paronychia setacea</i>	NL	S3	G	P
San Patricio tansyaster (Welder machaeranthera)	<i>Psilactis heterocarpa</i>	NL	S2S3	✓	P
Buckley's spiderwort	<i>Tradescantia buckleyi</i>	NL	S3	N	CA
Refugio zephyrlily (Refugio rain-lily)	<i>Zephyranthes refugiensis</i>	NL	S2	G	P
<b>MOLLUSKS</b>					
Golden orb	<i>Quadrula aurea</i>	C	T, S2	G	P
False spike mussel	<i>Quadrula mitchelli</i>	NL	T, S1	G	P
Texas pimpleback	<i>Quadrula petrina</i>	C	T, S1	G	P
Creeper	<i>Strophitus undulatus</i>	NL	S1	G	P
<b>INSECTS</b>					
Texas asaphomyian tabanid fly	<i>Asaphomyia texensis</i>	NL	SH	G	P
Manfreda giant-skipper	<i>Stallingsia maculosus</i>	NL	S1S2	N	P
<b>FISHES<sup>6</sup></b>					
American eel	<i>Anguilla rostrata</i>	NL	S5	✓	P
Opossum pipefish	<i>Microphis brachyurus</i>	NL	TS1	N	P
Smalltooth sawfish	<i>Pristis pectinata</i>	E	E, SNR	N	P
Texas pipefish	<i>Syngnathus affinis</i>	NL	S1	N	P
<b>AMPHIBIANS</b>					
Woodhouse's toad	<i>Anaxyrus woodhousii</i>	NL	SU	G	P
Sheep frog	<i>Hypopachus variolosus</i>	NL	T, S2	✓	P
Black-spotted newt	<i>Notophthalmus meridionalis</i>	NL	T, S1S2	✓	P

COMMON NAME	SPECIES NAME	STATUS AND OCCURRENCE		OCCURRENCE	
		FEDERAL <sup>1</sup>	STATE <sup>1,2</sup>	COUNTY <sup>3</sup>	NASCC <sup>4</sup>
<b>MARINE REPTILES<sup>6</sup></b>					
Loggerhead sea turtle	<i>Caretta caretta</i>	T	T, S4	N	P
Green sea turtle	<i>Chelonia mydas</i>	T	T, S3	N	P
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E	E, S1S2	N	P
Atlantic hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E	E, S2	N	P
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	E	E, S3	N	P
<b>TERRESTRIAL REPTILES</b>					
Texas scarlet snake	<i>Cemophora coccinea</i> ssp. <i>lineri</i>	NL	T, S1S2	N	P
Western diamondback rattlesnake	<i>Crotalus atrox</i>	NL	S4	✓	CC, CA, GO
Timber rattlesnake	<i>Crotalus horridus</i>	NL	T, S4	G	P
Texas indigo snake	<i>Drymarchon melanurus</i> ssp. <i>erebennus</i>	NL	T, S3	✓	P
Texas tortoise	<i>Gopherus berlandieri</i>	NL	T, S2	✓	CC
Spot-tailed earless lizard	<i>Holbrookia lacerata</i>	NL	S1S2	N	P
Northern keeled earless lizard	<i>Holbrookia propinqua</i> ssp. <i>propinqua</i>	NL	S3?	✓	P
Texas diamondback terrapin	<i>Malaclemys terrapin</i> ssp. <i>littoralis</i>	NL	S1S2	N	P
Gulf salt marsh snake	<i>Nerodia clarkii</i> ssp. <i>clarkii</i>	NL	S4	N	P
Texas horned lizard	<i>Phrynosoma cornutum</i>	NL	T, S4	✓	CC
Ornate box turtle	<i>Terrapene ornata</i>	NL	S3	G	P
<b>BIRDS</b>					
Le Conte's sparrow	<i>Ammodramus leconteii</i>	BCC (nb)	NL	✓	CC, WA
Henslow's sparrow	<i>Ammodramus henslowii</i>	BCC (nb)	S2S3N, SXB	G	P
Seaside sparrow	<i>Ammodramus maritimus</i>	BCC (c)	S4B	N	P
Nelson's sparrow	<i>Ammodramus nelsoni</i>	BCC (nb)	NL	✓	P
Grasshopper sparrow	<i>Ammodramus savannarum</i>	BCC	S3B	✓	CC, WA
Sprague's pipit	<i>Anthus spragueii</i>	C, BCC (nb)	S3N	✓	CC, WA
Short-eared owl	<i>Asio flammeus</i>	BCC (nb)	S4N	✓	P
Western burrowing owl	<i>Athene cunicularia</i> ssp. <i>hypugaea</i>	NL	S2B	✓	P
Upland sandpiper	<i>Bartramia longicauda</i>	BCC (nb), BCC <sup>7</sup>	NL	✓	P
American bittern	<i>Botaurus lentiginosus</i>	BCC	NL	✓	P
White-tailed hawk	<i>Buteo albicaudatus</i>	BCC <sup>8</sup>	T, S4B	✓	CC, WA
Red knot	<i>Calidris canutus</i>	C, BCC (nb)	S3N	N	CC
Western snowy plover	<i>Charadrius alexandrinus</i> ssp. <i>nivosus</i>	NL	S2B	N	P

COMMON NAME	SPECIES NAME	STATUS AND OCCURRENCE		OCCURRENCE	
		FEDERAL <sup>1</sup>	STATE <sup>1,2</sup>	COUNTY <sup>3</sup>	NASCC <sup>4</sup>
Southeastern snowy plover	<i>Charadrius alexandrinus</i> ssp. <i>tenuirostris</i>	NL	S2B	N	P
Piping plover	<i>Charadrius melodus</i>	T	T, S2	N	P
Mountain plover	<i>Charadrius montanus</i>	BCC (nb) <sup>8</sup>	S2	✓	P
Snowy plover	<i>Charadrius nivosus</i>	BCC (c)	S3B	N	P
Wilson's plover	<i>Charadrius wilsonia</i>	BCC	S4B	N	CC
Sedge wren	<i>Cistothorus platensis</i>	BCC (nb) <sup>8</sup>	S4	✓	CC, WA
Yellow rail	<i>Coturnicops noveboracensis</i>	BCC (nb)	NL	✓	P
Little blue heron	<i>Egretta caerulea</i>	BCC	S5B	✓	CC, GO
Reddish egret	<i>Egretta rufescens</i>	BCC	T, S3B	N	CC
Swallow-tailed kite	<i>Elanoides forficatus</i>	BCC	T, S2B	N	P
Northern aplomado falcon	<i>Falco femoralis</i> ssp. <i>septentrionalis</i>	E	E, S1	✓	P
Peregrine falcon	<i>Falco peregrinus</i>	DL, BCC (nb), BCC (b) <sup>9</sup>	T, S3B	✓	CC
American peregrine falcon	<i>Falco peregrinus</i> ssp. <i>anatum</i>	DL	T, S2B	✓	P
Arctic peregrine falcon	<i>Falco peregrinus</i> ssp. <i>tundrius</i>	DL	S3N	✓	P
Whooping crane	<i>Grus americana</i>	E	E, S1	N	P
American oystercatcher	<i>Haematopus palliatus</i>	BCC	S3B	✓	P
Bald eagle	<i>Haliaeetus leucocephalus</i>	DL, BCC (b)	T, S3B, S3N	N	P
Sennett's hooded oriole	<i>Icterus cucullatus</i> ssp. <i>sennetti</i>	NL	S3B	✓	P
Orchard oriole	<i>Icterus spurius</i>	BCC	S4B	✓	P
Least bittern	<i>Ixobrychus exilis</i>	BCC	S4B	✓	P
Loggerhead shrike	<i>Lanius ludovicianus</i>	BCC	S4B	✓	CC, GO
Short-billed dowitcher	<i>Limnodromus griseus</i>	BCC (nb)	NL	✓	CC
Marbled godwit	<i>Limosa fedoa</i>	BCC (nb)	NL	✓	CC
Hudsonian godwit	<i>Limosa haemastica</i>	BCC (nb)	S2	N	P
Wood stork	<i>Mycteria americana</i>	NL	T, SHB, S2N	N	P
Long-billed curlew	<i>Numenius americanus</i>	BCC, BCC (nb) <sup>10</sup>	S3B, S5N	N	CC
Eskimo curlew	<i>Numenius borealis</i>	E	E, SH	✓	P
Whimbrel	<i>Numenius phaeopus</i>	BCC (nb)	NL	N	P
Painted bunting	<i>Passerina ciris</i>	BCC <sup>8</sup>	S4B	✓	CC, CA, GO
Brown pelican	<i>Pelecanus occidentalis</i>	DL	E, S3B	N	CC
Texas Botteri's sparrow	<i>Peucaea (Aimophila) botterii texana</i>	NL	T, S3B	N	P

COMMON NAME	SPECIES NAME	STATUS AND OCCURRENCE		OCCURRENCE	
		FEDERAL <sup>1</sup>	STATE <sup>1,2</sup>	COUNTY <sup>3</sup>	NASCC <sup>4</sup>
White-faced ibis	<i>Plegadis chihi</i>	NL	T, S4B	✓	CC
Prothonotary warbler	<i>Protonotaria citrea</i>	BCC	S3B	N	P
Black skimmer	<i>Rynchops niger</i>	BCC <sup>8</sup>	S4B	N	CC
Dickcissel	<i>Spiza americana</i>	BCC <sup>8</sup>	S4B	✓	P
Least tern	<i>Sterna antillarum</i>	BCC(c)	NL	✓	CC, WA
Interior least tern	<i>Sterna antillarum</i> ssp. <i>athalassos</i>	E	E, S1B	G	P
Sooty tern	<i>Sterna fuscata</i>	NL	T, S2B	N	P
Gull-billed tern	<i>Sterna nilotica</i>	BCC	S4B	N	P
Sandwich tern	<i>Thalasseus sandvicensis</i>	BCC	NL	N	CC
Lesser yellowlegs	<i>Tringa flavipes</i>	BCC (nb)	NL	✓	CC, GO, WA
Solitary sandpiper	<i>Tringa solitaria</i>	BCC (nb)	NL	✓	P
Buff-breasted sandpiper	<i>Tryngites subruficollis</i>	BCC (nb)	S2S3	✓	P
Attwater's greater prairie-chicken	<i>Tympanuchus cupido</i> ssp. <i>attwateri</i>	E	E, S1B	G	P
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	BCC	S3B	✓	CC, CA, GO, WA
Bell's vireo	<i>Vireo bellii</i>	BCC (c)	S3B	✓	P
<b>MARINE MAMMALS<sup>6</sup></b>					
West Indian manatee	<i>Trichechus manatus</i>	E, MMPA	E, S1	N	P
Bottlenose dolphin	<i>Tursiops truncatus</i>	MMPA	S2	N	P
<b>TERRESTRIAL MAMMALS</b>					
Red wolf	<i>Canis rufus</i>	E	E, S1	✓	P
Maritime pocket gopher	<i>Geomys personatus</i> ssp. <i>maritimus</i>	NL	S4	N	CC, WA
Gulf Coast jaguarundi	<i>Puma yagouaroundi</i> ssp. <i>cacomitli</i>	E	E, S1	N	P
Southern yellow bat	<i>Lasiurus ega</i>	NL	T, S1	N	CC
Ocelot	<i>Leopardus pardalis</i>	E	E, S1	✓	P
White-nosed coati	<i>Nasua narica</i>	NL	T, S2?	✓	P
Plains spotted skunk	<i>Spilogale putorius</i> ssp. <i>interrupta</i>	NL	S3	✓	P

**Footnotes related to Status and Occurrence information**

<sup>1</sup> Federal and State Status: BCC = USFWS Birds of Conservation Concern (USFWS 2008), C = Candidate species for listing, DL = Delisted, E = Endangered, MMPA = Marine Mammal Protection Act, NL = Not Listed, T = Threatened, (c) = BCC status is for the non-listed subspecies or population of threatened and endangered species, (nb) = BCC status is for non-breeding population

<sup>2</sup> State Ranking information was obtained from TPWD 2012d: NL = Not Listed, S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable, S4 = Apparently Secure, S5 = Secure, ? = Questionable taxonomy, B = breeding, N = Nonbreeding, S#S# = Range Rank, SNR = Unranked, SU = Unrankable, SX = Presumed extirpated, SH = Possible extirpated (historical)

<sup>3</sup> Occurrence, County: G = Goliad County, N = Nueces County, ✓ = Occurs in both Nueces and Goliad counties

<sup>4</sup> Occurrence, NASCC: CC = Occurs at Main Station, CA = Occurs at NOLF Cabaniss, GO = Occurs at NOLF Goliad, P = Potential to Occur at NASCC, WA = Occurs at NOLF Waldron

Naval Air Station Corpus Christi  
 Integrated Natural Resources Management Plan

COMMON NAME	SPECIES NAME	STATUS AND OCCURRENCE		OCCURRENCE	
		FEDERAL <sup>1</sup>	STATE <sup>1, 2</sup>	COUNTY <sup>3</sup>	NASCC <sup>4</sup>

**Footnote related to Plant Names**

<sup>5</sup> Common and scientific plant names follow the USDA PLANTS Database nomenclature; names used by TPWD are included in parentheses as relevant

**Footnote related to Marine Species**

<sup>6</sup> Species that occur in brackish/sea water, including fish, sea turtles, and marine mammals have the potential to occur at the Main Station only.

**Footnotes related to Birds of Conservation Concern information**

<sup>7</sup> Only the non-breeding (nb) population of upland sandpiper is listed in USFWS Bird Conservation Region 37 (Main Station, NOLF Cabaniss, and NOLF Waldron). All populations of upland sandpiper are listed in USFWS Bird Conservation Region 21 (NOLF Goliad).

<sup>8</sup> This species is only listed in USFWS Bird Conservation Region 37 (Main Station, NOLF Cabaniss, and NOLF Waldron) and is not listed in USFWS Bird Conservation Region 21 (NOLF Goliad).

<sup>9</sup> The non-breeding (nb) population of peregrine falcon is listed in USFWS Bird Conservation Region 37 (Main Station, NOLF Cabaniss, and NOLF Waldron). The breeding (b) population of peregrine is listed in USFWS Bird Conservation Region 21 (NOLF Goliad).

<sup>10</sup> All populations of long-billed curlew are listed in USFWS Bird Conservation Region 37 (Main Station, NOLF Cabaniss, and NOLF Waldron). Only the non-breeding (nb) population of long-billed curlew is listed in USFWS Bird Conservation Region 21 (NOLF Goliad).

**Sources:** TPWD 2013, Cornell University 2012, National Oceanic and Atmospheric Administration Fisheries 2012, Texas A&M University – Corpus Christi 2012, TPWD 2012c, TPWD 2012d, USFWS 2012c, USFWS 2012d, Henke et al. 2010, Woodin et al. 2010, Sullivan et al. 2009, Navy 2009a, USFWS 2008, Hickman et al. 2007, Navy 2006b, Wolfe et al. 1998, National Audubon Society n.d., TPWD n.d. g, and USFWS n.da.

# APPENDIX F

## Native Landscaping Plants

**Table F-1. Recommended Plants for Native Landscaping – Main Station.**

This page intentionally left blank.



**Table F-1. Recommended Plants for Native Landscaping – Main Station.**

COMMON NAME	SCIENTIFIC NAME	SPECIAL CHARACTERISTICS
<b>Grasses</b>		
Big bluestem	<i>Andropogon gerardii</i>	E
Big sacaton	<i>Sporobolus wrightii</i>	E
Broomsedge bluestem	<i>Andropogon virginicus</i>	E
Buffalograss	<i>Bouteloua dactyloides</i>	E
Curly-mesquite	<i>Hilaria belangeri</i>	E
Green sprangletop	<i>Leptochloa dubia</i>	E
Hairy grama	<i>Bouteloua hirsuta</i>	E
Indiangrass	<i>Sorghastrum nutans</i>	WU, E
Sand dropseed	<i>Sporobolus cryptandrus</i>	E
Sideoats grama	<i>Bouteloua curtipendula</i>	E
Silver bluestem	<i>Bothriochloa laguroides</i>	E
Switchgrass	<i>Panicum virgatum</i>	WU, E
Virginia wildrye	<i>Elymus virginicus</i>	E
<b>Forbs/Wildflowers</b>		
Blue sage	<i>Salvia azurea</i>	E, C
Carolina snailseed	<i>Cocculus carolinus</i>	WU, E
Croton spp.	<i>Croton</i> spp.	WU, E
Indian blanket	<i>Gaillardia pulchella</i>	C
Jersey tea	<i>Ceanothus herbaceus</i>	WU, E
Pinkladies	<i>Oenothera speciosa</i>	E
Mustang grape	<i>Vitis mustangensis</i>	WU, E
Partridge pea	<i>Chamaecrista fasciculata</i>	WU, E
Golden tickseed	<i>Coreopsis tinctoria</i>	E, C
Prairie sunflower	<i>Helianthus petiolaris</i>	WU, C
Texas bluebonnet	<i>Lupinus subcarnosus</i>	BS, E, C
Trumpet creeper	<i>Campsis radicans</i>	WU, E, C
Turk's cap	<i>Malvaviscus dromondii</i>	B, H, BF, C
<b>Shrubs</b>		
Algerita	<i>Mahonia trifoliolata</i>	B, BS, E
American beautyberry	<i>Callicarpa americana</i>	B, BF, WU
American black elderberry	<i>Sambucus canadensis</i>	WU, E,
Brazilian bluewood	<i>Condalia hookeri</i>	B, WU, E
Whitebrush	<i>Aloysia gratissima</i>	BS, E
West Indian shrubverbena	<i>Lantana horrida</i>	BS, BF, C
Wright's desert honeysuckle	<i>Anisacanthus quadrifidus wrightii</i>	H, BF, C
Brewster County barometerbush	<i>Leucophyllum candidum</i>	H, BF, BS, WU, C
<b>Trees</b>		
American elm	<i>Ulmus americana</i>	E
Bitternut hickory	<i>Carya cordiformis</i>	E

COMMON NAME	SCIENTIFIC NAME	SPECIAL CHARACTERISTICS
<b>Trees, continued</b>		
Cedar elm	<i>Ulmus crassifolia</i>	E
Green ash	<i>Fraxinus pennsylvanica</i>	WU, E
Gum bully	<i>Bumelia lanuginosa</i>	WU, E
Honeylocust	<i>Gleditsia triacanthos</i>	WU, E
Live oak	<i>Quercus virginiana</i>	BF, WU, E
Redbud	<i>Cercis canadensis</i>	E,C
Yaupon	<i>Ilex vomitoria</i>	B, BF, WU, C, E

Sources: USDA, NRCS 2012 and Navy 2006

Plants that provide food and/or shelter for wildlife use the following abbreviations:

- B – Birds (except hummingbirds)
- BS – Bees
- H – Hummingbirds
- WU – Wildlife use
- BF – Butterflies
- C – Provides color
- E – Good to excellent erosion control

# **APPENDIX G**

## **Invasive and Noxious Species**

This page intentionally left blank.

“Exotic” (E) (alien) species are defined in Executive Order 13112, *Invasive Species*, as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. “Invasive” (I) species are defined as those species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Within this INRMP, invasive species also include those native species (N) that readily invade and dominate disturbed areas (e.g., *Baccharis neglecta*).

**Table G-1. Invasive, Exotic, and Nuisance Species of the Installation.**

COMMON NAME	SCIENTIFIC NAME	CATEGORY <sup>1</sup>	COUNTY OF OCCURRENCE <sup>2</sup>
<b>Plants<sup>3</sup></b>			
Bermudagrass	<i>Cynodon dactylon</i>	I/E	Nueces, Goliad
Brazilian peppertree <sup>4</sup>	<i>Schinus terebinthifolius</i>	I/E	Nueces
Buffelgrass	<i>Pennisetum ciliare</i>	I/E	Nueces, Goliad
Chinaberrytree <sup>4</sup>	<i>Melia azedarach</i>	I/E	Nueces
Chinese tallow <sup>4</sup>	<i>Triadica sebifera</i> <sup>5</sup>	I/E	Nueces
Eastern baccharis	<i>Baccharis halimifolia</i>	N	Nueces
Guineagrass <sup>4</sup>	<i>Urochloa maxima</i>	I/E	Nueces
Johnsongrass	<i>Sorghum halepense</i>	I/E	Nueces, Goliad
Kleberg’s bluestem	<i>Dichanthium annulatum</i>	I/E	Nueces, Goliad
Rooseveltweed, poverty weed	<i>Baccharis neglecta</i>	N	Nueces, Goliad
White leadtree	<i>Leucaena leucocephala</i>	I/E	Nueces
Yellow bluestem	<i>Bothriochloa ischaemum</i>	I/E	Nueces
<b>Mammals<sup>6</sup></b>			
Nutria	<i>Myocastor coypus</i>	I/E	Nueces
Wild boar	<i>Sus scrofa</i>	I/E	Nueces
<b>Invertebrates<sup>6</sup></b>			
Africanized honeybee	<i>Apis mellifera scutellata</i>	I/E	Nueces, Goliad
Red imported fire ant	<i>Solenopsis invicta</i>	I/E	Nueces, Goliad

<sup>1</sup> I = Invasive; E = Exotic; N = Native (nuisance)

<sup>2</sup> See Appendix E for tables that list plant and bird species occurrence by parcel

<sup>3</sup> Source: USDA, NRCS 2012

<sup>4</sup> This species is covered under the *Management Plan for Controlling Invasive Exotic Plants at Naval Air Station Corpus Christi* (Wiemers et al. 2007).

<sup>5</sup> Known in Texas as the noxious weed, *Sapium sebiferum*

<sup>6</sup> Source: USDA, National Invasive Species Information Center 2012

<sup>7</sup> Though not observed at NOLF Goliad Field, the house sparrow is known to permanently reside in all Texas counties (Casto 2006).

**BERMUDAGRASS (*Cynodon dactylon*)**

A low growing grass introduced to Texas as a forage and landscape species. It has a high salt tolerance and reproduces by seeds, tillers, rhizomes, and stolons. Found in waste places and weedy habitats. Good for erosion control.

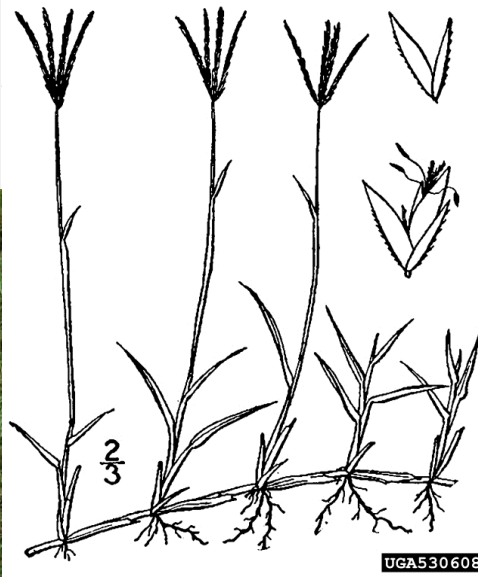


Photo source: David J. Moorhead, University of Georgia, Bugwood.org; Image Number 5344065

Drawing source: USDA NRCS PLANTS Database, Bugwood.org; Image Number 5306087

**BRAZILIAN PEPPERTREE (*Schinus terebinthifolius*)**

Native to South America and introduced to Florida in the 1800s, Brazilian peppertree was once sold in Texas as an ornamental but is now considered a serious threat to native biodiversity. Brazilian peppertree responds to abrupt environmental changes with heavy growth and acts as an opportunistic pioneer species (i.e., the first species to establish in disturbed areas such as fallow fields, ditches, drained wetlands, and roadsides). It has a high tolerance for shade and produces a large amount of seeds that are transported by birds and mammals. The 30–40 foot tree forms dense monospecific stands that crowd and shade out native grasses and shrubs, and take over native pine forests. It also suppresses native vegetation by producing chemicals that alter the properties and chemical composition of soil.



Source: Galveston Bay Estuary Program 2010

Photo sources: (left) Stephen D. Hight, USDA Agricultural Resource Service, www.forestryimages.org; Image Number 0002012;

(right) James P. Cuda, University of Florida, www.forestryimages.org; Image Number 0002008



**BUFFELGRASS (*Pennisetum ciliare*)**

Buffelgrass is a perennial bluish-green bunchgrass 4–60 inches tall that was introduced to the United States as livestock forage in the 1930s. It grows densely in thick mats, crowding out native plants via water competition, dense root systems, and shading. It prefers alkaline soils and establishes best within arid areas in pockets of high nutrients and moisture. It is dispersed via wind, flood waters, and seeds that attach to animals including humans.



Source: Texas Invasive Plant and Pest Council (TIPPC) 2007a

Photo sources: (left) Donna Berry, Rio Grande Valley Invaders; (right) Larry Allain @ USDA-NRCS PLANTS Database

**CHINABERRYTREE (*Melia azedarach*)**

*Melia azedarach* is a fast-growing deciduous tree reaching up to 50 feet in height with dark green leaves and clusters of fragrant lavender flowers in the spring that produce poisonous yellow berries. Native to Australasia, it invades along roadways, fencerows and other disturbed areas, and can also be found in upland grasslands, woodlands, pastures, and riparian areas. While it requires open sun, it adapts to a wide range of soil moisture conditions and is highly resistant to insects and other pathogens, allowing it to outcompete native species.



Source: Global Invasive Species Database 2006a

Photo sources: (left) Pedro Acevedo-Rodriguez @ USDA-NRCS PLANTS Database;  
(right) Robin R. Buckallew @ USDA-NRCS PLANTS Database

**CHINESE TALLOW (*Triadica sebifera*)**

A deciduous tree up to 60 feet tall and 3 feet diameter with pointed leaves and popcorn-like seeds in the fall and winter. The sap is milky and poisonous, and the leaves contain toxins that inhibit native species growth. Transforms native habitats into monospecific tallow forests, reducing wildlife habitat and livestock forage areas. Prolifically produces seeds and invades wet areas (stream banks, riverbanks, ditches) as well as upland sites. Native to China, it was introduced to South Carolina in 1776.



Source: TIPPC 2007b

Photo sources: (left) Chris Evans, River to River CWMA, Bugwood.org; Image Number 1264076

(right) Mark Atwater, Weed Control Unlimited, Inc., Bugwood.org; Image Number 2131093



**EASTERN BACCHARIS (*Baccharis halimifolia*)**

Eastern baccharis is a densely branched deciduous shrub (3–10 feet) with thick egg-shaped leaves and yellow and white flowers in the summer and fall. It generally grows in open woods, low prairies, and margins of salt marshes and rivers in coastal areas. Similar to Rooseveltweed, eastern baccharis is extremely drought tolerant, flammable, spreads quickly, and can grow in soil from pure sand to pure clay, even in saline soils. Although the plant can be useful for erosion control, it has become an aggressive invader of rangeland and disturbed sites. Livestock avoid eastern baccharis and it produces seeds prolifically, making it very difficult to eradicate once established.

Source: Texas Native Plants Database (n.d. a)

Photo source: Texas Native Plants Database (n.d. a)



**GUINEAGRASS (*Urochloa maxima*)**

Guineagrass is a tufted perennial 2–6.5 feet tall, which forms dense stands in disturbed areas and open pastures where it displaces native species. Due to its drought resistance, it can build up large masses of plant material that fuel fierce fires, wiping out less tolerant species. It regenerates rapidly from underground rhizomes, which can also survive quick-moving fires.



Source: Global Invasive Species Database 2006b

Photo source: Steve Conklin, Rio Grande Valley Invaders

Drawing source: USDA-NRCS PLANTS Database / Hitchcock, A.S.



**JOHNSONGRASS (*Sorghum halepense*)**

Considered one of the ten worst weeds in the world, it is a tenacious weed that thrives in disturbed soils. A perennial coarse grass with an extensive rhizome system and reddish to purplish panicles. Erect plant stands 3–6 feet tall. The seedhead is large and open. It is thought to be native to the Mediterranean region. This species is difficult to control due to prolific seed production, vigorous rhizomes, sprouting ability of fragmented rhizomes, and ability to grow in a wide range of environments.



Source: TIPPC 2004

Photo sources: (left) James H. Miller, USDA Forest Service, [www.forestryimages.org](http://www.forestryimages.org); Image Number 1120383;

(right) Chris Evans, River to River CWMA, [Bugwood.org](http://Bugwood.org); Image Number 2149089

**KLEBERG'S BLUESTEM (*Dichanthium annulatum*)**

Kleberg's bluestem, a bunchgrass 8-40 inches in height, grows fast in the spring, matures quickly, and is characterized by a high density of reproductive shoots. It thrives under grazing conditions, requires full sunlight, has a low tolerance to acidic soils, and a high tolerance to both drought and cold. It is a prolific seed producer and can invade and outcompete native grasses in bluestem coastal prairie communities.



Source: TIPPC 2007c

Photos sources: (left) Mary Jean Garcia, Rio Grande Valley Invaders; (right) Jose Hernandez @ USDA-NRCS PLANTS Database



**ROOSEVELTWEED (*Baccharis neglecta*)**

Roosevelt weed, found growing throughout much of Texas, is a tall shrub (5-9 feet) with numerous willow-like branches; dark green, linear leaves; and white flowers from the summer through the fall. Although native, it has become an increasing problem, overtaking forage plants as it aggressively invades rangeland and disturbed sites. It spreads quickly, is extremely drought tolerant with deep roots that draw a lot of water, can grow in high salt soils, and is very flammable. Livestock avoid *Baccharis neglecta* and it produces seeds prolifically, which means that it is very difficult to eradicate once established.

Source: Texas Native Plants Database (n.d. b)

Photo source: Texas Agricultural Experiment Station

**YELLOW BLUESTEM (*Bothriochloa ischaemum*)**

Planted extensively throughout Texas along highways to stabilize soils. Initiates growth in late spring; flowers year round under favorable moisture conditions. Warm season perennial native to Asia and Central Europe.



Photos source: Tarleton State University

**NUTRIA (*Myocastor coypus*)**

Nutria is a large (~ 2 feet long, 12 pounds), dark colored, semiaquatic rodent that originated from South America for use in fur coats. They breed year round and have adapted to a wide variety of environmental conditions including freshwater impoundments (e.g., farm ponds), drainage canals, rivers and bayous, freshwater and brackish marshes, swamps, and various wetland types. Their burrows undermine riverbanks causing instability, and by feeding on plants they cause erosion and the conversion of marshland to open water. They also feed on agricultural crops including sugarcane.



Sources: TIPPC 2011a and Global Invasive Species Database 2008a

Photo sources: (left) Philippe Amelant, Wikimedia Commons

(right) José Reynaldo da Fonseca, Wikimedia Commons

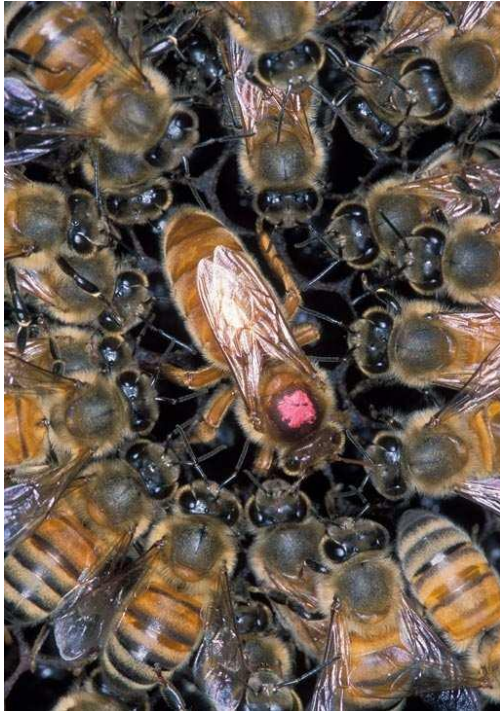
**WILD BOAR (*Sus scrofa*)**

Native to Europe, the wild boar, or feral hog, has been present in Texas since 1689 and has since established sizeable, free-ranging populations throughout much of Texas, particularly on the Rio Grande and Coastal Plains; current populations are estimated at more than 1.5 million wild boars in Texas. They are large with coarse, hairy coats brown to blackish-brown color, can have destructive influences on wildlife and plant communities as well as domestic crops and livestock, uprooting and trampling vegetation and preying upon wildlife and some livestock.



Source: TIPPC 2011b

Photo source: Animal Wildlife Information, City of San Antonio



**AFRICANIZED HONEYBEE (*Apis mellifera scutellata*)**

*Apis mellifera scutellata* are aggressive “killer” bees that defend their nests by stinging and chasing intruders in the hundreds; they have even caused death of pets, livestock, and people. They compete with European honeybees (cause colony inbreeding, killing local colonies’ queens), causing them to produce less honey. They have less selective habitat preferences than European honeybees, occurring in agricultural areas, forests, and disturbed and urban areas. They have been migrating from South America since the 1950s, arrived in Texas in the 1990s, and spread throughout the Southwest; colonies have been found in Tarrant County.

*Closeup of A. m. scutellata surrounding a European queen honeybee (pink dot)*

Source: Global Invasive Species Database 2010

Photo source: Scott Bauer, USDA Agricultural Research Service, Bugwood.org; Image number 1355021

**RED IMPORTED FIRE ANT (*Solenopsis invicta*)**

*Solenopsis invicta* is a prolific breeder, aggressive feeder, and successful invader that can quickly take over an area with dozens of mounds ranging from 4 to 24 inches tall. Native to South America, it is found throughout Texas, particularly in southern and southeastern counties. Nests typically occur in sunny, open areas and are especially common in disturbed and irrigated soils. Red imported fire ants displace native ants, and birds (particularly ground-nesters), lizards, mammals, and amphibians are all vulnerable to the ants’ sting. They occur in a range of habitats, from agricultural areas (where they are major pests), to forests, coastland, shrublands, and urban areas.



Source: TIPPC 2011d

Photo sources: (left) Chris Evans, River to River Cooperative Weed Management Area, Bugwood.org; Image number 1380123

(right) Johnny N. Dell, Bugwood.org; Image number 5382512

This page intentionally left blank.

# **APPENDIX H**

## Zoonoses of Concern

This page intentionally left blank.



## **Rabies**

Rabies is a viral infection of the central nervous system that can be transmitted by the bite or saliva of an infected animal via open skin abrasions or wounds. This disease can affect all warm-blooded animals, including humans. It is present in many wild animal populations in Texas, with skunks, bats, coyotes and foxes being the most common animals affected (Texas Department of Health Zoonosis Control Division 2011a). Although rabies is almost always fatal, vaccination is highly effective in preventing it. Control of rabies depends on public awareness of the signs and hazards of the disease, stringent enforcement of animal control regulations and immunization of all dogs and cats over 4 months old.

## **Lyme Disease (Lyme Borreliosis)**

Lyme disease is named after the town of Lyme, Connecticut where it was first described in 1976, and is the most frequently diagnosed tick/insect-borne disease in the U.S. (Texas Department of Health Zoonosis Control Division 2011b). It was identified in Texas in 1984. Lyme disease is caused by a spirochete form of bacteria (*Borrelia burgdorferi*) and is transmitted to humans by the bite of infected tick or flea. Lyme disease may cause skin, joint, heart and nervous system problems. The disease can affect persons of all ages, with effects continuing for months or even years if not adequately treated.

Illness usually begins in the spring or summer and is typically divided into three stages, often with apparent recovery between stages. The different stages may overlap but can occur independently. Stage I symptoms include flu-like symptoms that occur between 3 to 28 days after exposure. The flu symptoms may be intermittent, but often lethargy and fatigue are persistent during this first stage of infection, which can last for several months. Approximately 35% of persons infected with Lyme disease also develop skin lesions and/or a persistent, small red area around the bite that may expand. Approximately 80% of persons infected with Lyme disease develop a rash on the skin, which may vary in severity and occur only periodically. Stage II of Lyme disease infection affects the nervous system and heart. Excruciating headaches, neck pain or stiffness are common symptoms associated with Stage II. Approximately 15% of those infected may also develop severe neurological problems such as difficulty sleeping and concentrating, poor memory, emotional instability, irritability, double vision, numbness or weakness in extremities or face, and eye or ear pain. Approximately 10% of those infected will have temporary heart beat abnormalities (forcible, rapid or irregular heart beat). Stage III of Lyme disease infections affect the joints and nervous system. Approximately 60% of those infected will develop arthritis, which may last for weeks or months, with attacks lasting a few days and occurring intermittently. Neurological symptoms during Stage III include fatigue, psychiatric problems, or multiple sclerosis-like symptoms.

The best prevention of Lyme disease is to keep pets free of fleas and ticks; eliminate nuisance animals such as rats and mice, which reduces the number of animals available for fleas and ticks to feed on; and wear protective clothing and repellents when outdoors.

### **Rocky Mountain Spotted Fever**

Rocky Mountain spotted fever is a tick-borne disease caused by the bacterium *Rickettsia rickettsia* (Center for Disease Control 2010). This disease is transmitted by the bite of an infected tick, and can be fatal if not treated within the first few days of symptom occurrence. Symptoms of Rocky Mountain spotted fever are fever, headache, abdominal pain, vomiting, and muscle pain. A rash also may develop. Prevention is similar to measures described for Lyme disease, and includes avoiding tick bites and keeping pets free of ticks.

### **Human Ehrlichiosis**

Human ehrlichiosis is caused by bacteria belonging to the genus *Ehrlichia*, and is spread to humans through tick bites (Texas Department of Health Zoonosis Control Division 2012a). A varied range of symptoms are associated with human ehrlichiosis, including no symptoms to severe symptoms that include life-threatening conditions. Most cases include an abrupt onset of the illness about 12 days after infection, which can include fever, chills, headache, and general ill feeling. Some infections also include confusion, nausea, vomiting, joint pain, or rash. Preventative measures are similar to those described for Lyme disease and Rocky Mountain spotted fever.

### **Murine Typhus**

Murine typhus, also known as flea-borne typhus or endemic typhus, is caused by the bacterium *Rickettsia typhi* or *R. felis*. The disease is contracted when a flea bite wound is contaminated with infected fecal material shed while a flea feeds. The highest incidence of murine typhus in Texas occurs in South Texas, from Nueces County south to the Rio Grande Valley, but cases have been reported in other areas of the state each year (Texas Department of Health Zoonosis Control Division 2011c). Murine typhus can be easily treated with antibiotics. Symptoms include severe headache, fever, fatigue, and muscle aches. Approximately half of murine typhus cases also develop a rash. Prevention of murine typhus is maintained through an effective flea control program. Pets should be regularly and routinely treated for fleas.

### **Plague**

Plague is caused by bacteria, and is transmitted to rodents via infected fleas. The disease can be transmitted to humans and cats by flea bites, or by coming into contact with animals that have contracted, or have died from, plague (Texas Department of Health Zoonosis Control Division 2011d). Plague can occur in three forms: bubonic, septicemic, and pneumonic. Bubonic plague is the most common form that is obtained via a bite from an infected flea. Symptoms include swelling of the neck, under arms, or in the groin area that are sore when touched. Septicemic

plague occurs when the bacterium infects the blood, through an open wound or cut, and can cause severe illness. Pneumonic plague is the least common form of plague, but is the most severe. Pneumonic plague infects the lungs and is easily transmittable through coughing and sneezing. Cats infected with pneumonic plague may pass it to humans.

Symptoms of plague occur within 2–6 days of infection, and commonly include fever, restlessness, confusion, fatigue, and other flu-like symptoms. After a few days the sore swellings develop. If not treated, plague can cause death. Elimination and prevention of fleas is the best form of protection from plague, as well as removing unwanted mammals that live in and near dwellings.

### **Mosquito-borne Encephalitis**

Mosquito-borne encephalitis is a type of arbovirus that is usually transmitted by mosquitoes (Texas Department of Health Zoonosis Control Division 2012b). Birds and rodents are the most common hosts of the disease, and the disease can severely affect horses (Texas Department of Health Zoonosis Control Division 2012c). Vaccines are available for prevention of the disease in horses. Symptoms of the illness ranges in severity, from benign fevers of short duration, to encephalitis that leads to coma and death. In Texas there are five forms of the virus, including California encephalitis, St. Louis encephalitis, eastern equine encephalitis (also known as EEE or Triple E), western equine encephalitis, and dengue fever.

Standard precautions to prevent spread of mosquito-borne encephalitis include use of disinfectants, including soap and water or hospital grade disinfectants, to decontaminate potentially infected environments. The disease is not known to be transmittable from person to person. Effective mosquito control measures such as removal of standing water where mosquitoes may develop/breed (e.g., tires, cans, puddles), screening of residences and personal protection against mosquito bites are additional preventive measures that can be employed.

### **Brucellosis**

Brucellosis is a highly infectious disease caused by bacteria (*Brucella* spp.), and may infect animals and people. It is most frequently spread between animals by breeding of infected animals, and may also be spread by infected food (Texas Department of Health Zoonosis Control Division 2012d) Symptoms range from fever, headache, chills, weakness, and a general ill feeling; to psychiatric symptoms including depression, irritability; or gastrointestinal symptoms including constipation, anorexia, nausea, and diarrhea. Joint pain and respiratory symptoms may also affect some victims. Prevention includes decontamination with a hospital grade disinfectant of potentially infected environments. This includes treatment of water, through boiling, chlorination, iodination in areas that can be affected by the aerosol form of the bacteria.

## **Salmonellosis**

Salmonellosis is caused by rod-shaped, motile bacterium of the genus *Salmonella* that can infect humans and animals. Salmnoellosis is spread by eating contaminated foods, drinking contaminated water, or from hand-to-mouth contact with feces of an infected person or animal (Texas Department of Health Zoonosis Control Division 2011e). Potential for becoming infected with salmonellosis increases by eating raw or undercooked poultry or eggs, or drinking raw milk or untreated water. Persons working or enrolled in daycare facilities with diapered children, or person that handle pets or livestock are more susceptible to infection. Symptoms of salmonellosis include headache, stomach pain, diarrhea, nausea, and vomiting. Prevention of salmonellosis includes thoroughly cooking poultry, eggs, and egg products; and cleaning and disinfecting kitchen utensils and cutting boards used to prepared poultry or eggs. Hand washing after handling diapers, livestock, or cleaning up wastes also can help prevent the spread of salmonellosis.

## **Anthrax**

Anthrax is caused by the rod-shaped bacteria *Bacillus anthracis*. The disease occurs in both respiratory and cutaneous forms (Texas Department of Health Zoonosis Control Division 2011f). Respiratory anthrax begins within 1–60 days of infection with nonspecific symptoms such a general ill feeling, fever, chills, fatigue, or cough. Signs of improvement may occur in 2–4 days, followed by a sudden onset of severe respiratory distress, and chest wall edema. Without treatment, shock and death may occur within 24–36 hours of the onset of severe symptoms.

Cutaneous anthrax symptoms develop within 1–7 days of infection, and include development of skin lesions and ulcers that may become filled with fluid. Fever and chills may also be accompanied with cutaneous anthrax infections. If left untreated, approximately 20% of case will become fatal. Treatment includes vaccinations and drug treatment. Preventive measures include wearing gloves if there is a potential to come in contact with cutaneous lesions, and washing potentially infected surfaces with a sporicidal agent such as 0.5% hydrochlorite (1 part household bleach added to 9 parts water). Persons who may have become exposed to the aerosol form of anthrax should wash thoroughly with soap and water.

**APPENDIX I**  
Soil and Water Conservation Plan  
for  
Agricultural Out-Leasing

---

This page intentionally left blank.

---

**Soil and Water Conservation Plan  
for  
Agricultural Out-Leasing  
NAS Corpus Christi, Texas**

**1. LEASE AREA.**

All Lease areas shall be subject to the restrictions and guidelines provided in this Conservation Plan.

a. Access Area. Ingress and egress to and from the leased area will be allowed to the Lessee or his authorized representatives through gates and on roads located on the Station, and shall be from locations and along routes designated by the Government Representative. No parking or blocking of these gates, roads, and streets will be permitted. All gates shall be kept closed and locked at all times except when actually being used for ingress and egress. The Lessee shall maintain close contact with the designated Government Representative in conformance of the provisions of this lease.

b. Government Access. Lessee will allow Government personnel vehicular ingress and egress to leased area in order to conduct necessary Government business. Lessee may, at his own expense and with approval of the Government Representative, designate and mark a specific accessible path of 10-foot minimum width to be used as access for Government business. THE LEASE AREA DOES NOT INCLUDE AN AREA NOT TO EXCEED 20 FEET ADJACENT TO ALL FENCES.

c. Grazing Capacity Limit. Cattle or horses grazed on the premises shall not exceed a number which could damage existing vegetation by excessive removal. Overgrazing, which is defined as the grazing of palatable vegetation to less than two inches in height, is prohibited. When this begins to occur, cattle and horses will be removed or fed to an extent that grass recovers. Normal grazing may be resumed when the grass reaches height of four to six inches. No concentrated feeding operations will be permitted.

d. Fences. The suitability for a particular use of fences on the property must be evaluated on site by the Lessee. The Navy does not certify the suitability of any fences for any use. Lessee is responsible for upkeep and maintenance of perimeter and/or interior fences. Repair of fences is considered "Reimbursable Work" and is subject to provisions described below in Section 2 of this Conservation Plan. Fence repairs necessitated by actions of the Lessee or its animals are considered "Non Reimbursable Work" as described in Section 3 below.

e. Watering Facilities. If there are no watering facilities located on the leased property, it is anticipated that the Lessee will transport water to the leased property as necessary for livestock operations.

## 2. REIMBURSABLE WORK.

a. Reimbursable Work Defined. "Reimbursable Work" is Long Term Maintenance work which the Navy has determined necessary for the improvement and productive use of the out-leased property. "Long Term Maintenance" shall mean items of soil and water conservation work and certain other items of protection, preservation, maintenance, repair, or restoration of the lease area and improvements thereto. This will exclude work required by Section 3 of the Conservation Plan to be performed at Lessee's expense. Such reimbursable work shall be approved and directed in writing by the Government.

b. Reimbursable Work Applied. The following procedures for reimbursable work apply should reimbursable work be requested by the Navy:

(1) The Natural Resource Manager shall prepare a Scope of Work and Government Cost Estimate. Scope of Work shall include what work is to be done and identify how or what method should be used to complete the work. It shall also include a time schedule in which the work must be completed.

(2) The Natural Resource Manager shall forward the Scope of Work and Government Cost Estimate to the Real Estate Contracting Officer.

(3) The Real Estate Contracting Officer shall forward the Scope of Work to the Lessee and request a cost proposal.

(4) The Lessee shall send a cost proposal to the Real Estate Contracting Officer. This proposal may be based on Lessee having a third party perform the work. The Lessee may, at this time, inform the Government that he is incapable of performing the work.

(5) If the Lessee submits an acceptable proposal, the Real Estate Contracting Officer shall either; (1) issue a letter of authorization to proceed, advising a modification to the lease will be forthcoming, or (2) forward a modification to the Lessee reflecting changes. Work shall not begin until a letter or authorization or a modification has been received.

(6) If the proposal is unacceptable, the Government shall negotiate with the Lessee or determine alternative means of completing the required work.

(7) When work is completed, Lessee and Natural Resources Manager shall perform a joint inspection. If work is acceptable and within the time frame allotted, terms of the modification shall be activated; i.e., rent reduction may be granted.

(8) If it is determined during a joint inspection that the work was not completed properly or done within the required time frame, the Government may, at its option, allow the Lessee additional time, not to exceed 25% of original time allotted, to complete the work or the Government shall have the work completed and charge the Lessee.



c. Unscheduled Maintenance/Improvement Projects (Reimbursable). The Lessee may be requested to accomplish certain agricultural out-leasing improvement projects which are not a requirement of this lease, but which, if Lessee agrees to perform, shall be funded by the Government funds authorized under Public Law 97-321 of October 1982. The procedure for approval and reimbursement of work authorized through funding under Public Law 97-321 shall be the same as detailed in Section 2 (Reimbursable Work) of this Conservation Plan. All such work shall be approved and directed in writing in advance by the Real Estate Contracting Officer. The Government reserves the right to publicly advertise this work to obtain competitive bids.

### **3. NON-REIMBURSABLE WORK.**

a. Fence Repairs. All fences must be maintained and repaired in a timely manner by the Lessee. Fences shall be repaired to correct damages caused by Lessee's animals or equipment and to approximate their condition at the beginning of the lease. Lessee is responsible for ensuring that all fences are adequate to safely contain livestock prior to and during occupation of fields by livestock.

b. Watering facilities. If watering facilities do not exist on the property, it is expected that the lessee will establish and maintain a watering facility for their livestock at their own expense.

c. Erosion Control. Prudent erosion control measures will be applied by Lessee as prescribed from time-to-time by the Government to reduce the loss of soil due to the actions of ground disturbance, related other work, wind, or water.

d. Debris Control. Lessee shall promptly and properly clean up the areas used by his personnel and agents. All refuse and debris generated at work sites shall be disposed of by Lessee in a manner satisfactory to the Government.

e. Proper Farm Equipment. Hydraulic connections on all power-driven equipment will be made in a manner to prevent oil leaks. The storage of fuel for equipment use shall be in accordance with Government regulations. The Lessee shall not authorize or permit the use of crawler tractors, other tracked vehicles, or spike wheeled vehicles that will injure, impair, or cut into the surface on any pavement within the installation. All equipment shall be inspected and approved by the Government Representative prior to use.

f. Rodent, Insect, and Other Pest Control. Undesirable rodents, insects, and other pest species, including invasive plant species such as sandspurs, Johnson grass, Purple Lovegrass, may be controlled by the Lessee at the Lessee's expense on the leased area. The Lessee is responsible for obtaining all required permits for pest control activities referenced by this paragraph. The Lessee shall also coordinate all control activities with the Government Representative in advance and Government approval is required prior to any Pest Control operations. See paragraph (i) for specific reporting

requirements for pest control actions. Any controls required by the Government for other than normal cultural practices in the area shall be at the Government's expense (see paragraph (h)).

g. Hunting and Trapping. Hunting and trapping of wildlife shall not be permitted unless authorized by the Real Estate Contracting Officer in writing.

h. Fire Management.

(1) General. All grazing practices shall be conducted in a manner to prevent and/or reduce fire hazards. Engine-driven equipment utilized by the Lessee will be equipped with operable spark arrestors, mufflers, and tail pipe assemblies. In addition, any 1975 or newer vehicle having a catalytic converter pollution control device may not be driven off improved roads. Hydraulic connection on all equipment used on the area shall be made in a manner to prevent oil leaks.

(2) Storage of Equipment & Flammable Materials. Equipment fuel and oil may be stored on the leased property only in an area approved by the Government. Said storage area shall be kept in a neat and orderly condition at all times. Extreme care shall be taken by the Lessee to reduce the risk of fire in this area.

(3) Prescribed Controlled Fire. The use of prescribed controlled fire is authorized as a management practice for authorized work. Requests for the use of prescribed controlled fire shall be made in writing to the Government Representative at a minimum notice of two weeks prior to the desired burn date. The use of such fire shall be subject to approval and conditions or restrictions issued by the Texas Forest Service and the NAS Corpus Christi Fire Department.

i. Pesticide Application and Management. All applications of pesticides including herbicides, insecticides, fungicides, and rodenticides by the Lessee shall be accomplished in compliance with Department of Defense requirements for Pest Control Operations, and all applicable safety and environmental protection requirements. In this regard all applications of pesticides must have the advance written approval of the Government Representative. The Government reserves the right to limit the chemical materials to be used. In addition, any State or County permits required for application of a particular pesticide shall be obtained by the Lessee prior to the application. Specific and complete information on pesticide applications will be furnished by the Lessee to the Government Representative who will report all pesticide usage in accordance with Department of Defense requirements. The Government shall observe and approve all pest control operations conducted on the leased area. Upon requests, the Lessee shall provide the Government Representative with one copy of the invoices for pesticides purchased and used on the leased premises. The Lessee will be responsible for damage to non-lease areas as a result of pesticide applications.

j. Aviation Operations Restrictions. The Government reserves the rights to delay, curtail, or otherwise alter Lessee's planned or ongoing activities at the airfield when they would adversely impact the safety of Navy flight training operations.

k. Inspection Reports. The Lessee shall be available to meet with the Government Representative quarterly or as warranted to discuss the Lease, the progress made toward completing lease work requirements on schedule, and any proposed changes. Quarterly inspections shall be made by the Government Representative and submitted using Exhibit "C" notating:

- Lessee's required land management work for the lease term.
- Lessee's progress toward completing maintenance requirements.
- Maintenance work requiring attention.
- General condition of field.
- Related problems occurring during the reporting quarter.

An annual inspection shall be made at least 30 days prior to the end of each lease period. A copy of all reports shall be forwarded to NAVFAC Southeast (Code EV22) by the Government Representative.

This page is intentionally blank.

## **APPENDIX J**

### **NASCC 2004 Wetland Delineation Re-verification**

This delineation is out-of-date,  
and is useful for pre-planning only.

A new project in wetlands requires  
a new delineation to be completed  
for the affected area(s).

This page intentionally left blank.

# Turner Collie & Braden Inc.

TRANSMITTAL

ENGINEERS • PLANNERS • PROJECT MANAGERS

400 West 15<sup>th</sup> Street, Suite 500

Austin, Texas 78701

512/472-4519

512/472-7519 (FAX)

To: Mr. Mike Hilger  
NAS Corpus Christi  
11001 D Street, Suite 143  
Corpus Christi, Texas 78419-5021

Date: June 18, 2004

RE: NAS Corpus Christi  
Wetland Delineation Re-verification

Contract No.: N62467-02-M-9861

Transmitted By: Overnight Mail

---

Mike:

I am forwarding to you the approved re-verification from the USACE. They approved the delineation as four separate approvals (Main Installation, Peary Place, Cabaniss and Waldron), hence the four separate approval letters. I'm glad we could finally wrap this up.

Pleas call if you have questions: (512) 457-7754.

By:   
\_\_\_\_\_  
Carlos Swonke

cc:



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
**GALVESTON DISTRICT, CORPS OF ENGINEERS**  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318

June 9, 2004

Regulatory Branch

SUBJECT: D-7540(01)

Mr. Carlos Swonke  
Turner Collie and Braden, Inc.  
400 West 15<sup>th</sup> Street, Suite 500  
Austin, TX 78701

Dear Mr. Swonke:

This concerns your March 12, 2004 written request for a Corps of Engineers re-verification of a past jurisdictional determination, D-7540, for wetlands located at the Naval Air Station, Cabaniss Field, Corpus Christi, Nueces County, Texas. The Cabaniss Field installation encompasses approximately 971 acres and is located adjacent to Oso Creek near the intersection of Saratoga Road and Chapman Ranch Road.

The approximate 28.2 acres of wetlands as portrayed in your maps, and the wetland data sheets are consistent with past findings and are considered to be waters of the U.S. subject to regulation pursuant to Section 404 of the Clean Water Act, as shown on the attached maps. Areas that are waterward of the mean high tide would also be subject to Section 10 of the Rivers and Harbors Act of 1899. Section 404 provides for the regulation of the discharge of dredged and fill material into Waters of the United States, which includes all tidal waters, non-tidal waters connected to tidal waters, and wetlands adjacent to tidal and non-tidal waters. Such areas require a Department of the Army (DA) permit prior to the placement of dredged or fill material. Any fill, structures or work, such as dredging, within Section 10 areas will also require a DA permit.

This preliminary jurisdictional determination is valid for 5 years from the date of this letter unless new information warrants a revision of the determination prior to the expiration date. Please reference determination number **D-7540(01)** in future correspondence pertaining to this subject.



Thank you for contacting our office and please do not hesitate to contact John Wong or myself at the letterhead address or by telephone at 361-814-5847 should you have any questions.

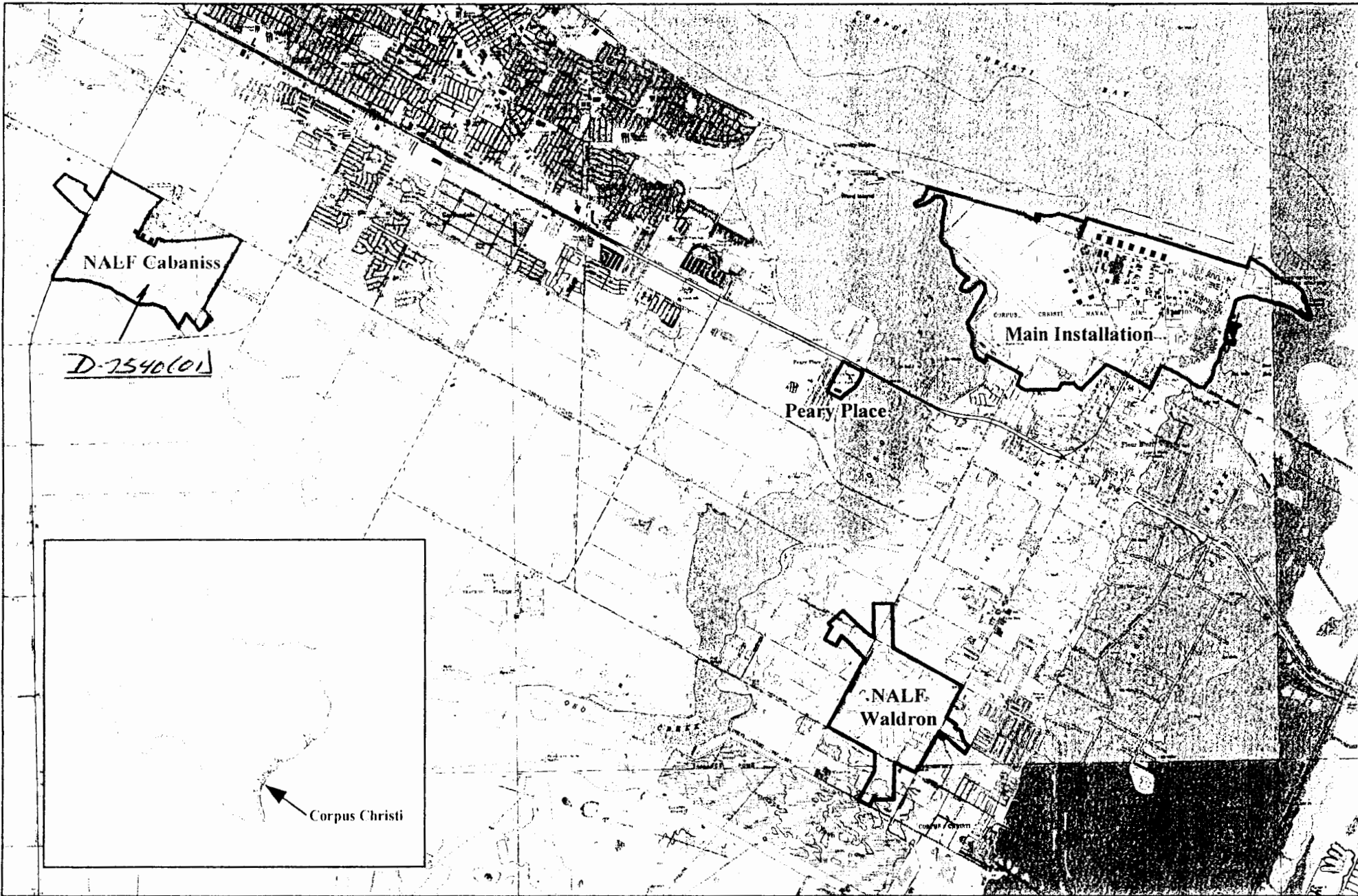
Sincerely,

A handwritten signature in black ink, appearing to read "Lloyd Mullins", with a long, sweeping horizontal stroke extending to the right.

Lloyd Mullins  
Unit Leader  
Corpus Christi Regulatory Office

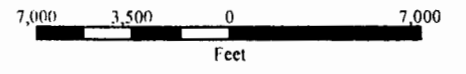
Enclosures

E:\Navy\_SoD\NAS\_Corpus\_Christi\Weldand\_Delineation\Project\_Location\_NASCC



**Legend**  
 — Naval Air Station Boundary

**Figure 1**  
**Site Location Map**  
 Naval Air Station Corpus Christi  
 Nueces County, Texas



**TurnerCollie & Braden Inc.**

D-7450(01) SHEET 1 OF 3

Note: Turner Collie & Braden does not warrant the accuracy of this map, either to scale or completeness. Source: USGS 7.5 minute Topographic Quadrangle of Nueces County, Texas, dated 1989.

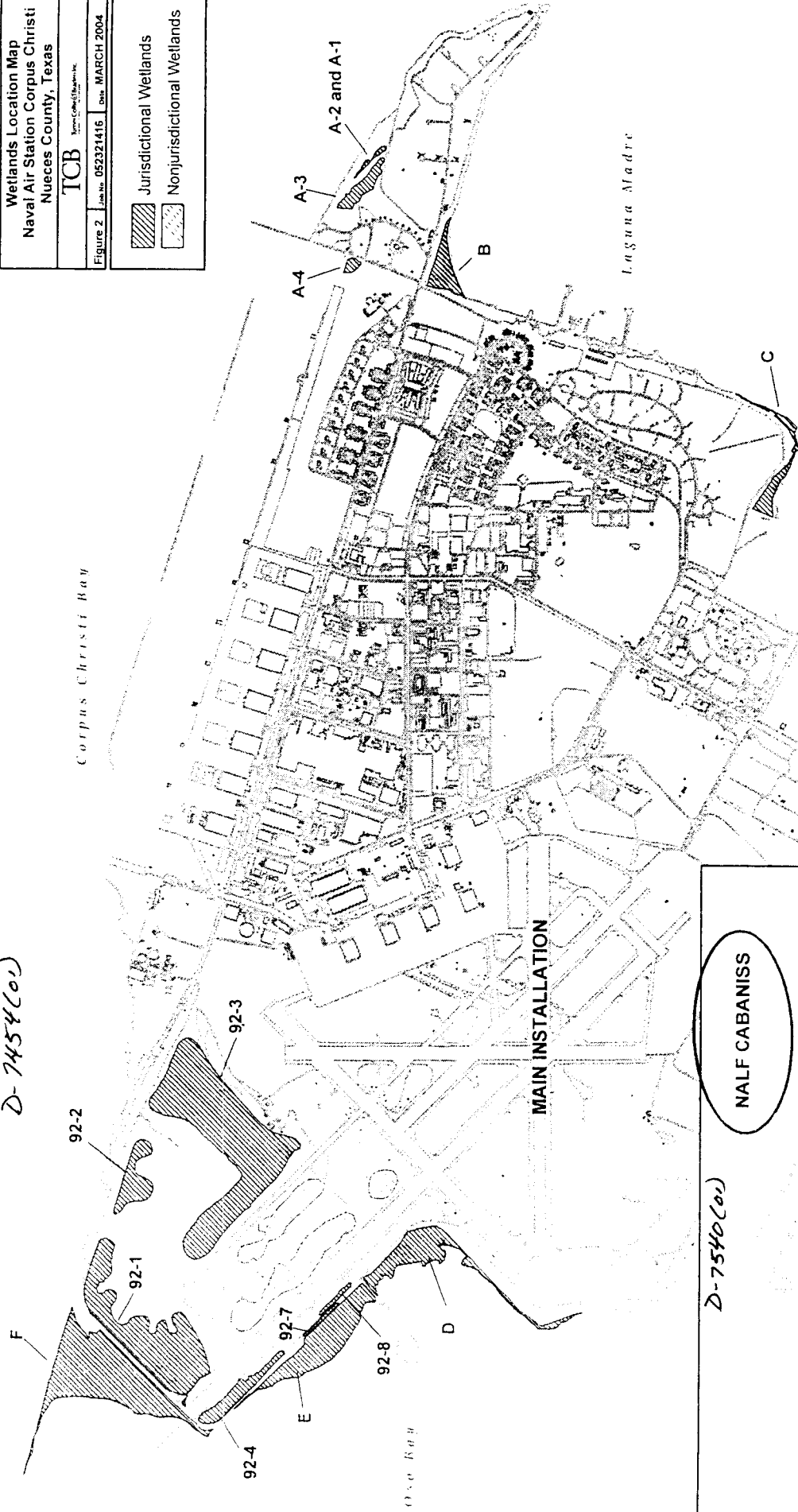
Wetlands Location Map  
 Naval Air Station Corpus Christi  
 Nueces County, Texas

TCB  
Texas Coastal Bend

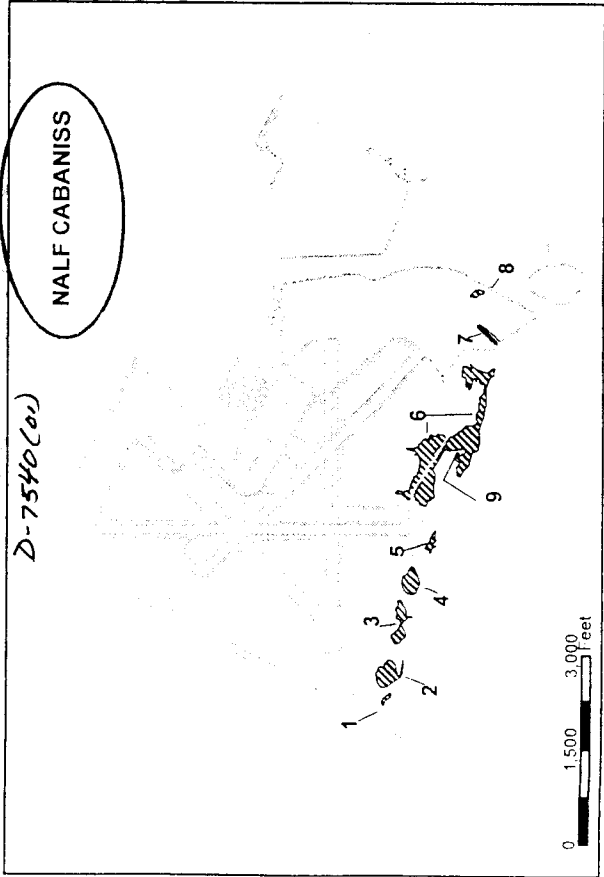
Figure 2  
Map No. 052321416 Date: MARCH 2004

Jurisdictional Wetlands  
 Nonjurisdictional Wetlands

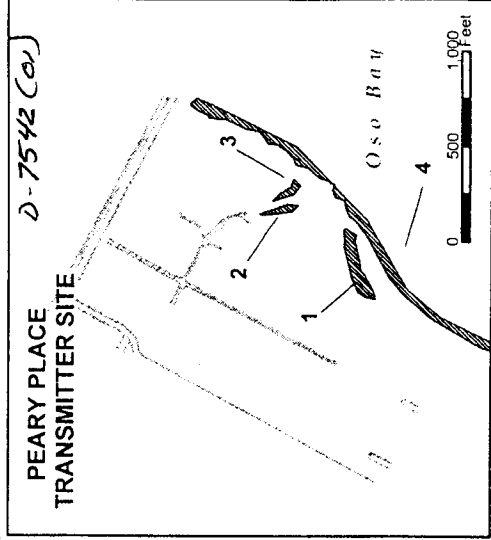
Corpus Christi Bay



D-7454 (cov)



D-7540 (cov)



D-7542 (cov)

D-7450 (cov)  
 SHEET 2 OF 3

Table 1. Area and acreage of wetlands at NAS Corpus Christi.

Wetlands Area	Acreage	Wetlands Area	Acreage
<b>Main Installation</b>			
A-1/A-2	0.6	92-1	28.9
A-3	3.0	92-2	5.7
A-4	1.4	92-3	49.1
B	4.5	92-4	4.8
C	3.9	92-5	15.3
D	11.9	92-6	8.6
E	14.8	92-7	0.5
F	30.3	92-8	0.7
		92-9	2.9
<b>Peary Place</b>			
1	0.54	3	0.67
2	0.12	4	3.00
<b>NALF Cabaniss</b>			
1	0.25	6	16.22
2	2.54	7	0.38
3	2.15	8	0.78
4	1.95	9	0.03
5	0.54	10	3.44

D. 7450 (01)  
 NAVAL AIR STATION  
 CABANKS FIELD  
 SHEET 3 OF 3

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Naval Air Station Corpus Christi	File Number: D-7540(01)	Date: 9 June 2004
Attached is:		See Section below
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of Permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/> or Corps regulations at 33 CFR Part 331.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved jurisdictional determination (JD) or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:  
Lloyd Mullins, Unit Leader  
U.S. Army Corps of Engineers, CESWG-PE-RCC  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318  
Telephone 361-814-5847; FAX 361-814-5912

If you only have questions regarding the appeal process you may also contact:  
James E. Gilmore, Appeal Review Officer  
CESWD-ETO-R, 1100 Commerce Street  
Dallas, Texas 75242-0216  
Telephone: 214-767-2457; FAX 214-767-9021  
Email: [James.E.Gimore@swd02.usace.army.mil](mailto:James.E.Gimore@swd02.usace.army.mil)

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or authorized agent.	Date:	Telephone number:
---	-------	-------------------



DEPARTMENT OF THE ARMY  
GALVESTON DISTRICT, CORPS OF ENGINEERS  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318

REPLY TO  
ATTENTION OF

June 9, 2004

Regulatory Branch

SUBJECT: Files D-7454(01)

Mr. Carlos Swonke  
Turner Collie and Braden, Inc.  
400 West 15<sup>th</sup> Street, Suite 500  
Austin, TX 78701

Dear Mr. Swonke:

This concerns your March 12, 2004 written request for a Corps of Engineers re-verification of a jurisdictional determination, D-7454, for wetlands located at the Corpus Christi Naval Air Station main installation, Corpus Christi, Nueces County, Texas. This project area also includes areas previously reviewed and confirmed as non-jurisdictional under D-11624.

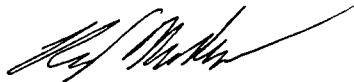
The wetlands as portrayed in your maps and the wetland data sheets are consistent with past findings and are considered to be waters of the U.S. subject to regulation pursuant to Section 404 of the Clean Water Act, as shown on the attached maps. However please be aware that your map does not depict all jurisdictional areas.

As discussed with John Wong of our office, there are other jurisdictional areas near the shoreline that are void of vegetation and not depicted on your wetland map, such as that area shown on Sheet 3. Other areas may also exist. Mudflats, algal flats and sandflats are special aquatic sites that are also considered to be waters of the United States pursuant to Section 404 of the Clean Water Act. If these areas occur below the mean high tide line, then they are also subject to regulation pursuant to Section 10 of the Rivers and Harbors Act. The Corps of Engineers has the authority to regulate certain work under the provisions of Section 10 of the Rivers and Harbor Act and Section 404 of the Clean Water Act. Section 404 provides for the regulation of the discharge of dredged and fill material into Waters of the United States.

This preliminary jurisdictional determination is valid for 5 years from the date of this letter unless new information warrants a revision of the determination prior to the expiration date. Please reference determination number **D-7454(01)** in future correspondence pertaining to this subject.

Thank you for contacting our office and please do not hesitate to contact John Wong or myself at the letterhead address or by telephone at 361-814-5847 should you have any questions.

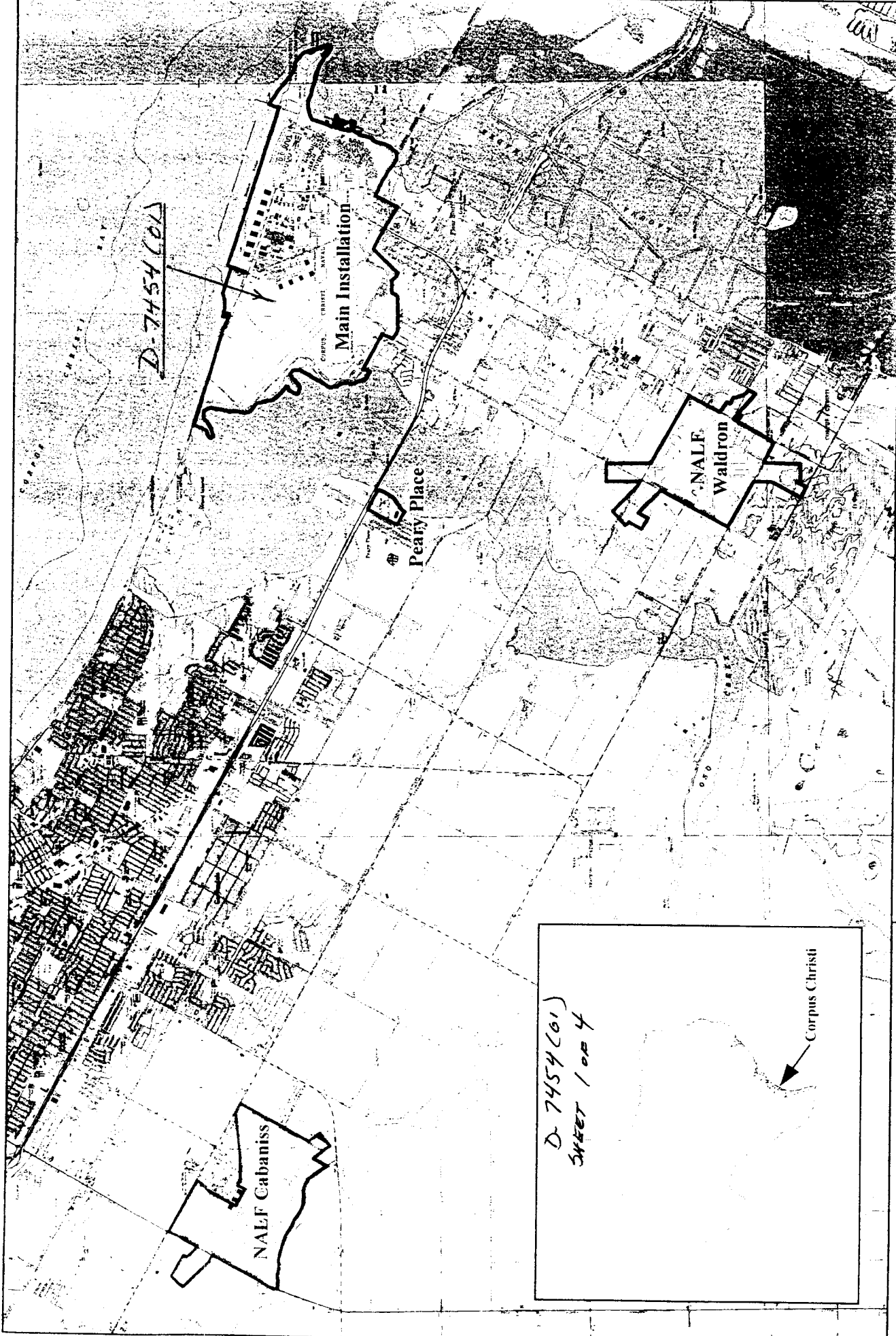
Sincerely,

A handwritten signature in black ink, appearing to read "Lloyd Mullins", with a long, sweeping horizontal stroke extending to the right.

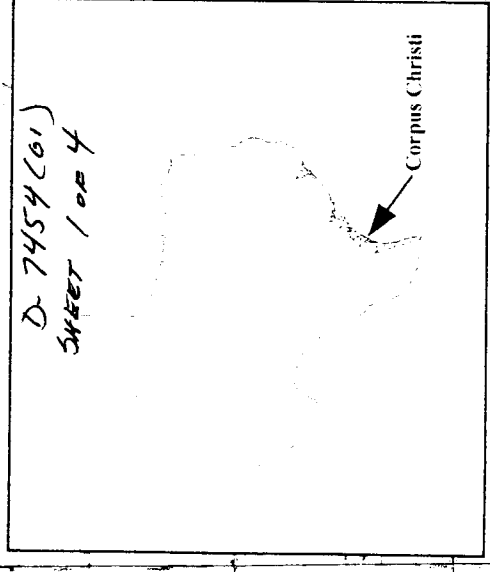
Lloyd Mullins  
Unit Leader  
Corpus Christi Regulatory Office

Enclosures





**Figure 1**  
**Site Location Map**  
**Naval Air Station Corpus Christi**  
**Nueces County, Texas**



**Legend**

— Naval Air Station Boundary



**TurnerCollie & Braden Inc.**

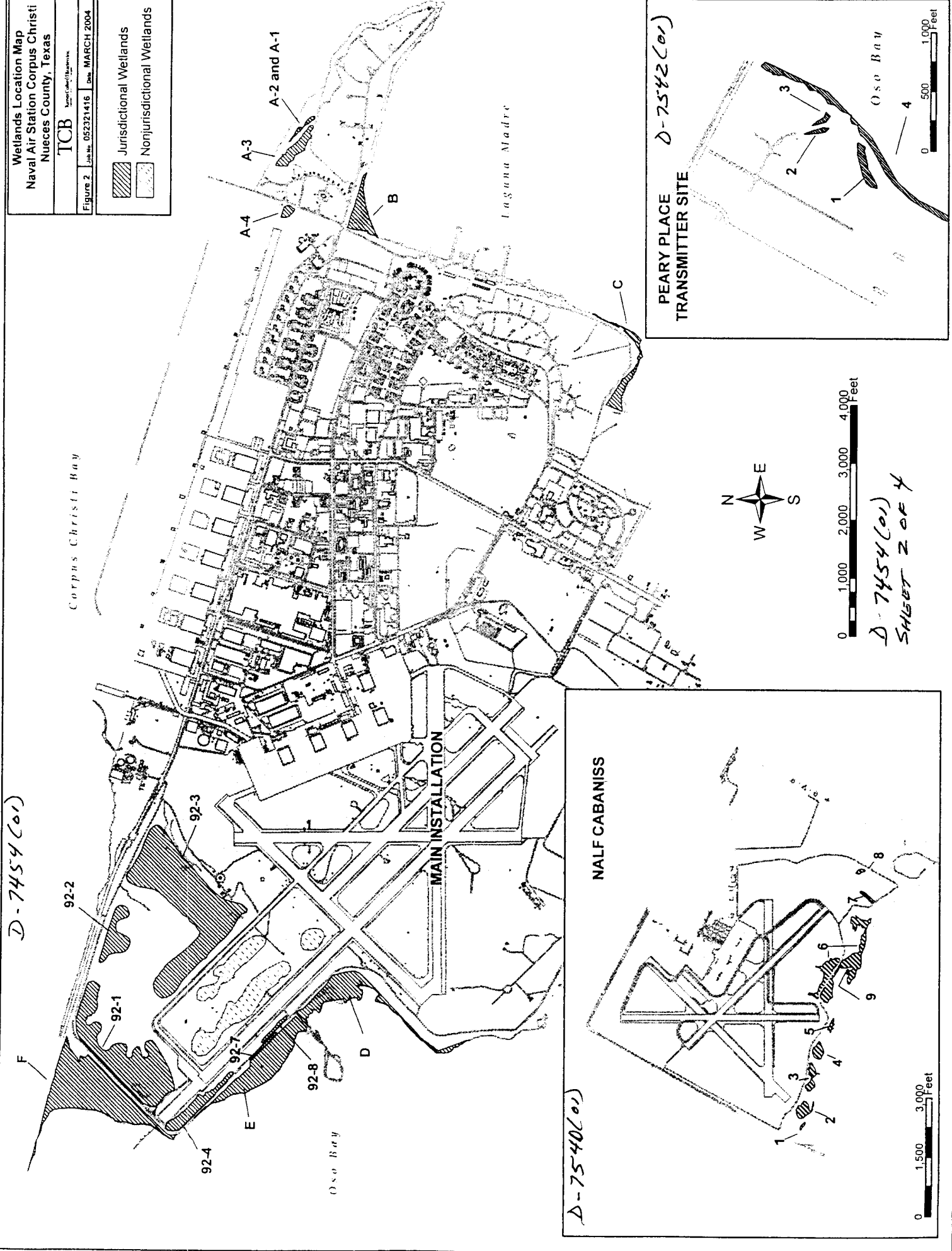
Note: Turner Collie & Braden does not warrant the accuracy of this map, either to scale or completeness. Source: USGS 7.5 minute Topographic Quadrangle of Nueces County, Texas, dated 1989.

Wetlands Location Map  
 Naval Air Station Corpus Christi  
 Nueces County, Texas

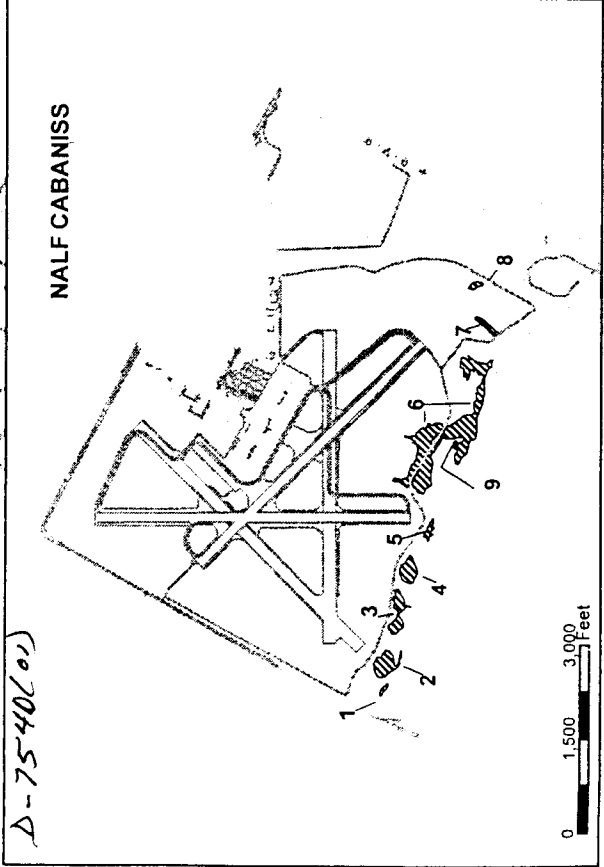
TCB  
Topographic Base Map

Figure 2 Job No. 052321416 Date MARCH 2004

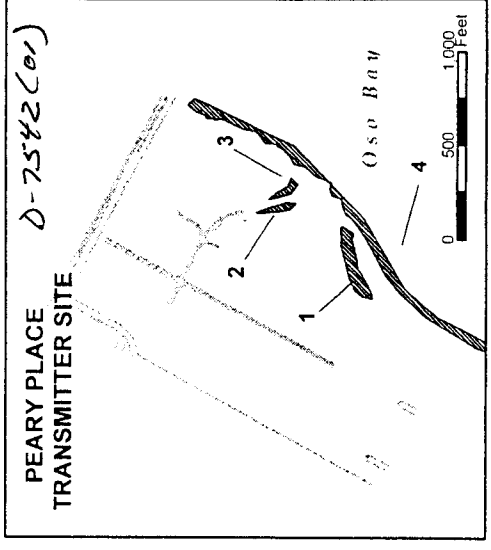
 Jurisdictional Wetlands  
 Nonjurisdictional Wetlands



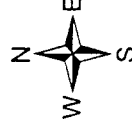
*D-7454 (or)*



*D-7540 (or)*




*D-7542 (or)*



0 1,000 2,000 3,000 4,000 Feet

*D-7454 (or)*  
*SHEET 2 OF 4*



Jurisdictional tidal  
wetland not shown  
TC&B wetland map &  
table. D-7454(01)  
SHEET 3 OF 4

Table 1. Area and acreage of wetlands at NAS Corpus Christi.

Wetlands Area	Acreage	Wetlands Area	Acreage
<b>Main Installation</b>			
A-1/A-2	0.6	92-1	28.9
A-3	3.0	92-2	5.7
A-4	1.4	92-3	49.1
B	4.5	92-4	4.8
C	3.9	92-5	15.3
D	11.9	92-6	8.6
E	14.8	92-7	0.5
F	30.3	92-8	0.7
		92-9	2.9
<b>Peary Place</b>			
1	0.54	3	0.67
2	0.12	4	3.00
<b>NALF Cabaniss</b>			
1	0.25	6	16.22
2	2.54	7	0.38
3	2.15	8	0.78
4	1.95	9	0.03
5	0.54	10	3.44

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Naval Air Station Corpus Christi	File Number: D-7454(01)	Date: 9 June 2004
Attached is:		See Section below
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of Permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/> or Corps regulations at 33 CFR Part 331.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved jurisdictional determination (JD) or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:

Lloyd Mullins, Unit Leader  
U.S. Army Corps of Engineers, CESWG-PE-RCC  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318  
Telephone 361-814-5847; FAX 361-814-5912

If you only have questions regarding the appeal process you may also contact:

James E. Gilmore, Appeal Review Officer  
CESWD-ETO-R, 1100 Commerce Street  
Dallas, Texas 75242-0216  
Telephone: 214-767-2457; FAX 214-767-9021  
Email: [James.E.Gimore@swd02.usace.army.mil](mailto:James.E.Gimore@swd02.usace.army.mil)

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

\_\_\_\_\_  
Signature of appellant or authorized agent.

Date:

Telephone number:



**DEPARTMENT OF THE ARMY**  
**GALVESTON DISTRICT, CORPS OF ENGINEERS**  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318

REPLY TO  
ATTENTION OF

June 9, 2004

Regulatory Branch

SUBJECT: D-7542(01)

Mr. Carlos Swonke  
Turner Collie and Braden, Inc.  
400 West 15<sup>th</sup> Street, Suite 500  
Austin, TX 78701

Dear Mr. Swonke:

This concerns your March 12, 2004 written request for a Corps of Engineers re-verification of a past jurisdictional determination, D-7542, for wetlands located at the Naval Air Station, Peary Place transmitter site, Corpus Christi, Nueces County, Texas. The 44-acre Peary Place transmitter site is located adjacent to Cayo Del Oso between Padre Island Drive, and Wallace Road, as shown on the attached vicinity map.

The 4.33 acres of wetlands as portrayed in your maps, and the wetland data sheets are consistent with past findings and are considered to be waters of the U.S. subject to regulation pursuant to Section 404 of the Clean Water Act. Areas that are waterward of the mean high tide would also be subject to Section 10 of the Rivers and Harbors Act of 1899. Section 404 provides for the regulation of the discharge of dredged and fill material into Waters of the United States, which includes all tidal waters, non-tidal waters connected to tidal waters, and wetlands adjacent to tidal and non-tidal waters. Such areas require a Department of the Army (DA) permit prior to the placement of dredged or fill material. Any fill, structures or work, such as dredging, within Section 10 areas will also require a DA permit.

This preliminary jurisdictional determination is valid for 5 years from the date of this letter unless new information warrants a revision of the determination prior to the expiration date. Please reference determination number **D-7542(01)** in future correspondence pertaining to this subject.

Thank you for contacting our office and please do not hesitate to contact John Wong or myself at the letterhead address or by telephone at 361-814-5847 should you have any questions.

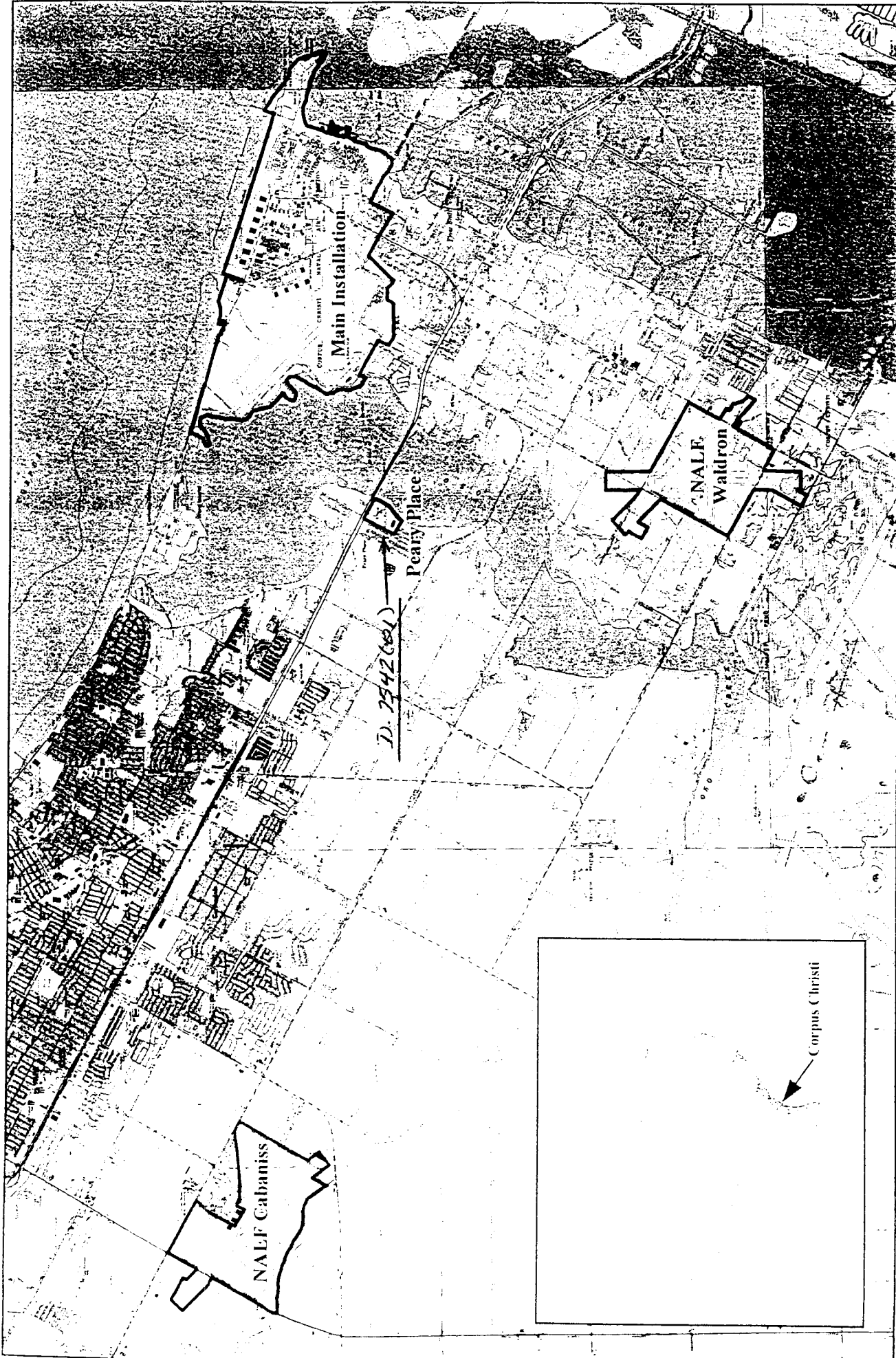
Sincerely,

A handwritten signature in black ink, appearing to read "Lloyd Mullins", with a long horizontal flourish extending to the right.

Lloyd Mullins  
Unit Leader  
Corpus Christi Regulatory Office

Enclosures

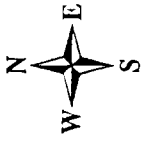




D-7542(01)

Figure 1

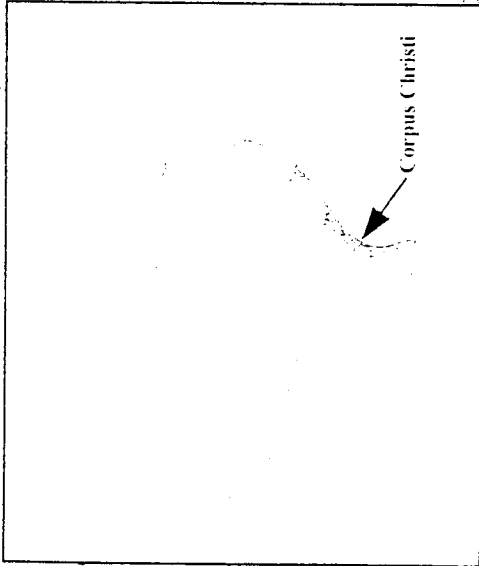
Site Location Map  
 Naval Air Station Corpus Christi  
 Nueces County, Texas



SHEET 1 OF 3

Legend

— Naval Air Station Boundary





TurnerCollie & Braden Inc.

Note: Turner Collie & Braden does not warrant the accuracy of this map, either in scale or completeness. Source: USGS 7.5 minute Topographic Quadrangle of Nueces County, Texas, dated 1989.

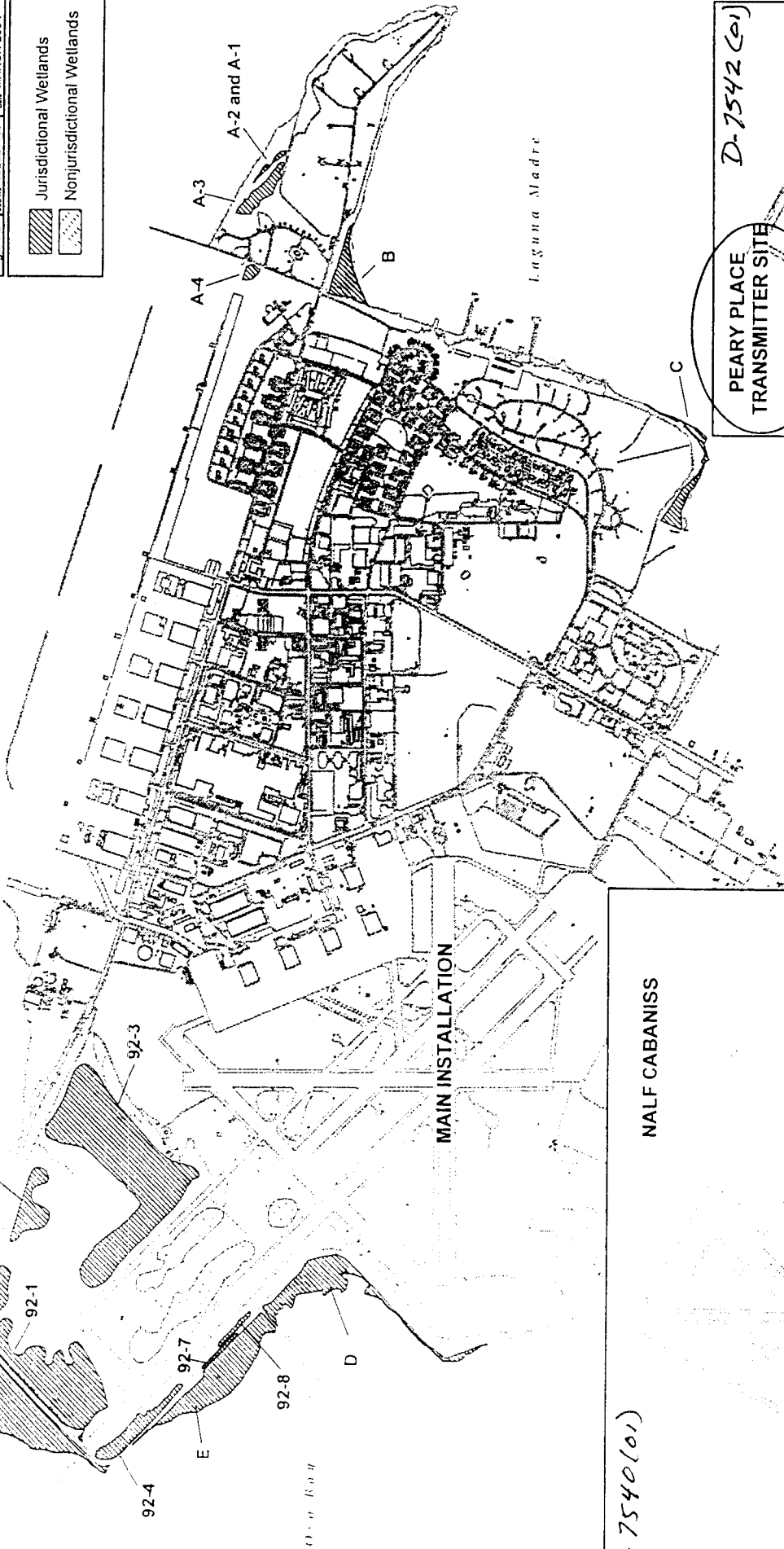
Wetlands Location Map  
 Naval Air Station Corpus Christi  
 Nueces County, Texas

**TCB**  
Texas Coastal Bay Area

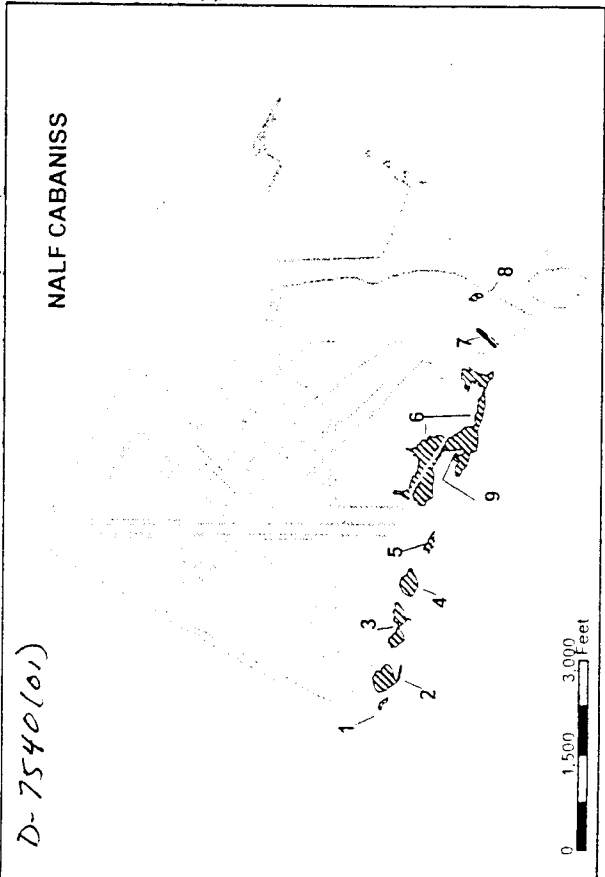
Figure 2 Job No. 052321416 Date MARCH 2004

 Jurisdictional Wetlands  
 Nonjurisdictional Wetlands

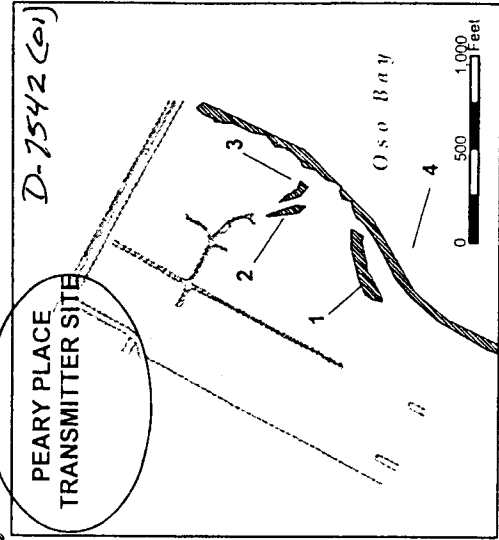
Corpus Christi Bay



D-7454(01)



D-7540(01)



PEARY PLACE  
 TRANSMITTER SITE

D-7542(01)

SHEET 2 OF 3

Table 1. Area and acreage of wetlands at NAS Corpus Christi.

Wetlands Area	Acreage	Wetlands Area	Acreage
<b>Main Installation</b>			
A-1/A-2	0.6	92-1	28.9
A-3	3.0	92-2	5.7
A-4	1.4	92-3	49.1
B	4.5	92-4	4.8
C	3.9	92-5	15.3
D	11.9	92-6	8.6
E	14.8	92-7	0.5
F	30.3	92-8	0.7
		92-9	2.9
<b>Peary Place</b>			
1	0.54	3	0.67
2	0.12	4	3.00
<b>NALF Cabaniss</b>			
1	0.25	6	16.22
2	2.54	7	0.38
3	2.15	8	0.78
4	1.95	9	0.03
5	0.54	10	3.44

D-7542(01)  
 SHEET 3 OF 3  
 NAVAL AIR STATION  
 PEARY PLACE  
 NUECES CO., TX

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Naval Air Station Corpus Christi		File Number: D-7542(01)	Date: 9 June 2004
Attached is:		See Section below	
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)	A	
	PROFFERED PERMIT (Standard Permit or Letter of Permission)	B	
	PERMIT DENIAL	C	
	APPROVED JURISDICTIONAL DETERMINATION	D	
X	PRELIMINARY JURISDICTIONAL DETERMINATION	E	

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/> or Corps regulations at 33 CFR Part 331.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved jurisdictional determination (JD) or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:  
Lloyd Mullins, Unit Leader  
U.S. Army Corps of Engineers, CESWG-PE-RCC  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318  
Telephone 361-814-5847; FAX 361-814-5912

If you only have questions regarding the appeal process you may also contact:  
James E. Gilmore, Appeal Review Officer  
CESWD-ETO-R, 1100 Commerce Street  
Dallas, Texas 75242-0216  
Telephone: 214-767-2457; FAX 214-767-9021  
Email: [James.E.Gimore@swd02.usace.army.mil](mailto:James.E.Gimore@swd02.usace.army.mil)

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or authorized agent.	Date:	Telephone number:
--	-------	-------------------



DEPARTMENT OF THE ARMY  
GALVESTON DISTRICT, CORPS OF ENGINEERS  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318

REPLY TO  
ATTENTION OF

June 9, 2004

Regulatory Branch

SUBJECT: D-7541(01)

Mr. Carlos Swonke  
Turner Collie and Braden, Inc.  
400 West 15<sup>th</sup> Street, Suite 500  
Austin, TX 78701

Dear Mr. Swonke:

This concerns your March 12, 2004 written request for a Corps of Engineers re-verification of a past jurisdictional determination, D-7541, for land located within the Naval Air Station, auxiliary landing at Waldron Field, Corpus Christi, Nueces County, Texas. The Waldron Field installation encompasses approximately 851 acres and is more or less bounded by Yorktown Boulevard, Flour Bluff Drive and Waldron Road.

A review of aerial photography, Natural Resource Conservation Service maps, and topographic maps indicate that there are no areas on this tract that are considered to be waters of the U.S. subject to regulation pursuant to Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbor Act.

This preliminary jurisdictional determination is valid for 5 years from the date of this letter unless new information warrants a revision of the determination prior to the expiration date. Please reference determination number **D-7541(01)** in future correspondence pertaining to this subject.

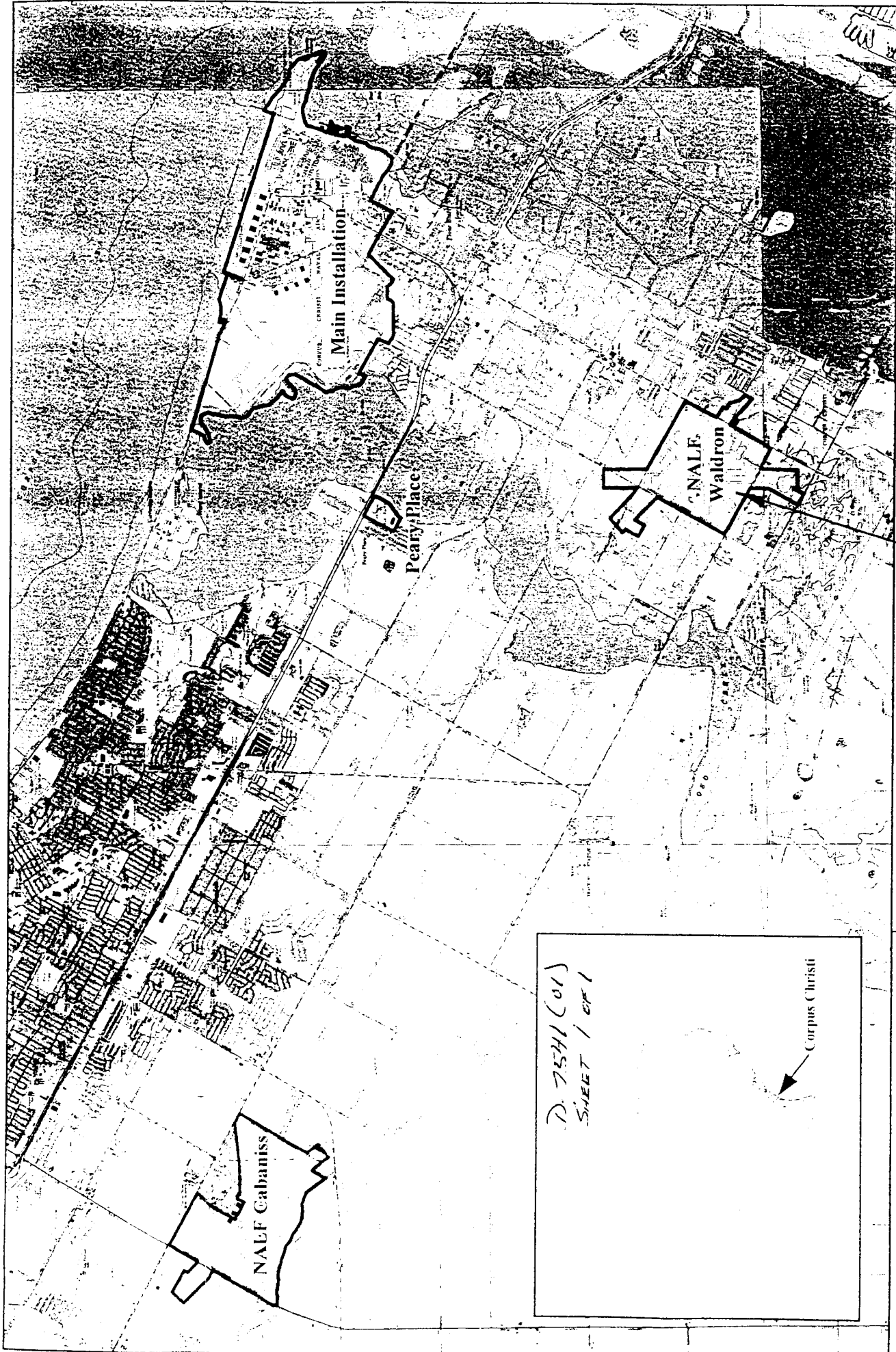
Thank you for contacting our office and please do not hesitate to contact John Wong or myself at the letterhead address or by telephone at 361-814-5847 should you have any questions.

Sincerely,

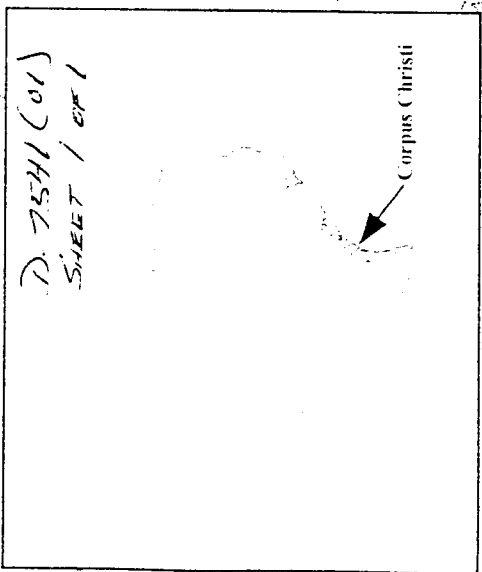
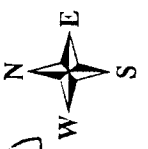
A handwritten signature in black ink, appearing to read "Lloyd Mullins".

Lloyd Mullins  
Unit Leader  
Corpus Christi Regulatory Office

Enclosures



**Figure 1**  
**Site Location Map**  
 Naval Air Station Corpus Christi  
 Nueces County, Texas



- Legend**
- Naval Air Station Boundary

**TurnerCollie & Braden Inc.**

Note: TurnerCollie & Braden does not warrant the accuracy of this map, either in scale or completeness. Source: USGS 7.5 minute Topographic Quadrangle of Nueces County, Texas, dated 1989.

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Naval Air Station Corpus Christi	File Number: D-7541(01)	Date: 9 June 2004
Attached is:		See Section below
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of Permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg/> or Corps regulations at 33 CFR Part 331.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved jurisdictional determination (JD) or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.



**SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION:**

If you have questions regarding this decision and/or the appeal process you may contact:  
Lloyd Mullins, Unit Leader  
U.S. Army Corps of Engineers, CESWG-PE-RCC  
Corpus Christi Regulatory Field Office  
5151 Flynn Parkway, Suite 306  
Corpus Christi, Texas 78411-4318  
Telephone 361-814-5847; FAX 361-814-5912

If you only have questions regarding the appeal process you may also contact:  
James E. Gilmore, Appeal Review Officer  
CESWD-ETO-R, 1100 Commerce Street  
Dallas, Texas 75242-0216  
Telephone: 214-767-2457; FAX 214-767-9021  
Email: [James.E.Gimore@swd02.usace.army.mil](mailto:James.E.Gimore@swd02.usace.army.mil)

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or authorized agent.	Date:	Telephone number:
--	-------	-------------------



# **APPENDIX K**

## **INRMP Project Data**

This page intentionally left blank.

**Table K-1. NASCC INRMP Projects.**

PROJECT NO.	PROJECT DESCRIPTION	INRMP PAGE REF.	SCHEDULED IMPLEMENTATION (FY)	PRIME LEGAL DRIVER <sup>1</sup>	FUNDING PRIORITY <sup>2</sup>	ENVIRONMEN. READINESS LEVEL <sup>3</sup>	GUIDEBOOK NUMBER <sup>4</sup>	FUNDING SOURCE <sup>5</sup>	NEPA REQUIREMENT
1	Biological Inventory		2019 - 2028	3, 8	M	4	12101	ENV, STA	No
2	Rare, Threatened and Endangered Species Habitat Management		2019 - 2028	3, 8	M	4	12104	ENV	No
3	Invasive Species Control		2019 - 2028	1, 9	M	4	12106	ENV, STA	No
4	NASCC INRMP Updates		2019 - 2028	2	M	4	12103	ENV	No
5	Prescribed Fire Management		2019 - 2028	8	M	N/A	N/A	FR, FOR	No
6	Neotropical Migratory Bird Survey		2019 - 2028	3, 5, 8	M	4	N/A	ENV	No
7	Habitat Management and Restoration		2019 - 2028	3, 8	M	4	12104	ENV, STA, AO, LY	No
8	Natural Resources Outreach		2019 - 2028	8	S	3	12999	ENV	No
9	Marine Resources Survey		2019 - 2028	3, 8	M	4	12104	ENV	No

<sup>1</sup> (1) 7 USC 2814 Federal Noxious Weed Act  
 (2) 16 USC 670a-f Sikes Act Improvement Act  
 (3) 16 USC 1531 & 1536 Endangered Species Act  
 (4) 33 USC 1251 Clean Water Act (not used in table)  
 (5) 16 USC 703 Migratory Bird Treaty Act  
 (6) 16 USC 2912 North American Wetlands Conservation Act (not used in table)  
 (7) 16 USC 590A  
 (8) 32 CFR 190  
 (9) EO 13112  
 (10) EO 12962  
 (11) EO 11990  
 Soil and Water Conservation Act (not used in table)  
 Natural Resources Management Program  
*Invasive Species*  
*Recreational Fisheries* (not used in table)  
*Wetlands Protection* (not used in table)

<sup>2</sup> M = Mandatory Project; S = Stewardship Project

<sup>3</sup> From the EPRWeb Guidebook

<sup>4</sup> From Chapter 12 of the EPRWeb Guidebook

<sup>5</sup> AO = Agricultural Outlease  
 ENV = Environmental O&MN  
 FOR = Forestry  
 FR = Forestry Reserve

LY = Legacy  
 MWR = Morale, Welfare, and Recreation (not used in table)  
 NRR = Natural Resources Reserve (not used in table)  
 STA = Station O&MN

**PROJECT NO. 1:                    BIOLOGICAL INVENTORY**

- Purpose:** Monitor the status and population of rare, threatened, and endangered plant and animal species, as well as natural communities, present at NASCC.
- Goal and Objective:** Goal 1, Objective 1.13 – Provide adequate special management or protection of threatened, endangered, and rare plant and animal species, including marine species; significant rare communities; and at-risk plant and wildlife species and their habitats.
- Location:** Installation-wide.
- Description:** FY 2022 biological surveys will update the biological survey and accomplish the biological inventory necessary for INRMP updates and revisions. Inventories will include rare, threatened, and endangered plants and animals.
- Baseline:** Existing, most recent surveys.
- Monitoring:** The monitoring components of this project will determine the need for activities to be carried out under Project No. 2, Rare, Threatened, and Endangered Species Habitat Management.
- Legal Drivers:** Endangered Species Act, 16 USC 1531 et seq.; Natural Resources Management Program, 32 CFR 190; Sikes Act, as amended 16 USC 670 a-o; Migratory Bird Treaty Act, as amended, 16 USC 703 et seq.; Fish and Wildlife Conservation Act, 16 USC 2901; and OPNAVINST 5090.1D.
- Accomplishments:** NASCC conducted a comprehensive biological inventory in 2005-06 of mammals, herps, birds, and freshwater fish on the main station, NALF Waldron, NALF Cabaniss, and the Perry Place transmitter site<sup>1</sup>. A survey of vegetation, mammals, and birds was conducted at NOLF Goliad in 2011-12<sup>2</sup>. A bat survey was initiated in 2019.

---

<sup>1</sup> Hickman, G.C., A.S. Baxter, and H.T. Gallo. 2007. Species inventory update at NAS Corpus Christi, Texas, including NALF Waldron, NALF Cabaniss, and the Perry Place transmitter site. Prepared for NAVFAC Southdiv. Prepared by Texas A&M-Corpus Christi, Corpus Christi, Texas.

<sup>2</sup> Lehman, R.L., G.C. Hickman, L.M. Rhyne, and K. Bowers. 2012. Biological survey for Naval Outlying Field (NOLF) Goliad, Goliad, Texas. Prepared for the U.S. Navy. Prepared by Texas A&M University-Corpus Christi. Corpus Christi, Texas. 94 pp.

**PROJECT NO. 2: RARE, THREATENED, AND ENDANGERED SPECIES  
HABITAT MANAGEMENT**

- Purpose:** Conduct management and implement projects to enhance habitat for rare, threatened, and endangered species, as well as other wildlife and natural communities.
- Goal and Objective:** Goal 1, Objective 1.13 – Provide adequate special management or protection of threatened, endangered and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.
- Location:** Installation-wide.
- Description:** This project will enhance, protect, and modify species habitat and resources for rare, threatened, and endangered plants and animals throughout NASCC properties. Numerous natural community and habitats improvements are included in this project, including conducting prescribed burns in coastal prairie, non-fire brush removal, and limiting access to sensitive areas, among others.
- Baseline:** Existing biological inventories and management activities.
- Monitoring:** Results of specific projects will be monitored as needed. Formal monitoring will be conducted through Project No. 1, Biological Inventory.
- Legal Drivers:** Natural Resources Management Program, 32 CFR 190; Endangered Species Act, 16 USC 1531 et seq.; Conservation Programs on Military Installations (Sikes Act) as amended, 16 USC 670 (a) et seq.; Fish and Wildlife Conservation Act, 16 USC 2901 et seq.; Executive Order (EO) 11990 – *Wetlands Protection*; EO 13112 – *Invasive Species*; and OPNAVINST 5090.1D.
- Accomplishments:** An abundance survey of the maritime pocket gopher was carried out at NAS Corpus Christi and NOLF Waldron between 2005 and 2007. The resulting report provides guidance for managing maritime pocket gophers on these properties<sup>3</sup>. A genetic study of pocket gophers on NASCC was conducted in 2009-10. The subspecies *G.*

---

<sup>3</sup> Cortez, J.D., S.E. Henke, T.E. Fulbright, E. Redeker, D. Wiemers. 2007. Study and management plan for the maritime pocket gopher at Naval Air Station Corpus Christi. Prepared for U.S. Navy. Prepared by Texas A&M University-Kingsville. Kingsville, Texas.

*p. maritimus*, a listed State Species of Concern, was identified on NASCC<sup>4</sup>.

A piping plover survey took place between August 2013 and April 2014. Piping plovers were observed only in Critical Habitat Unit TX-12 and were most abundant in April<sup>5</sup>.

An RTE species survey in 2014-15 determined the presence of two state-listed reptiles, Texas tortoise (*Gopherus berlandieri*) and Texas indigo snake (*Drymarcon melanurus erebennus*) as well as 142 avian species, six amphibians, and 15 other reptiles<sup>6</sup>.

---

<sup>4</sup> Henke, S.E., A. Lund, D. Williford, R. DeYoung, C. Wineberger, J. Trantham, and N.L. Mitton. 2010. Genetic structure and phylogenetic relationships among pocket gophers (*Geomys*) in southern coastal Texas. Prepared for U.S. Navy. Prepared by Texas A&M University-Kingsville, Kingsville, Texas.

<sup>5</sup> Withers, Kim. 2014. Spatial and temporal abundance of non-breeding piping plovers within designated critical habitat associated with Naval Air Station-Corpus Christi (Texas Units 11 and 12). Prepared for NAS Corpus Christi. Prepared by Texas A&M University-Corpus Christi, Corpus Christi, Texas.

<sup>6</sup> GSRC. 2015. Rare, threatened, and endangered species survey report, Naval Air Station Corpus Christi, Texas. Prepared for NAVFAC Southeast. Prepared by GSRC, Baton Rouge, Louisiana.



**PROJECT NO. 3:                    INVASIVE SPECIES CONTROL**

**Purpose:** Control invasive and exotic plant species at NASCC to acceptable levels to promote native ecosystems.

**Goal and Objective:** Goal 1, Objective 1.7 – Maintain and enhance native vegetation to promote community diversity and to control and monitor noxious, invasive and exotic plant species.

**Location:** Installation-wide.

**Description:** This project will focus on controlling invasive and exotic plant species and protecting and enhancing native ecosystems. This project will identify invasive plant species, map their locations, provide GIS map layers, and provide recommendations and a schedule for control. A combination of chemical and mechanical methods will be used to control and eradicate invasive species. This project supports habitat protection for protected species such as the federally threatened piping plover.

**Baseline:** Baseline will be established during the survey phase of the project.

**Monitoring:** Previously treated areas will be monitored annually to determine the effectiveness of the implemented removal methods. An inventory will be conducted every three (3) years to ensure no new establishment of invasive and exotic species and to determine new areas requiring treatment.

**Legal Drivers:** Federal Noxious Weed Act of 1974, 7 USC 2801, Sec. 2814 (a); EO 13112 – *Invasive Species*; Department of Defense (DoD) Pest Management Program; Endangered Species Act, 16 USC 1531 et seq.; Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 USC 136; and OPNAVINST 5090.1D.

**Accomplishments:** An invasive plant management plan was developed in 2005 to map infestations of guineagrass, Brazilian pepper, chinaberry and Chinese tallow on NASCC properties, determine environments preferred by those four invasive species, determine the efficacy of select herbicides in managing infestations of the species, and develop a management plan for use in reducing invasive plant infestations and invasions. Another survey was completed in 2016<sup>7</sup>,

---

<sup>7</sup> Texas A&M. 2017. Invasive, exotic vegetation survey and management recommendations, Naval Air Station Corpus Christi. Prepared for NAS Corpus Christi. Prepared by Texas A&M Natural Resources Institute, San Antonio, Texas.

and 14 acres of coastal habitat was treated in 2017 and Brazilian pepper was targeted across 8 acres in 2018.

Invasive species control continues at NASCC, although all efforts are not necessarily funded by this project; some have been funded by Project 7.

**PROJECT NO. 4: NASCC INRMP UPDATES**

**Purpose:** Ensure the NASCC INRMP is kept current and reflects: Installation and Regional management direction, current projects, new natural resources information, current regulatory concerns and policies, and mission requirements.

**Goal and Objective:** Goal 3, Objective 3.4 – Establish a planning team to review and update the INRMP in accordance with OPNAVINST 5090.1D.

**Location:** Installation-wide.

**Description:** In accordance with OPNAVINST 5090.1D, the INRMP is reviewed on a yearly basis and re-approved every five (5) years. The review process will take into account changes in military mission requirements, legal mandates and information obtained from monitoring programs and surveys. Data from species surveys will be incorporated into the INRMP as soon as possible upon acquisition. INRMP updates will document survey results and add newly listed species and their habitat requirements, as well as management actions herein that benefit and conserve the species and their habitats. Revisions will be reviewed for consistency with the military mission, federal and state laws, and ecosystem management goals and objectives of the INRMP.

The revision process will be conducted under the direction of the NASCC CO; and revisions will require consultation with and approval by the NASCC CO, the NASCC NRM, the NRM of the Engineering Field Division (EFD), the USFWS, and the TPWD.

**Baseline:** Existing INRMP; current surveys.

**Monitoring:** N/A

**Legal Drivers:** Conservation Programs on Military Installations (Sikes Act) as amended, 16 USC 670 (a) et seq.; DoD Instructions (DoDI) 7310.5, Accounting for Production and Sale of Forest Products; OPNAVINST 5090.1D; USMC-MCO P5090.2.; and National Environmental Policy Act (NEPA) of 1969, 42 USC 4321 et seq.

**Accomplishments:** The NASCC INRMP is reviewed annually with conservation partners. It was last updated and reviewed for operation and effect in 2019 to align the document with OSD guidance and partner recommendations, and ensure all federally-listed, proposed, and petitioned species are included in the document. Further updates are completed on an annual basis, primarily to ensure these objectives are maintained.

**PROJECT NO. 5:                    PRESCRIBED FIRE MANAGEMENT**

- Purpose:** This project provides for the equipment necessary to conduct prescribed burns. Prescribed fire is a management tool for many of the INRMP goals and objectives.
- Goal and Objective:** Goal 1, Objective 1.6 – Maintain vegetation to reduce wildland fire hazards.
- Location:** Urban forest prescription precautions will be in effect when burning close to base housing, administrative areas, and training areas. Wildfire control will be administered where needed.
- Description:** Develop a burn plan for NASCC to include identification of areas of NASCC where prescribed burns should be conducted “as needed”. BASH Program requirements, airfield operations and adjacent properties will be considered when developing the burn plan. Conduct prescribed burns as recommended in the NASCC burn plan.
- Baseline:** NASCC, in coordination with NAVFAC Southeast, will update the Fire Management Information System to serve as the baseline for all prescribed burn work.
- Monitoring:** Annual review of burn units to determine necessary program changes.
- Legal Driver:** Natural Resources Management Program, 32 CFR 190.
- Accomplishments:** NASCC burned approximately 20 acres in 2010-11 for an unexploded ordnance clearing operation.

**PROJECT NO. 6: NEOTROPICAL MIGRATORY BIRD SURVEY**

**Purpose:** Determine neotropical migratory bird species at NASCC and potential migratory bird management practices. Neotropical migratory birds are those species that breed in North America and winter in the Neotropics (Central and South America).

**Goal and Objective:** Goal 1, Objective 1.13 – Provide adequate special management or protection of threatened, endangered, and rare plant and animal species; significant rare communities; and at-risk plant and wildlife species and their habitats.

**Location:** Installation-wide.

**Description:** NASCC completes neotropical migratory bird inventory approximately every five years, particularly during spring and fall migrations. This project will include GIS data layers as a product of the final report.

The DoD is an active participant in international bird conservation partnerships including Partners in Flight (PIF) and the North American Bird Conservation Initiative (NABCI). NASCC may have high quality habitat for migratory bird species of concern, and this project will provide valuable data that could be used by DoD as it continues its leadership role in bird conservation partnerships.

**Baseline:** None.

**Monitoring:** Existing, most recent surveys.

**Legal Drivers:** Migratory Bird Treaty Act, 16 USC 703; Natural Resources Management Program, 32 CFR 190; Fish and Wildlife Conservation Act, 16 USC 2901; Endangered Species Act, 16 USC 1531 et seq.; DoDI 4715.03, Natural Resources Conservation Program; Sikes Act, as amended, 16 USC 670 a-o; and OPNAVINST 5090.1D.

**Accomplishments:** A wintering bird survey was funded by this project in 2016-17<sup>8</sup>. Other bird surveys have been accomplished at NASCC by other means. A Legacy project funded a USGS survey of wintering grassland birds at NASCC and NOLF Waldron between 2003 and

---

<sup>8</sup> Texas A&M. 2018. Avian survey, Naval Air Station Corpus Christi. Prepared for NAS Corpus Christi. Prepared by Texas A&M Natural Resources Institute, San Antonio, Texas.

2008<sup>9</sup>. Birds were included in the 2011-12 biological survey at NOLF Goliad under Project 1.

---

<sup>9</sup> Woodin, M.C., Skoruppa, M.K., Pearce, B.D., Ruddy, A.J., and Hickman, G.C. 2010. Grassland birds wintering at U.S. Navy facilities in southern Texas: U.S. Geological Survey Open-File Report 2010-1115. 48 pp. with appendices.

**PROJECT NO. 7: HABITAT MANAGEMENT AND RESTORATION**

**Purpose:** Enhance wildlife habitat at NASCC using mechanical or chemical brush control methods.

**Goal and Objective:** Goal 1, Objective 1.1 – Manage, maintain, and enhance land areas with natural resources value, and maintain ecological function.

Goal 1, Objective 1.9 – Manage natural habitats to promote use by a diverse range of wildlife species, including protection of mature tree stands and snags; protection of plant species that provide suitable nesting and foraging habitat for wildlife; and maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.

**Location:** Complex-wide.

**Description:** Conduct a survey of ecosystems associated with the installation properties including oak-redbay, coastal prairie, tidal flats, dunes, and wetlands.

**Baseline:** None.

**Monitoring:** Results of specific projects will be monitored as needed.

**Legal Drivers:** Natural Resources Management Program, 32 CFR 190; Fish and Wildlife Conservation Act, 16 USC 2901; Endangered Species Act, 16 USC 1531 et seq.; DoDI 4715.03, Natural Resources Conservation Program, Sikes Act, as amended, 16 USC 670 a-o; and OPNAVINST 5090.1D.

**Accomplishments:** A survey for black-spotted newts was carried out at the golf course ponds in November 2010. No specimens were captured<sup>10</sup>.

Another project was initiated in 2014 to carry out herbicide treatment of invasive and exotic plant species at NASCC, particularly of Brazilian pepper. Eighteen acres of wetland were improved in the spring of 2018<sup>11</sup>.

---

<sup>10</sup> Labella, L. 2011. A survey for the Black Spotted Newt at Naval Air Station (NAS) Corpus Christi, NAS Kingsville, and Navy Auxiliary Landing Field (NALF) Orange Grove. Prepared by NAVFAC Southeast.

<sup>11</sup> Texas A&M. 2018. Naval Air Station Corpus Christi habitat enhancement. Prepared for NAS Corpus Christi. Prepared by Texas A&M Natural Resources Institute, San Antonio, Texas.

**PROJECT NO. 8: NATURAL RESOURCES OUTREACH**

**Purpose:** Educate installation staff and the general public about the natural resources found at NASCC.

**Goal and Objective:** Goal 3, Objective 3.3 – Implement training, education, and stewardship initiatives for ecosystems management.

Goal 3, Objective 3.5 – Promote educational awareness of NASCC natural resources and the importance of natural resources stewardship.

**Location:** Complex-wide.

**Description:** NASCC will develop materials for informational signage, self-guided educational programs and guided instruction on nature trails and wildlife viewing areas at NASCC properties.

**Baseline:** None.

**Monitoring:** N/A

**Legal Drivers:** Natural Resources Management Program, 32 CFR 190 and OPNAVINST 5090.1D.



**PROJECT NO. 9: MARINE RESOURCES SURVEY**

**Purpose:** Survey and characterize nearshore aquatic life and benthic habitats at NAS Corpus Christi.

**Goal and Objective:** Goal 1, Objective 1.9 – Manage natural habitats to promote use by a diverse range of wildlife species, including maintenance of wildlife travel corridors, wetland protection, and aesthetic buffer zones.

**Location:** NAS Corpus Christi.

**Description:** This project supports species and habitat conservation during waterfront maintenance and repair activities at NAS Corpus Christi. This has become more important as rising sea levels and intense tropical storms compromise the integrity of seawalls and natural shorelines. This project will survey and characterize nearshore aquatic life and benthic habitats to support ESA Section 7 consultations, essential fish habitat (EFH) assessments, and MMPA consultations.

**Baseline:** Pre-existing surveys.

**Monitoring:** 3-to-5 year intervals.

**Legal Drivers:** Natural Resources Management Program, 32 CFR 190; Endangered Species Act, 16 USC 1531 et seq.; Conservation Programs on Military Installations (Sikes Act) as amended, 16 USC 670 (a) et seq.; Fish and Wildlife Conservation Act, 16 USC 2901 et seq.; Executive Order (EO) 11990 – Wetlands Protection; EO 13112 – Invasive Species; and OPNAVINST 5090.1D.

This page intentionally left blank.

**APPENDIX L**  
**Biological Survey Reports and  
Environmental Assessments**

This page intentionally left blank

\*The titles below are presented chronologically, rather than alphabetically by author.

Wolfe, D., W. Carr, T. Ettel, T. Cook, and M. Goering. 1998. Survey of rare, threatened, and endangered plants and animals at the Corpus Christi Naval Air Station. Prepared for NAS Corpus Christi. Prepared by The Texas Conservation Data Center and The Nature Conservancy of Texas.

Department of the Navy. 2001. Final Environmental Assessment for the Implementation of an Integrated Natural Resources Management Plan at Naval Air Station Corpus Christi, Texas.

Cortez, J.D., S.E. Henke, T.E. Fulbright, E. Redeker, D. Wiemers. 2007. Study and Management Plan for the Maritime Pocket Gopher at Naval Air Station Corpus Christi. Caesar Kleberg Wildlife Research Institute at Texas A&M University – Kingsville.

Hickman, G.C., A.S. Baxter, and H.T. Gallo. 2007. Species inventory update at NAS Corpus Christi, Texas, including NALF Waldron, NALF Cabaniss, and the Perry Place transmitter site. Prepared for NAS Corpus Christi. Prepared by Texas A&M University – Corpus Christi. Corpus Christi, Texas.

Wiemers, D., T.E. Fulbright, W. Kuvlesky, A. Ortega-S., and G.A. Rasmussen. 2007. Management plan for controlling invasive exotic plants at Naval Air Station Corpus Christi. Prepared for NAS Corpus Christi. Prepared by Texas A&M University-Kingsville. Kingsville, Texas.

Department of the Navy. 2009. Final Environmental Assessment of Naval Air Station Corpus Christi, Texas for Compatibility with the T-6 Joint Primary Aircraft Training System.

Henke, S.E., A. Lund, D. Williford, R. De ousing, C. Wineberger, J. Trantham, and N. L. Mitton. 2010. Final Report: Genetic Structure and Phylogenetic Relationships Among Pocket Gophers (Geomys) in Southern Coastal Texas. Texas A&M University – Kingsville.

Woodin, M.C., M.K. Skoruppa, B.D. Pearce, A.J. Ruddy, and G.C. Hickman. 2010. Grassland birds wintering at U.S. Navy facilities in southern Texas. Prepared for Department of the Navy. Prepared by Department of the Interior and U.S. Geological Society in cooperation with Texas A&M University-Corpus Christi.

Labella, L. 2011. Survey for the black-spotted newt at NAS Kingsville, NAS Corpus Christi, and NALF Orange Grove. Prepared for NAS Corpus Christi. Prepared by NAVFAC SE. Jacksonville, Florida.

Lehman, R.L., G.C. Hickman, L.M. Rhyne, and K. Bowers. 2012. Biological survey for Naval Outlying Field (NOLF) Goliad, Goliad, Texas<sup>1</sup>. Prepared for NAS Corpus Christi. Prepared by Texas A&M University-Corpus Christi. Corpus Christi, Texas.

---

<sup>1</sup> In 2013, Herpetofauna and Fish appendices were added to the 2012 Goliad report.

This page intentionally left blank