Cover Page

U. S. AIR FORCE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Avon Park Air Force Range
598th Range Squadron

(See INRMP signature pages for plan approval date)

About This Plan

This installation-specific Environmental Management Plan (EMP) is based on the United States Air Force's (USAF) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which includes Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); Department of Defense Instructions (DoDIs); USAF Playbooks; federal, state, and local requirements; Biological Opinions; and permits are referenced.

Certain sections of this INRMP begin with standardized, USAF-wide "common text" language that address USAF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the USAF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by the approved plan owner.

NOTE: The terms "Natural Resources Manager," "NRM," and "NRM/POC" are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DoDI 4715.03, Natural Resources Conservation Program.

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Document Control

Standardized INRMP Template

In accordance with (IAW) the Air Force Civil Engineer Center (AFCEC) Environmental Directorate (CZ) Business Rule (BR) 08, EMP Review, Update, and Maintenance, the standard content in this INRMP template is reviewed periodically, updated as appropriate, and approved by the Natural Resources Subject Matter Expert (SME).

This version of the template is current as of 06/26/2020 and supersedes the 2018 version.

NOTE: Installations are not required to update their INRMPs every time this template is updated. When it is time for installations to update their INRMPs, they should adopt the most recent version of this template available in the Plan Tool.

Installation INRMP

Record of Review – The INRMP is updated no less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. IAW the Sikes Act and AFMAN 32-7003, Environmental Conservation, the INRMP is required to be reviewed for operation and effect no less than every five years. An INRMP is considered compliant with the Sikes Act if it has been approved in writing by the appropriate representative from each cooperating agency within the past five years. Approval of a new or revised INRMP is documented by signature on a signature page signed by the Installation Commander (or designee), and a designated representative of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries when applicable (AFMAN 32-7003).

Annual reviews and updates are accomplished by the installation Natural Resources Manager (NRM), and/or a Section Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the Section Natural Resources Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of USFWS, state fish and wildlife agency, and NOAA Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signing the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans.

INRMP Approval/Signature Pages

Integrated Natural Resources Management Plan Review

Avon Park Air Force Range (APAFR), FL

Fiscal Year 2022

This Integrated Natural Resources Management Plan (INRMP) had been prepared and implemented in accordance with regulations, standards, and procedures of the Department of Defense and the United States Air Force (USAF) in cooperation with the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC). The signatures below indicate the mutual agreement of the parties concerning the conservation, protection and management of fish and wildlife resources as presented in this plan.

Plan Approval

_____ _____

Michael S. Ryan
Lieutenant Colonel, USAF
Command, 598th RANS

Date

Agency Agreement

_____ _____

Constance L. Cassler
Conservation Delivery Division Manager
U.S. Fish and Wildlife Service
Vero Beach, FL

Date

_____ _____

Eric Sutton
Executive Director
Florida Fish and Wildlife
Conservation Commission
Tallahassee, Florida

Date

Executive Summary

The purpose of this Integrated Natural Resources Management Plan (INRMP) is to provide interdisciplinary strategic guidance for the conservation and management of the vast array of diverse and unique natural resources at Avon Park Air Force Range (APAFR). The primary objective of the AF's Natural Resources Program is to ensure continued access to land and airspace required for the AF mission while sustainably managing natural resources and preserving ecological processes and natural habitat conditions. To ensure that natural resources management and other mission activities are integrated and in agreement with federal mandates, the INRMP is prepared in cooperation with the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC).

This INRMP is a living document and utilizes an adaptive ecosystem management approach to sustain and enhance natural resources at APAFR. This means it must be flexible and capable of adapting and implementing new methods and processes as needed over time. In implementing projects to achieve the objectives in the plan, assumptions leading to management decisions are based on the latest scientific research, past experience, staff knowledge and input from stakeholders. As projects are implemented under this plan, the results will be monitored and compared with the initial assumptions. It is likely that some assumptions will be shown to be invalid, and appropriate changes will be made to projects when necessary. This adaptive approach allows resource managers to make changes in a timely fashion to both preserve natural resources and ensure mission flexibility and sustainability.

APAFR contains a diverse array of natural areas and represents a valuable link in a chain of public lands that stretches through central Florida. These public lands function as intact, unique ecosystems and biological refugia in a state experiencing rapid population growth and development. Public lands offer a great opportunity to preserve natural areas where the diversity of species reflect the historical landscapes found in Florida.

Under the philosophy of adaptive ecosystem management, the focus of this plan will be to maintain, restore and enhance native biodiversity and ecosystem types across their natural range. This landscape level ecological approach will blend the needs of the military mission with the health of the environment to ensure the ecosystems of APAFR are diverse, productive and sustainable. The major goals identified for this plan are:

- Maintain or restore ecosystem composition, structure, and function within a natural range of variability, with special emphasis on rare or endemic communities such as cutthroat grass seepage slopes, pine flatwoods, Florida dry and wet prairies, scrub, sandhill, and other imperiled communities unique to Florida.
- Utilize ecological processes such as fire as the primary tool for restoring ecosystems, focusing primarily on lightning season burns where practical and consistent with the military mission.
- Manage or restore hydrological function of floodplains, groundwater, lakes, riparian areas, springs, swamps, streams and wetlands to protect or ensure their quality and individual values and functions.
- Conserve, protect, and recover endangered and threatened species.
- Ensure continued access and flexibility for military training by implementing an Environmental Impact Analysis Process (EIAP) that facilitates the planning and coordination of military activities while promoting military readiness, ensuring no net loss of military missions, and minimizing ecological impacts.
- Use an aggressive and integrative approach to encourage diverse participation with regional partners, including other DoD components, as well as other federal, state and local agencies and adjoining landowners.
- Provide for public utilization (e.g. hunting, fishing, trapping), agricultural production and sustainable silvicultural practices, while ensuring that such use does not impair long-term ecosystem function or negatively impact the installation's or AF mission.

- Continue to identify the presence of exotic and invasive species, and implement programs to detect and control those species within the installation. Develop installation-specific and joint control strategies with other federal, state, and local cooperating agencies and adjacent landowners to increase the effectiveness of control measures.

The INRMP is a programmatic document that sets a framework for achieving the desired future condition of the land. It is not a list of projects, nor is it merely a compilation of operational plans, such as wildfire management or species recovery plans. A programmatic document points the way to the future destination, describing the direction to go and providing standards as signposts, but leaves the land manager the freedom not only to decide which road to take to get there, but also to adapt to a new route. This INRMP indicates a change in natural resource management from previous versions with a change in how several programs are managed including agricultural outleasing, forestry management, outdoor recreation and hunting. It also reflects the changes that are needed to implement a successful adaptive ecosystem management program and includes new management approaches for a recently found federally endangered bat and updated management for existing threatened and endangered species.

1 Overview and Scope

This INRMP was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the United States Air Force. They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of Air Force adaptability in all environments. The Air Force has stewardship responsibility over the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the Air Force natural resources program is to sustain, restore and modernize natural infrastructure to ensure operational capability and no net loss in the capability of AF lands to support the military mission of the installation. The plan outlines and assigns responsibilities for the management of natural resources, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act is the legal driver for the INRMP.

1.1 Purpose and Scope

This INRMP is a road map for natural resources management of the 598th Range Squadron (598 RANS) located at APAFR, Florida. It is based on an interdisciplinary approach to adaptive ecosystem management and input from a wide variety of operational organizations on APAFR as well as various local, state and Federal agencies. The INRMP is a required document for Federal military installations with significant natural resources based on The Sikes Act Improvement Act of 1997, 16 U.S. Code (USC) § 670a *et seq.* , as amended. The USFWS and FWC were consulted during the development of this INRMP as regulatory agencies for Federal and state wildlife species. APAFR does not need to consult with the National Marine Fisheries Service (NMFS) as no portion of the installation occurs in a coastal ecosystem. APAFR will provide a realistic and sustainable training environment to meet military mission requirements while maintaining compliance with legal mandates for natural resource stewardship on federal, military, and public lands. APAFR has implemented an Environmental Management System, which provides additional oversight for installation activities.

The INRMP is an update from the previous document created in 2017. This update more accurately reflects the natural resource management and goals of APAFR and its environmental staff. The natural resource goals and objectives, found later in this document, are arranged hierarchically. The goals outline how APAFR will remain compliant with environmental regulations to ensure no net loss of military missions (Goal 1), restore landscapes to support native biodiversity (Goal 2), seek regional partnerships to increase mission flexibility (Goal 3), and provide support for revenue-driven opportunities (Goal 4). Objectives are included that support each goal and specific projects are defined within the objectives. Projects are written with an annual timeframe in mind.

These goals, objectives, and projects serve as a roadmap for natural resource management at APAFR. All goals, objectives, and projects will be implemented with an adaptive management process to provide continuous input and alterations as needed during their implementation. The INRMP describes a pathway for both the continued protection and proliferation of federally and state-listed threatened and endangered (T&E) species at APAFR and the continued success of APAFR as a military training facility. The INRMP is used by the installation's commander to help manage natural resources effectively across the installation.

1.2 Management Philosophy

The INRMP serves as a key component of the Installation Development Plan, which provides background and rationale for the policies and programming decisions related to land use, resource conservation, facilities and infrastructure development, and operations and maintenance. The INRMP supports the military mission at APAFR by identifying the natural resources present on the installation, developing management goals for these resources, and developing objectives within these management goals that meet both military requirements for mission operations/support and regulatory compliance within the installation. APAFR utilizes the INRMP to integrate several different management plans (e.g. Integrated Pest Management Plan, Wildland Fire Management Plan, Bird/Wildlife Aircraft Strike Hazard Plan) into a succinct and logical document.

This INRMP outlines the steps needed to fulfill compliance requirements related to natural resources management and also highlights environmental stewardship occurring on the installation. It is organized into the following principal sections:

- An overview of the current status and conditions of the natural resources
- Identification of potential impacts to or from natural resources
- The key natural resource management areas addressed
- Management recommendations that incorporate the installation's goals and objectives for natural resource management areas
- Specific work plans for effective implementation of the INRMP

Management issues and concerns, as well as goals and objectives, are developed from analysis of all the gathered information, and are reviewed by APAFR personnel involved with or responsible for various aspects of natural resources management. The INRMP was developed using an interdisciplinary approach and is based on existing information of the physical and biotic environments, mission activities, and environmental management practices at APAFR. Information was obtained from a variety of documents, interviews with installation personnel, on-site observations, and communications with both internal and external stakeholders (USFWS and FWC). Coordination and correspondence with these agencies is documented and satisfies a portion of the requirements of 32 Code of Federal Regulations (CFR) Part 989 – Environmental Impact Analysis Process (EIAP). Goals and objectives require monitoring on a continuous basis and management strategies are updated via an annual review process whenever there are changes in mission requirements, adverse effects to or from natural resources, or changes in regulations governing management of natural resources, or new requirements for federally listed species. These annual reviews are a large part of the adaptive management philosophy that APAFR utilizes for all levels of natural resource management.

1.3 Authority

INRMPs are required for all properties containing natural resources that are managed by or under the control of DoD and its component parts pursuant to DoD Instruction 4715.03, Air Force Policy Directive (AFPD) 32-70, AF Instruction (AFI) 32-7064, and the Sikes Act (16 USC 670 et seq.).

The Sikes Act is the cornerstone legislative mandate that provides for natural resources management on DoD lands and has been amended several times. The Sikes Act was enacted in 1960 to provide for cooperation among DoD, the USFWS, and State fish and wildlife agencies; and to authorize collection of hunting and fishing fees on military installations. In 1968, the Sikes Act was amended to provide for public outdoor recreation programs. In 1974, it was amended to require that natural resource plans provide for fish and wildlife habitat management, range rehabilitation and preservation of endangered species of fish, wildlife, and plants. In 1986, it was amended to require that DoD manage its wildlife and fishery resources with professionals trained in fish and wildlife management, to provide sustained multi- purpose use and public access, to review fish and wildlife plans on a regular basis but not less than once every five

years, and to ensure that any sale or lease of land or forest products be compatible with the fish and wildlife plan. In 1994, it was amended to improve the management of fish, wildlife, and other natural resources on military installations by requiring all installations to prepare and implement INRMPs, and for the Secretaries of Defense and Interior to submit annual reports to Congress on the status of, and amount of money expended on, implementation of these natural resource management plans. The Sikes Act Improvement Act of 1997 broadens the INRMP's scope to integrate natural resource management with installation operations and training, to be consistent with the installation's mission, to provide for no net loss in the capability of the installations lands to support the military mission, and to provide for broader cooperation between DoD, USFWS, and FWC while preserving mission sustainability, to the extent appropriate and applicable. As such, the conservation of natural resources and the military mission on APAFR are not mutually exclusive.

As required by AFPD 32-70, *Environmental Quality* (20 July 1994), and Department of Defense Instruction (DoDI) 4715.03, *Environmental Conservation Program* (3 May 1996), natural resources at APAFR will be managed through effective and timely planning integrated with the military mission. APAFR natural resource management staff will perform ecosystem management to protect natural landscape-level communities and their inhabitants. Ecosystem management on DoD lands relies on developing a collaborative vision of desired future ecosystem conditions that integrates ecological, economic, and social factors with the military mission (AFPD 32-70, July, 1994). The ecosystem approach differs from DoD natural resource management in the past that primarily centered on producing outputs (game species management) rather than on maintaining and restoring the natural communities that support an array of species, including game species, as well as T&E species.

AFI 32-7064, *Integrated Natural Resources Management* (18 November 2014) implements these directives by establishing the installation INRMP as the primary planning document for natural resources at AF installations. The INRMP assures compliance with Federal law, Executive Orders (EOs), DoD Instructions, and AFPDs as detailed in AFI 32-7064 and listed below.

- National Environmental Policy Act (NEPA) (42 USC 4321 *et seq*, PL 91-190)
- Endangered Species Act (ESA) (16 USC 1531)
- National Historical Preservation Act (NHPA) of 1966, 1974, 1986 (16 USC 470 *et seq*)
- Federal Water Pollution Control Act of 1977 (Clean Water Act (CWA)) (33 USC1251 *et seq*, as amended), and CWA as amended 1987.
- Clean Air Act (42 USC 7401 *et seq*, as amended)
- Fish and Wildlife Conservation Act of 1980 (16 USC 2901 *et seq*)
- Fish and Wildlife Coordination Act (16 USC 661)
- Sikes Act (16 USC 670 *et seq*)
- Archaeological Resources Protection Act of 1979 (16 USC 470a *et seq*)
- Native American Graves Protection and Repatriation Act (November 16, 1990) (Public Law 101-601; 25 U. S. C.3001-3013
- EO 11990 Protection of Wetlands (May 24, 1977)
- EO 11988 Floodplain Management (May 24, 1977)
- EO 11987, Exotic Organisms
- EO 13112 Invasive Species (Feb 13, 1999)
- EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds (January 17, 2001)
- EO 11989, Use of Off Road Vehicles on Public Lands (May 24, 1977)
- EO 11644, Use of Off Road Vehicles on Public Lands (Feb.8, 1972)
- EO 12898, Environmental Justice (February 11, 1994)
- Forest Management, Title 10 USC 2665
- Agricultural Outleasing, Title 10 USC 2667

- 40 CFR 1500, Council of Environmental Quality NEPA Regulations
- Federal Noxious Weed Act of 1974 (7 USC 2801 *et seq*)
- Migratory Bird Treaty Act of 1918 (16 USC 703-712; Ch.128; July 13, 1918; 40 Stat.755)
- DoDI 4715.03, Environmental Conservation Program (May 3, 1996)

Installation-Specific Policies (including State and/or Local Laws and Regulations)	

1.4 Integration with Other Plans

By its nature, the INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans help identify management priorities and potential impacts to natural resources. The INRMP is integrated with a number of 598 RANS plans including:

- **Integrated Pest Management Plan (IPMP) for 598 RANS** – The plan for management of pest and exotic species to minimize the impact to military missions, natural resources and installation structures.
- **Bird/Wildlife Aircraft Strike Hazard (BASH) Plan for 598 RANS** – The plan to control and minimize the collision potential between aircraft and wildlife in and within the immediate vicinity of APAFR airfield and bombing ranges.
- **Hazardous Waste Management Plan (HWMP) for 598 RANS** – The plan for procedures for management of hazardous waste.
- **Integrated Solid Waste Management Plan (ISWMP) for 598 RANS** – The plan for procedures of the management of solid waste at APAFR.
- **Integrated Cultural Resources Management Plan (ICRMP) for 598 RANS** – The plan to identify, document, inventory and protect all cultural resources on APAFR, and provide support for the mission of APAFR while maintaining compliance with all applicable cultural resource legislation.
- **Storm Water Pollution Prevention Plan for 598 RANS** – The plan to implement best management practices by APAFR personnel and tenants to minimize storm water pollution and impacts to water quality
- **Wildland Fire Management Plan (WFMD) for 598 RANS –** The plan for the implementation of prescribed and wildfire operations and suppression tactics occurring at APAFR. Includes the implementation of the new AF Wildland Fire Center.

Integration between the INRMP and the previously mentioned plans is crucial for the continued success of natural resource management at APAFR. The INRMP provides overall guidance, instruction for natural resource management and projects for natural resource management. Each plan details how those projects can be completed in much greater detail and specificity. All of these plans impact natural resources and must integrate and support the INRMP.

2 Installation Profile

Office of Primary Responsibility	Environmental Flight has overall responsibility for implementing the Natural Resources Management program and is the lead organization for monitoring compliance with applicable federal, state and local regulations
Natural Resources Manager/POC	Brent Bonner 863-452-4256 brent.bonner@us.af.mil
State and/or local regulatory POCs (For US-bases, include agency name for Sikes Act cooperating agencies)	Florida Fish and Wildlife Conservation Commission Angeline Barker District Wildlife Biologist 863-660-8028 Angeline.Barker@MyFWC. com United States Fish and Wildlife Service Robert Aldredge, Ph.D. Supervisory Fish and Wildlife Biologist 850-630-3131 robert_aldredge@fws.gov
Total acreage managed by installation	~106,000 acres
Total acreage of wetlands	54,300 acres
Total acreage of forested land	49,943 acres
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	RCW Translocation BO 2004 Florida Army National Guard (FLARNG) BO 2005 Critical Infrastructure Program (CIP) BO 2011 Integrated Natural Resources Management Plan (INRMP) BO 2013 Joint Integrated Fires Exercises (JIFE) BO 2015 Plant Collection BO 2015 Florida Grasshopper Sparrow (FGSP) BO 2016 820th Training BO 2018 Flaring HIMARS BO 2019 Upland Ridge Habitat Restoration BO 2019210480ac Range Operations Programmatic BO 2020 All Biological Opinions (BOs) are maintained on the APAFR network and at the USFWS Vero Beach Field Office.
NR Program Applicability (Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0)	✓ Invasive species ✓ Wetlands Protection Program ✓ Grounds Maintenance Contract/SOW ✓ Forest Management Program ✓ Wildland Fire Management Program ✓ Agricultural Outleasing Program ✓ Integrated Pest Management Program ✓ Bird/Wildlife Aircraft Strike Hazard (BASH) Program ▫ Coastal Zones/Marine Resources Management Program

	✓ Cultural Resources Management Program

2.1 Installation Overview

2.1.1 Location and Area

APAFR is an approximately 106,000-acre air-to-ground training installation located in south-central Florida on the eastern boundary of the Lake Wales Ridge ecosystem and the western portion of the Kissimmee River Valley ecosystem. It is located approximately 95 miles east of MacDill Air Force Base (AFB) and 85 miles southwest of the Orlando metro area.

The Kissimmee River, KICCO Wildlife Management Area (WMA), and River Ranch Property Owners Association form the eastern boundaries while the western boundary follows the edge of Blue Jordan Swamp, Lake Arbuckle, and Arbuckle Creek. The northern boundary is shared with the River Ranch Property Owners Association and the southern boundary is shared with several private agricultural landowners. There are no geographically separated portions of the APAFR managed by the AF or DoD. APAFR is located within Polk and Highlands Counties with the county lines running horizontally through the approximate center of the installation.

APAFR is located within a mostly rural and agricultural community including Avon Park approximately 10 miles to the west, Sebring 8 miles to the southeast and Frostproof 6 miles to the northwest. Agriculture is a major contributor to the economy of Avon Park, with citrus and livestock production the predominant agricultural activities. Frostproof is a small rural city with citrus and livestock production as the primary commercial enterprises. Sebring is the county seat of Highlands County and the largest residential location adjacent to APAFR. In addition to citrus and agricultural production, commercial enterprises include light industry and human services (e.g. hospitals, health care).

Installation/GSU Location and Area Descriptions

Base/GSU Name	Main Use/Mission	Acreage	Addressed in INRMP?	Describe NR Implications
Avon Park Air Force Range	Air-ground, Air-air, Ground-air military training facility.	~106,000	*Yes*	INRMP will cover all aspects of natural resource management at APAFR. See Section 2.0 (Installation Profile) for implications and applicability.

2.1.2 Installation History

As evidenced by artifacts found on APAFR, the region comprising APAFR may have been inhabited by Native Americans as early as the Paleo Indian (ca. 13,000 – 9,000 BP) period. Many archaeologists believe that Florida's Paleo Indians were generalized hunter-gatherers, utilizing various small game, plants, and possibly marine resources. Lanceolate projectile points diagnostic of this period have been found at the Dragline Site (08HG0035). Sites dating to the Paleo period include the Nalcrest Site (08PO0015) located on Lake Weohyakapka, just north of APAFR (Beasley 2009).

Shards containing sand and fiber tempering dated to the Archaic period (ca. 9,000 – 2,500 BP) have been found on APAFR. The people of this period were more sedentary than the Paleo Indians, utilizing a wider range of food sources, including deer and other small game, hardwood nuts, and mollusks. Many Archaic period artifacts have been found throughout the Kissimmee River region. One of the Early Archaic sites on APAFR is Bill Bay West (08HG1054). A Bolen Beveled projectile point was recovered from this site during a Phase I survey. This site was further subjected to Phase II testing, recovering an Archaic Stemmed point and numerous flakes, but high-water conditions prevented further assessment (Beasley 2009).

The post-Archaic native cultures in Florida prior to European contact (ca. 500 BC – 1500 AD) were characterized by more formal settled communities with increasingly complex political and religious organization than their predecessors. Dirt middens found along the Kissimmee River indicate a diet of turtle, fish, mollusks, gastropods, deer, nuts, and inland plants. Ongoing excavations and the acquisition of several radiocarbon dates, as well as the inclusion of geomorphologic and geological research will provide an important addition to the archaeological record of the Kissimmee basin (Beasley 2009)

In the early 1500s, the Spaniards arrived in Florida, followed by the British in the mid-1700s. They both raised cattle, cultivated citrus, and harvested timber. Although European influence was felt throughout the state, there is no firm evidence of European presence in the Kissimmee River Valley before the mid-19th century (Piper 1986). Direct contact between Spanish and native peoples inhabiting Florida occurred principally along the coast and in north Florida where many Catholic missions were established (Beasley 2009).

By the end of the 18th century, repeated conflicts with the Europeans and exposure to European diseases resulted in the decimation and dispersal of the aboriginal cultures (Piper 1986). Many of Florida's remaining Native Americans assimilated with the Creeks and other Southeastern tribes who began fleeing into Florida due to pressures from the north in the early 18th century. This new group eventually became known as the Seminoles. No Seminole sites are recorded on the installation, but historical accounts place them in the Avon Park area in the mid to late 19th century.

The first known white visitors to the Kissimmee Valley were Col. Zachary Taylor and his troops (DeVane 1983), travelling along the western side of the Kissimmee River on their way south during the Second Seminole War in 1837 (Piper 1986). Fort Basinger was built along the Kissimmee River south of APAFR and was abandoned soon after Taylor's victory at the Battle of Okeechobee that same year (DeVane 1983).

During the Second Seminole War in 1849, the Army built a string of forts along Twiggs Trail (a crude military road); two of these forts, Fort Kissimmee and Fort Arbuckle, were within what is now APAFR (DeVane 1983). Fort Arbuckle was built near the eastern shore of Lake Arbuckle. This fort was designated as the relocation point of surrendering Seminoles to the Indian Territory in Oklahoma. Both this fort and Fort Kissimmee were abandoned within two years (DeVane 1983). After the Third Seminole War (1855-1858) fewer than 200 Seminoles remained in Florida.

The first known white settler, William Willingham, arrived in 1859 and raised a herd of approximately 1500 Spanish cattle. He left the area after several years, but further development in the area came with the Civil War, when many sought safety in the interior of the state, which had less military importance than the coastal areas. Until the fall of the Confederacy in 1865, the area was a very important supplier of beef to the Confederate Army (DeVane 1983).

After the Civil War, cattlemen, farmers and other homesteaders began to settle in the area in scattered settlements concentrated at the Seminole War forts (Piper 1986). They practiced subsistence farming and raised hogs and cattle for food and income. With Cuba as a new market during its war with Spain, beef production again began to rise (DeVane 1983).

In 1881, the state sold the land (approximately 4,000,000 acres) to land speculator Hamilton Disston. After Disston died in 1893, his organization sold the land in the early 1900s to the Consolidated Naval Stores Co., which began harvesting turpentine by 1919 (Piper 1986). Throughout this time, homesteaders were allowed to stay and continue their way of life (DeVane 1983; Piper 1986), and their population peaked with no more than 30 families inhabiting the area that was to become APAFR (Piper 1986). In 1917, the Consolidated Naval Stores Co. transferred 133,506 acres to its subsidiary, the Kissimmee Island Cattle Company (KICCO); by 1919, there were 24,000 company cattle in the region (DeVane 1983; Piper 1986). Turpentine extraction continued until 1928. Logging in the area began around 1925. By 1930, the resource was depleted and the land intensively logged and converted to cattle range, groves, or sold. Afterwards, only KICCO cattle and a dwindling number of homesteaders remained (DeVane 1983).

As a military installation, APAFR has a long history of use beginning on January 14, 1942, when construction was authorized and the War Department purchased approximately 107,000 acres from Consolidated Naval Stores Co. During World War II, Avon Park Army Air Force, as it was first named, was the final training point for hundreds of American bomber crews and provided transition training in combat planes, bombing, and gunnery. Training included air-to-air gunnery, air-to-ground gunnery, fighter interception, fighter escort, searchlight defense, as well as actual range bombing and camera bombing. The types of bombs used ranged from small, 15-pound practice charges to 2,000-pound demolition bombs loaded with one half ton of high explosives (HEs) to incendiary bombs that burst into flame upon contact with the target. By May 1944, 11,268 bombs had been dropped from B-17s on seven practice ranges at APAFR.

Due to force reductions following World War II, the AF discontinued stationing flying units directly at APAFR. During the early 1960s, APAFR's primary use was training more than 4,000 F-4 Phantom aircrews for deployment to Vietnam. The majority of the munitions used were practice bombs. By March 1971, APAFR's primary mission had expanded to F-4 and B-57 aircraft training, AF specialized aircraft, Florida Army National Guard (FLARNG), and Reserve Officer Training Corps. In addition, the Army, Navy, and Marine Corps also used the range. By 1974, APAFR contained six air-to-ground target complexes and 20 electronic warfare sites. APAFR's operational tempo continued to grow and by fiscal year (FY) 1976, annual sortie operations increased to approximately 13,650, and ordnance expenditures during the first 10 months of 1976 were approximately 1,155 practice bombs.

The 1980s saw an increase in training flights to an average of approximately 25,000 sortie operations per year. Practice bombs (Bomb Dummy Unit [BDU]-33), MK-82, and MK-106) were the primary ordnance used on the tactical ranges. The FLARNG became a full-time tenant in August 1984 and still holds active permits for training activities. The highest usage occurred in 1988, when 36,800 sortie-operations were flown at APAFR, most of which were associated with F-16s from MacDill AFB. In 1987, to accommodate larger and more modern aircraft, the runway was extended from 5,000 feet to 8,000 feet.

Throughout its history, a wide variety of HE and inert/practice ordnance has been delivered at APAFR by many different fixed- and rotary-wing aircraft. Today, APAFR is used for air-to-air combat, air-to-ground inert/practice bombing and gunnery training by DoD aircrews, but is no longer authorized for the use of air-to-ground HE bomb delivery from fixed-wing aircraft. AF AC-130s are authorized for, and fire, air-to-ground HE warhead rounds including 25-millimeter (mm), 40mm and 105mm ammunition types. Hellfire missiles are fired from helicopters. Among the many DoD users of APAFR, Navy aircrews currently use APAFR for inert/practice ordnance delivery during integrated and sustainment training, each event requiring the use of Avon Park from four to eight days. Other DoD military units conduct a variety of other training activities at APAFR, including HE artillery firing, small arms firing, troop maneuvers, search-and-rescue operations, joint service exercises, and other ground training exercises.

2.1.3 Military Missions

APAFR is the largest AF bombing and gunnery training range east of the Mississippi River. The 23rd Wing, Moody AFB, Georgia, is responsible for operating APAFR. This unit is an element of Air Combat Command (ACC). In September of 2015, APAFR was officially designated as the 598 RANS.

APAFR's mission is to "Support America's expeditionary combat forces with a world class training environment" by providing a training infrastructure that allows air and ground forces to practice the latest combat training techniques and procedures safely, efficiently, and realistically and to design training facilities that meet training needs. The APAFR is utilized by a wide variety of military and civilian agencies, including military Coalition partners. The Vision Statement of the Control and Reporting Post (CRP), approved in October, 2006, describes the APAFR as "The AF's premiere East Coast air-ground training complex, relevant and sustainable, focused on the joint interagency multinational air-ground combat team while supporting compatible missions for National Defense."

To reach that vision, the CRP has identified goals in seven focus areas: Land, Airspace, Unexploded Ordnance (UXO), Environmental Plant, Environmental, Range Systems, and Range Management. All proposed Goals, Objectives and Work Plans for this INRMP were developed in concordance with the CRP**.**

Listing of Tenants and NR Responsibility

Tenant Organization	NR Responsibility
Florida Air National Guard (FLARNG)	*Natural Resource staff provides NEPA guidance through the EIAP process. FLARNG is responsible for the implementation of natural resource guidelines and biological opinions.*

2.1.4 Natural Resources Needed to Support the Military Mission

Military training in general requires realistic and natural settings to be an effective copy of what is seen during actual combat or operations. Critical attributes that provide the required training scenario include a variety of natural resource communities that offer an opportunity for a wide array of training activities. APAFR has an abundance of land that needs to be maintained in the proper ecological setting to replicate the training requirements from units accessing the installation's training areas. This includes maintaining a healthy and sustainable endangered species, wildland fire, forest management, and hydrology program.

These programs can provide necessary training components. A healthy wildlife management, wildland fire management, outdoor recreation, and forest management program allows for adequate ground cover for concealment of troops and equipment during training exercises. A successful hydrology program allows for the maintenance of soil structure throughout the installation to provide roads for access to military training areas and support locations.

One of the most important portions of the natural resources program is the wildland fire program. The Southeast, and Florida specifically, is a hyper-pyrogenic environment. The natural and historic landscape in Florida was maintained through the constant and natural implementation of fire from lightning strikes. These fires moved across the landscape based on weather and moisture content of vegetation. Over the last two centuries, there has been the reduction of natural landscapes through development and suppression of natural fires. APAFR has a rich history of the implementation of prescribed fires (intentional fires set to mimic natural fires) for the maintenance of vegetation across the installation. With the continuation of a wildland fire program, there can be the successful continuation of military exercises and training throughout APAFR.

2.1.5 Surrounding Communities

Surrounding communities adjacent to the APAFR include Avon Park approximately 10 miles to the West, Sebring 8 miles to the southwest, and Frostproof 6 miles to the northwest. Avon Park is home to an estimated 9,839 residents (2020 Census). Agriculture is a major contributor to the economy of Avon Park, with citrus and livestock production the predominant agricultural activities. Frostproof is a small rural city located 6 miles northwest of APAFR with a population of 2,877 (2020 census). The city of Sebring is comprised of approximately 11,087 residents (2020 Census). As the county seat of Highlands County, Sebring is the largest residential location adjacent to the APAFR.

Much of the area immediately adjacent to the installation is natural (undeveloped, water bodies, and public conservation properties) or undeveloped improved agricultural lands for livestock and agricultural operations. Kissimmee Prairie State Park Preserve (KPPSP), KICCO WMA, and Lake Wales State Forest

are directly adjacent to several borders of APAFR and are managed for several different conservation and public use purposes (hunting, outdoor recreation, commercial silviculture, water storage and filtration) (Figure 2.1.5). This large area of undeveloped land surrounding APAFR provides a large compatible land use buffer that is relatively rare for DoD installations, especially in the southeastern United States (U.S.).

With climate change projections showing a significant impact on coastal communities and military installations, the amount of development in the central Florida region and around APAFR could increase in the long-term future. APAFR has worked, through the Readiness and Encroachment Protection Initiative (REPI), to secure parcels of land and conservation easements in the surrounding communities to prevent encroachment and development issues that could jeopardize future mission flexibility. The 2016 Sentinel Landscape designation of APAFR and the associated Kissimmee River Valley provides an opportunity to work with the U.S. Department of Interior and U.S. Department of Agriculture (USDA) in alleviating development and encroachment pressures**.**

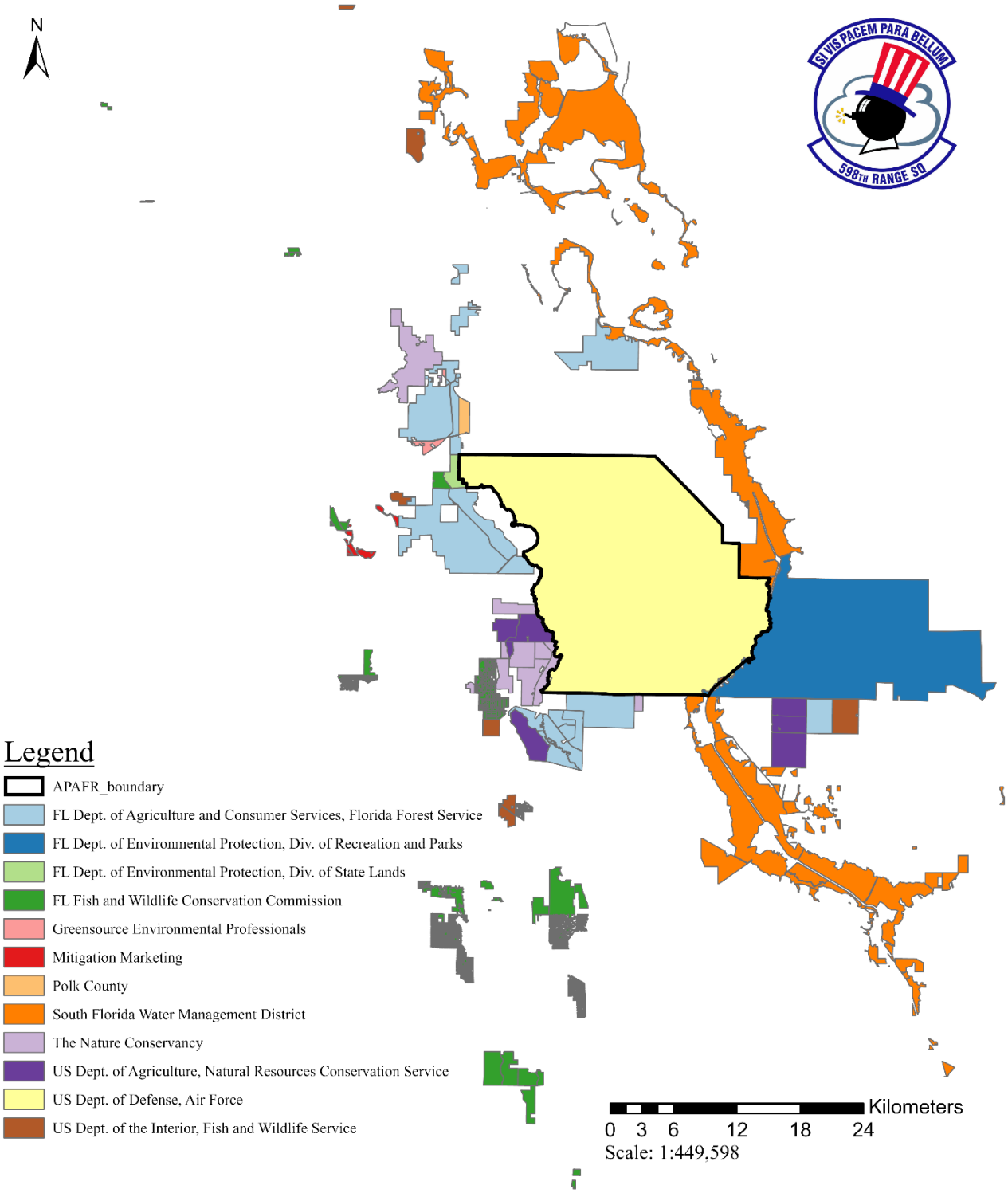

Figure 2.1.5: Conservation lands within five miles of Avon Park Air Force Range as of January 2022.

Created: 6/8/2022
by Kris Pitcher, Ph.D.

2.1.6 Local and Regional Natural Areas

Lake Wales Ridge State Forest is located directly adjacent to the western boundary of APAFR and shares a border with Lake Arbuckle and Arbuckle Creek. It consists of four tracts, Arbuckle, Hesperides, Prairie, and Walk-in-the Water, which comprise 26,563 acres of flatwoods, scrubby flatwoods, sandhill, scrub, prairie, and wetlands.

The Polk County Natural Resources division maintains Lake Arbuckle. It is of natural resource significance to APAFR due its water storage capacity. The lake acts as a collection point for several drainages located at APAFR and other public conservation lands.

South Florida Water Management District (SFWMD) owns several large tracts of land and water bodies located directly adjacent to APAFR. The KICCO WMA is located on the northeastern corner of the installation and is co-operated by FWC and SFWMD. FWC oversees hunting on the property, and SFWMD handles all other management. The KICCO WMA consists of pine flatwoods, scrubby flatwoods, improved roads/infrastructure and floodplains associated with the Kissimmee River. It is home to several federal and state T&E species, including the red-cockaded woodpecker (RCW; *Picoides borealis*), Everglade snail kite (*Rostrhamus sociabilis*), and Audubon's crested caracara (*Caracara cheriway*). Several large areas immediately surrounding the Kissimmee River are owned and managed by the SFWMD to the north and south of APAFR and are critical to protecting the Kissimmee River from further development.

Kissimmee Prairie Preserve State Park (KPPSP) is located on the eastern border of the Kissimmee River directly across from APAFR and encompasses 53,732 acres of mostly dry and wet prairie with marshes and sloughs throughout. It is owned and operated by the Florida Department of Environmental Protection (FDEP) and is one of four public conservation lands that contain breeding populations of the federally endangered Florida grasshopper sparrow (FGSP; *Ammodramus savannarum floridanus*). APAFR, along with KPPSP, Three Lakes Wildlife Management Area (TLWMA), and Corrigan Ranch are the only remaining public conservation lands with large tracts of intact dry/wet prairie that contain populations of FGSPs. Cooperation between these four properties is essential for the continued management and recovery of this species. KPPSP's large size and composition of ecosystems and species makes it a key piece of conservation land in central Florida.

Tiger Creek Preserve is located approximately 5 miles to the northwest of APAFR and is owned and operated by The Nature Conservancy (TNC) of Florida. It consists of 4,915 acres of pine flatwoods, scrubby flatwoods, scrub, sandhill, and riparian areas associated with several creeks. It shares borders with sections of the Lake Wales Ridge State Forest.

The Carter Creek South tract of the Lake Wales Ridge National Wildlife Refuge is located approximately 4 miles to the southwest of APAFR. This property is owned and maintained by collaboration between the USFWS and FWC. It is composed of 5,740 acres of sandhill, scrub, bayheads, and marshes. It is home to several federal and state T&E plants and animals, including pigeon wings (*Clitoria fragrans*), Florida scrub-jay (FSJ; *Aphelocoma coerulescens*) and wireweed (*Polygonella basiramia*).

The Carter Creek tract of the Lake Wales Ridge Wildlife and Environmental Area lies just north of the Carter Creek South tract. This property is managed by FWC. It is composed of 3,505 acres of sandhill, scrub, scrubby flatwoods, and mesic flatwoods, of which 2,303 acres are owned by FWC.

The region surrounding APAFR contains some of the rarest and most biologically rich lands remaining in Florida. As expanding citrus operations, phosphate mining, and residential development threaten the few remaining natural areas, the importance of the Avon Park region and the leadership of the natural resources staff is crucial to the future management of this landscape.

2.2 Physical Environment

2.2.1 Climate

APAFR has a humid subtropical climate, with a hot wet growing season (late May to early October) and a pronounced mild dry dormant season (early October to late May). Onset of the rainy season occurs on average in mid to late May, but it can vary by more than 24 days (1 SD, n = 56 years), especially in extreme El Niño-Southern Oscillation (ENSO) phases. Rainfall averages 132 ± 28 cm $yr.^{-1}$, with the average dry season having 45 ± 18 cm rainfall and the average wet season 87 ± 28 cm (data from NOAA from station AVON_PARK_2_W between 1950 and 2008). The highest monthly average precipitation occurs in June (22.6 cm) and the lowest occurs in December (4.75 cm). These are also the months with the most and least variation in precipitation, respectively. About 60% of the total rainfall occurs during the summer wet season, with 45% of the total falling from June through August. During the summer wet season, sea breeze fronts are caused by diurnal heating of the land surface during the late afternoon and early evening hours, which produces cumulus build-up and convective rainfall.

ENSO influences dry season (winter) rainfall, with the El Niño phase increasing dry-season rainfall while La Niña phase decreases dry-season rainfall. Thereby, the ENSO cycle strongly affects wildfire frequency and intensity. Historically, landscape level lightning-ignited fires occur from April to mid-June, prior to onset of the wet season. However, the wildfire season is sensitive to ENSO. Variability in the ENSO-fire relationships, coupled with altered hydrology and tropical storms can interact to produce high water levels well into the subsequent dry season, and thereby affect the wildfire season.

Tropical systems, especially hurricanes and tropical storms originating in the Atlantic tropical cyclone basin, can bring heavy rainfall and high winds in late summer and early autumn. The peak time for Atlantic tropical cyclone genesis is September and extends into October, when the sea surface temperatures are warmest and humidity highest. Between 1851 and 2004, twelve major storms passed over APAFR: five tropical depressions, two tropical storms, two category 1 hurricanes, and one hurricane in each of categories 2, 3, and 4. In 2004, two major hurricanes passed directly over APAFR (Frances and Jeanne) and the eye of a category-4 hurricane (Charlie) passed within 25 miles.

The mean annual temperature is 22.8º C. The highest daily mean (27.8º C) occurs in August, and the lowest (16.3º C) in January. In the summer (June-August), the temperature ranges between an average minimum of 21.9º C and an average maximum of 33.3º C. The winter (December-February) average range is 10.4 to 23.8º C. The extreme temperatures recorded over a 65-year period are 39.4º C in July 1961 and –7.8º C in January 1981. Although the average minimum temperatures in winter are well above freezing, cold spells occur with at least one day of sub-freezing temperatures in 75% of the years between 1942 and 2005.

Climate projections for Avon Park Air Force Range (APAFR) (Table 2.2.1a) suggest minimum and maximum temperatures will increase over time under two emission scenarios – a moderate carbon emission scenario (Relative Concentration Pathway [RCP] 4.5) and a high emission scenario (RCP 8.5). The potential impact of these two climate change scenarios on the site's natural resources was analyzed using extracted climate data from 2026 to 2035 to represent the decadal average for 2030, and extracted data from 2046 to 2055 for the decadal average for 2050.

For the decade centered around 2030, both of the scenarios project a similar degree of increase in average annual temperature (TAVE) of between 2.0 °F (1.1 °C) and 2.3 °F (1.3°C) over historic average. The two emission scenario projections show higher warming by 2050, with the RCP 8.5 expressing a warming of approximately 3.9 °F (2.1°C) during the decade centered around 2050. RCP 4.5 expresses a slightly more modest warming of 2.7 °F (1.5 °C) for this period. Maximum and minimum temperatures also show similar increasing trends over time under both scenarios.

Precipitation (PRECIP) varies between emission scenarios and over time due to larger interconnected ocean-atmosphere dynamics associated with the National Center for Atmospheric Research (NCAR)

Community Climate System Model (CCSM) model. For 2030, RCP 4.5 scenario projects an increase in precipitation of 9% while RCP 8.5 shows a slight increase of 2%. For 2050, RCP 4.5 projects an increase in precipitation of 6% while RCP 8.5 shows a smaller increase of approximately 1%.

Table 2.2.1a Summary data for the 30-year historical base period and the decadal average data for 2030 and 2050 for RP4.5 and RCP 8.5 scenarios.

		RCP 4.5		RCP 8.5	
Variable	Historical	2030	2050	2030	2050
PRECIP	53.4in / 135.6cm	58.2in / 147.8cm	56.6in / 143.8cm	54.7in / 139.0cm	53.8in / 136.7cm
TMIN	61.8°F / 16.6°C	63.8°F / 17.7°C	64.5°F / 18.1°C	64°F / 17.8°C	65.7°F / 18.7°C
TMAX	83.8°F / 27.8°C	85.8°F / 29.9°C	86.5°F / 30.3°C	86.2°F / 30.1°C	87.7°F / 31°C
TAVE	72.8°F / 22.7°C	74.8°F / 23.8°C	75.5°F / 24.2°C	75.1°F / 24°C	76.7°F / 24.8°C
GDD	8401°F / 4649°C	9001°F / 4983°C	9159°F / 5071°C	9053°F / 5012°C	9459°F / 5237°C
HOTDAYS	100.9	135.6	151.9	145.9	171
WETDAYS	1.6	0.3	0.3	0.8	0.9

Notes: TAVE °F = annual average temperature; TMAX °F = annual average monthly temperature average maximum; TMIN °F = annual average monthly average minimum temperatures; PRECIP (inches) = average annual precipitation; GDD °F = Average annual accumulated growing degree days with a base temperature of 50 °F (10 °C); HOTDAYS (average # of days per year) = average number of hot days exceeding 90 °F (32 °C); WETDAYS (average # of days per year) = annual number of days with precipitation exceeding 2 inches (5 cm) in a day.

Understanding changes in daily intensity and total precipitation for multi-day precipitation events is helpful to evaluate precipitation patterns in addition to assessment of annual averages. Three-day storm events were generated from projected precipitation data based on RCP 4.5 and 8.5 emission scenarios for target years 2030 and 2050 (2.2.1b). Historical precipitation data were used to calculate a baseline storm event for the year 2000 for comparison (2.2.1b). Projected storms were generated from ten years of data surrounding the targeted year and are therefore likely to occur between once per year to once per ten years during the 10-year projection period.

Table 2.2.1b Climate assessments and projected precipitation for the years 2030 and 2050 under both climate scenarios.

Precipitation/day	Baseline	RCP 4.5		RCP 8.5	
	2000	2030	2050	2030	2050
Day 1	1.41in /	1.20in /	1.19in /	0.94in /	0.98in /

	3.60cm	3.05cm	3.02cm	2.39cm	2.49cm
Day 2	1.88in / 4.78cm	1.45in / 3.68cm	1.80in / 4.57cm	1.37in / 3.48cm	1.87in / 4.75cm
Day 3	1.59in / 4.04cm	0.98in / 2.49cm	1.44in / 3.66cm	1.22in / 3.10cm	1.20in / 3.05cm
Total	4.88in / 12.40	3.64in / 9.25cm	4.43in / 11.24cm	3.52in / 8.94cm	4.05in / 10.29cm
% Change from baseline		-25.41	-9.22	-27.87	-17.01

2.2.2 Landforms

APAFR is entirely in the Floridian section of the coastal plain province, within the Central or Mid-peninsula geomorphic zone. This is the Osceola Plain, a nearly level sandy marine terrace of the Wicomico shoreline (Pleistocene-age deposit). The Osceola Plain is characterized by nearly level sandy plains with scattered shallow depressions and drainage-ways. The Kissimmee River and its bordering wetlands on the eastern side of the base lie within the Okeechobee Plain. The Okeechobee Plain is only of minor extent confined to the eastern part of APAFR and is characterized by gently sloping, poorly drained sands and organic deposits. The relief on both the Osceola and Okeechobee Plains ranges from 13 to 22 m above sea level.

The Bombing Range Ridge has attributes of a large remnant marine sand bar and it rises from 12 to 20 m above the base level of the surrounding Osceola Plain. It is located from six to 12 km east of the eastern base of the Lake Wales Ridge and both ridges are separated by the Arbuckle Creek valley. The Bombing Range Ridge traverses in a roughly north-south direction through the approximate center of the installation and is located almost entirely within APAFR.

Surficial geology of APAFR consists of undifferentiated, unconsolidated sands of Plio-Pleistocene age. These deposits range in thickness from 15 to 45 m, and they are deepest under the Bombing Range Ridge. The Peace River Formation and the Hawthorne Group underlie surficial deposits. The Peace River Formation consists of interbedded sands, clays, and dolomite with variable phosphate content. The Hawthorne Group, a member of the Arcadia Formation, consists of quartz, sandy, phosphatic, and sometimes clayey dolomites and occasionally limestones. Below the Hawthorne Group lie the Ocala Group and Avon Park Limestones. The Ocala Group contains two upper formations, both of which are undulated and consist of a coquina of large foraminifera in a chalky calcilutite matrix, and a lower formation, which is a well undulated limestone and dolomite. In southeast Polk County, the top of the Ocala Group is approximately 30 m below mean sea level and generally about 91 m thick. The Avon Park Formation lies below the Ocala Group and consists of finely crystalline dolomite with some fossiliferous limestone. It is generally highly fractured, very permeable, and up to 213 m thick.

2.2.3 Geology and Soils

The soils at APAFR range from excessively well drained, with the highest water tables varying from 1.8 to more than 3.0 m, to very poorly drained with maximum water table varying from 0.6 to less than 0.25 m. A 1983 USDA soil survey identified 35 soil series (40 mapping units, including pits, river spoil, etc.) (Figure 2.2.3). All soil series at APAFR are found exclusively within peninsular Florida. Hierarchically, six of the seven soil orders known to occur in Florida occur at APAFR: alfisols, entisols, histosols, inceptisols, mollisols and spodosols. Spodosols comprise 50%, entisols 22%, alfisols 9%, histosols 6%,

inceptisols 4%, and mollisols 1% of the 92% of the mapped soil orders at APAFR. Approximately 8% of the remaining total includes miscellaneous categories (e.g. pits, spoil). Also included within this 8% is the St. Johns-Basinger-Placid mapping unit, which includes more than one soil order, hence necessitating its artificial placement within the miscellaneous category. Spodosols are the predominant soil within the pinelands and grasslands at APAFR and they are characterized by a subsurface zone called a spodic (organic) horizon layer. The spodic horizon and its depth strongly influence soil-water relations.

There are five soil associations at APAFR. The Archbold-Satellite occurs on the most xeric uplands on nearly level to gently sloping, moderately well drained and somewhat poorly drained sandy soils. The Satellite-Archbold-Pomello is the other xeric upland soil association on nearly level or gently sloping, somewhat poorly drained or moderately well drained sandy soils, some which may have an organic-stained subsoil. This soil association occurs in two distinct areas at APAFR, on the highest elevations of the Bombing Range Ridge and in an isolated upland area along the escarpment above the floodplain of the Kissimmee River. The most extensive soil associations are the Smyrna-Myakka-Immokalee and the Malabar-Eau Gallie-Valkaria. These occur on nearly level terrain, and are poorly drained soils of the pineland and grassland landscapes. The difference between these two soil associations is that Smyrna-Myakka-Immokalee is sandy throughout, whereas the Malabar-Eau Gallie-Valkaria sandy soils, maybe underlain by loamy material. The Samsula-Hontoon consists of nearly level, very poorly drained soils, most organic with a sandy substratum, but some with only a thin organic surface layer. The floodplains of Lake Arbuckle, Arbuckle Creek-Morgan Hole, Long Cypress Slash and Blue Jordan Swamp are mapped as the Samsula-Hontoon Soil association. Nittaw-Kaliga-Chobee consists of nearly level, very poorly drained, loamy and mucky soils that are subject to flooding and are mapped at APAFR exclusively along the Kissimmee River.

The following associations consist of nearly level, poorly to very poorly drained sandy soils, some with an organic-stained subsoil or underlain by loamy material: Myakka-Immokalee-Smyrna, Felda-Hicoria-Malabar, Basinger-Valkaria-Placid, and Oldsmar-Eau Gallie-Pomona soil associations. The Myakka-Immokalee-Smyrna is mapped for the greatest areal extent in the Highlands County portion of the installation. The Basinger-Valkaria-Placid is confined to drainages emptying into the Kissimmee River in the southeastern portion of the installation. Kaliga-Tequesta-Gator is a nearly level, very poorly drained association with soils that have an organic layer underlain by loamy material and is restricted in occurrence to the floodplain of Arbuckle Creek and the Kissimmee River floodplain.

The Basinger-St. Johns-Placid is labeled as the cutthroat (*Coleataenia abscissa*) seep soil association. These soils are poorly drained or very poorly drained sandy soils primarily of seepage slopes on the side slopes of the Bombing Range Ridge. This soil association has inclusions of sandy peats, mucky sand, or mucky peat. Due to fine scale changes in variation of sand and muck content across the seepage slope gradient, this soil association has several undescribed soil series that would be considered as histosols. These warrant investigation and naming as “new” soil series because there are at least 9,000 acres of cutthroat grass on the installation.

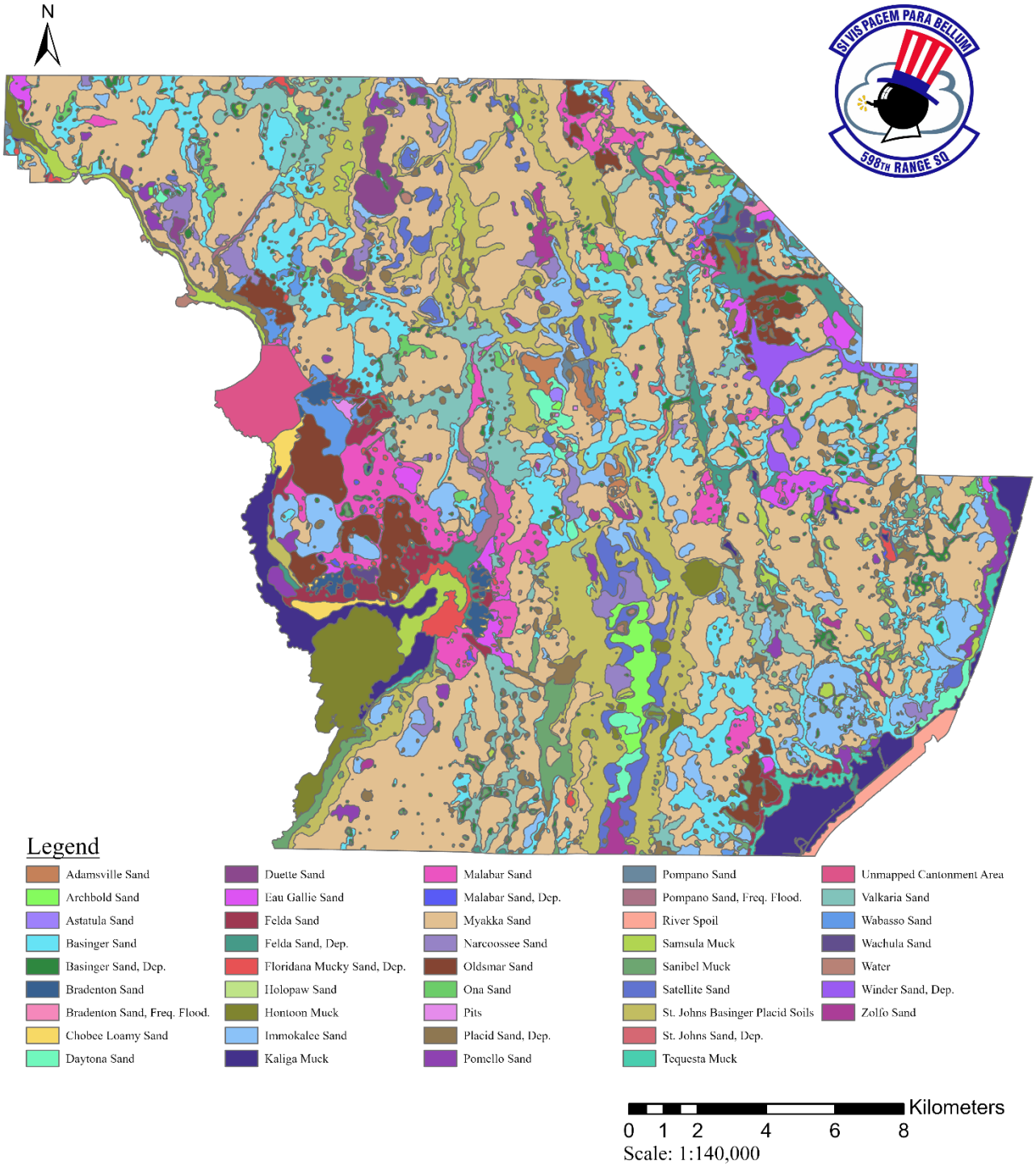

Figure 2.2.3: Soils types at Avon Park Air Force Range.

Created: 6/8/2022
by Kris Pitcher, Ph.D.

2.2.4 Hydrology

APAFR is located within the Kissimmee River Drainage Basin (USACE 1991; McGill 1987) and the Lake Okeechobee Watershed. West of the Bombing Range Ridge is a shallow valley formed by Arbuckle Creek, which drains Lake Arbuckle into Lake Istokpoga, approximately 10 miles to the south of APAFR. Major hydrologic features draining to Lake Arbuckle and Arbuckle Creek include Morgan Hole Creek (MHC), Willingham Creek, and the Arbuckle Marsh. East of the Bombing Range Ridge, drainages empty into the Kissimmee River and include the major systems of Eight Mile Slough, Tick Island Slough, and Hick's Slough. Wetland communities comprise over 50,000 acres of the installation and include wet flatwoods, bay galls, seepage slopes, hydric hammocks, wet prairies, swamps, marshes, depression ponds and lakes (Figure 2.2.4).

The Bombing Range Ridge, in the near center of the installation, also contains two unique lakes: Submarine Lake and Little Lake, which are permanent water bodies that developed on the xeric upland portion of the ridgetop, possibly due to sinkhole action. The ecosystems around these lakes are unique to the Bombing Range Ridge, as drainage from the lakes has formed specific channel types, which are not found anywhere else in Florida. The age of these lakes is unknown, but other similar lakes nearby have been aged to be between 40,000 to 80,000 years old.

In 1954, Congress authorized the Kissimmee River Waterway Project, which converted the 103-mile long, shallow, meandering river to a 50-mile long, 30-foot deep channel called the C-38 canal. This work took 10 years to complete (1962-1971) and altered the river floodplain by the addition of water control structures and tieback levees that created a series of five water impoundments (Fernald and Patton 1984). The Kissimmee River provided a drainage path from the Kissimmee Chain-of-Lakes in Osceola County south to Lake Okeechobee. Approximately eight miles of the Kissimmee River and associated marshes is adjacent to the APAFR installation boundary.

After floodplain ecosystem degradation was recognized over many years, Congress authorized the Kissimmee River Restoration Project in 1992, a plan to restore more than 40 square miles of river floodplain, 20,000 acres of wetlands, and 40+ miles of historic river channel. Beginning in 1999, the United States Army Corps of Engineers (USACE) and SFWMD initiated work on the four phases of the project with planned completion in 2020. Phases 1, 4A, and 4B were completed by 2016, with section 4B being adjacent to APAFR's southeastern boundary. To achieve the goals of the restoration project, APAFR entered into an agreement with the SFWMD in 1998 (a Flowage Easement), which allowed the SFWMD and USACE to flood, flow and store water up to the 100-year flood line in perpetuity for justified needs. Coordination with USACE and SFWMD continues as the project progresses into Phases 2 and 3, which are currently underway.

To the west, Lake Arbuckle and Arbuckle Creek create the natural western boundary of the installation. The upper Arbuckle Creek has been retained in its natural meandering state with only minor man-made effects where bridges have been built. The Arbuckle Marsh is located completely within the installation and comprises approximately 5,000 acres of mixed marsh habitats, predominant in sawgrass. The marsh was converted to an impoundment in 1973 when a 2.5-mile long dike was constructed to keep water levels high and improve waterfowl habitat. After many years of modifications to the Arbuckle Marsh system, the original dike was restored in 2009 with three water control structures that manage discharges into Arbuckle Creek, near the southern boundary of the installation.

Most groundwater at APAFR is stored in what is called the surficial aquifer, which is generally about four feet below the land surface (Geraghty and Miller 1994), and is recharged through local rainfall (McGill 1987) due to high sand content of the soils. Lower geologic confining layers cause lateral movement of groundwater, resulting in seepage communities along the slopes of the Bombing Range Ridge. These are also unique wetland ecosystems.

Drinking water is acquired from the Floridan Aquifer, which is located below confining layers, and is

recharged by downward discharges from the surficial aquifer. Some of the highest rates of Upper Floridan Aquifer recharge in Highlands County occur along the Bombing Range Ridge (Spechler 2010) where the potentiometric surface of the aquifer is also supportive of free-flowing, or artesian, wells. Floodplains are present at both the eastern and western boundaries due to proximity to major flood-prone water bodies, including the Kissimmee River to the east and Arbuckle Creek to the west. Internal flooding on the installation is addressed by man-made waterways, including the airfield drainage system and Rim Canal, and numerous ditch and swale systems. The Rim Canal collects storm water from the airfield to prevent flooding of the runways, and discharges water to Arbuckle Creek.

Many diverse land use and land management activities have altered the natural hydrology of the installation's landscape over the past century. Development of roads and railways may have been utilized first for activities such as turpentining and timber harvesting, with later military use creating vast networks of improved and unimproved traffic routes leading to areas prepared for training. Over time, roads and trails have acted as levees across the landscape, impeding natural water flows. Continued improvements and maintenance to roadways (paved, dirt, or otherwise) involves appurtenances in the form of culverts, bridges, and low-water-crossings to allow the movement of water into areas that are seasonally or permanently inundated.

Flood modeling due to rainfall events and river overflow was not conducted for APAFR because available data on hydrologic and hydraulic network was not sufficient for analysis. Floodplain areas are altered by construction of water control structures and tieback levees and require additional data to analyze. However, climate assessments (Table 2.2.1b) project a decrease in storms (frequent and high-recurrence interval rainfall events) for the years 2030 and 2050 under the RCPs 4.5 and 8.5 and suggest that frequent flooding could decrease.

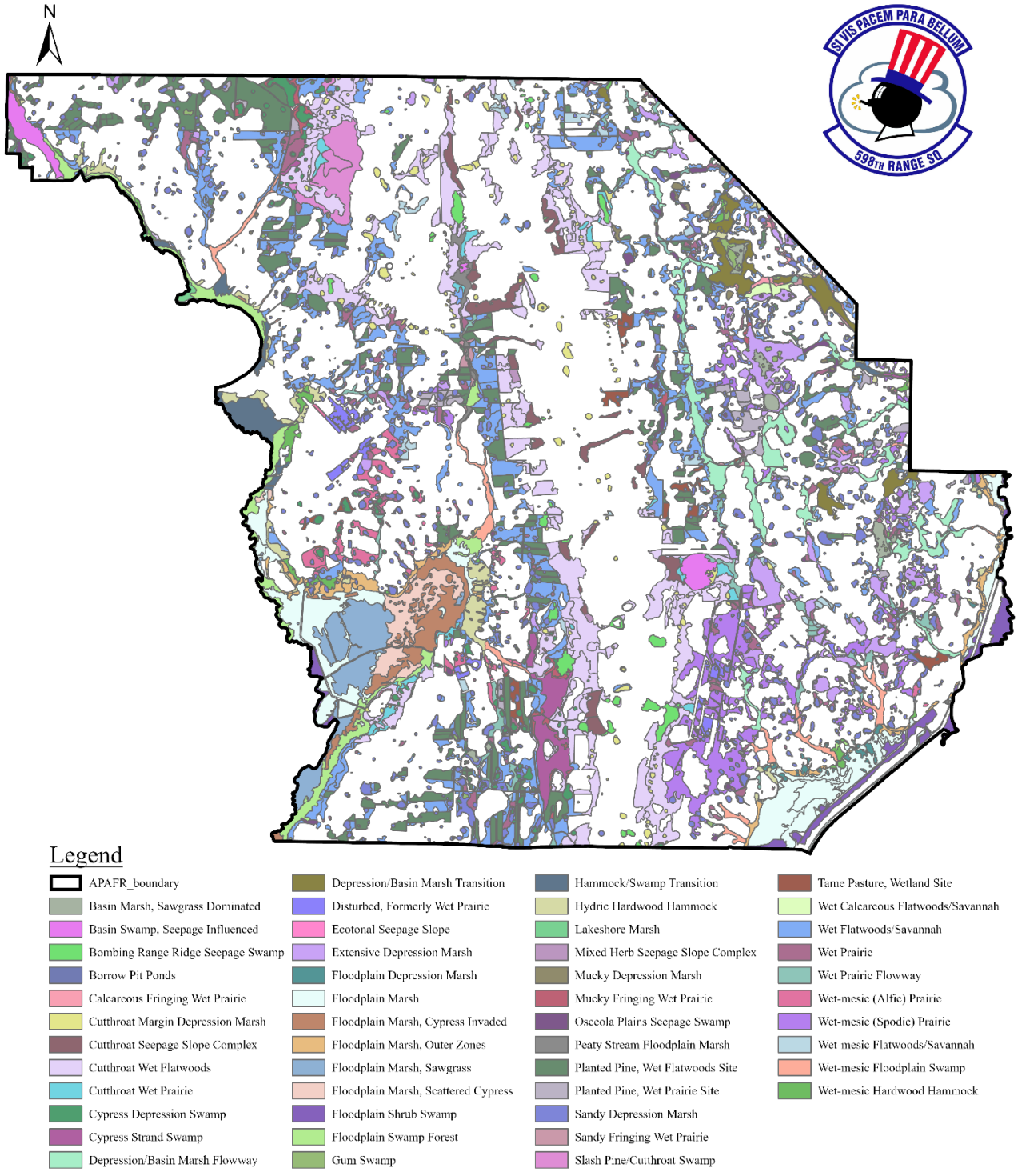

Figure 2.2.4: Wetland communities at Avon Park Air Force Range.

2.3 Ecosystems and the Biotic Environment

2.3.1 Ecosystem Classification

APAFR has some of the most intact ecosystems and diverse fire-maintained landscapes remaining in south-central Florida. Recently, the southeastern USA coastal plain has been recognized a global biodiversity hotspot (Noss et al. 2016), and APAFR is recognized for its rich biodiversity and remnant long leaf pine (*Pinus palustris*) savannas. Nationally, APAFR occurs within the Outer Coastal Plain Mixed Forest Province. The fire regime at APAFR is strongly influenced by both natural and human components (seasonal wet/dry climate; three ignition sources - lightning, military, and prescription; and pyrogenic plants and plant communities). From the early 1940s through the 1980s, during a period of widespread fire suppression in south-central Florida, APAFR had an uninterrupted history of lightning and mission wildfires, followed by ignition of prescribed fire. About 94,000 acres of APAFR are subject to fire, including both disturbed areas (e.g. planted pine stands, improved pastures, target sites) as well as 62,000 acres of intact natural vegetation.

Ecosystems found within APAFR are classified within the Humid Temperate Domain, Subtropical Division, Outer Coastal Plain Mixed Forest (Bailey, 2014). The ecosystems within APAFR are typically associated with high humidity, absence of cold winters.

2.3.2 Vegetation

Over 98,300 acres of APAFR are undeveloped, with approximately 82,393 remaining minimally disturbed with representative examples of natural vegetation cover (Figure 2.3.2). Some of the least disturbed vegetation types found on the installation include seepage slopes, mesic and wet flatwoods, dry and wet prairies, floodplain marshes, hammocks, scrubby flatwoods, and scrub. Roughly 53 percent (approximately 54,300 acres) of the installation is considered jurisdictional wetlands.

Of the remaining 23,717 remaining acres not representative of natural vegetation cover, 18,587 acres are pine plantations, 1,790 acres are tame grass pasture, and some 2,199 acres are developed for military missions. In addition, two large river marshes are located in the southeast (Kissimmee River) and southwest (Arbuckle Creek and Marsh) corners of the installation, and Lake Arbuckle borders the northwest border of the installation.

A relatively high sand ridge, containing sand pine, longleaf pine, and scrub oak (with associated species), is oriented north-south through the center of the installation and is the site of several ponds and small, poorly drained areas. This central Bombing Range Ridge is a relic of an early Pleistocene barrier island. Elevation on the ridge ranges from 40 feet in the southeastern section of the installation to 146 feet above sea level at the crest of the ridge. The majority of the undeveloped land, on the surface, seems to represent typical south-central Florida flatwoods, containing scattered small swamps, sloughs, scrub and grasslands. While these plant communities are representative of south-central Florida, it should be noted that many are unique to peninsular Florida, not being found elsewhere on the southeastern U.S. coastal plain.

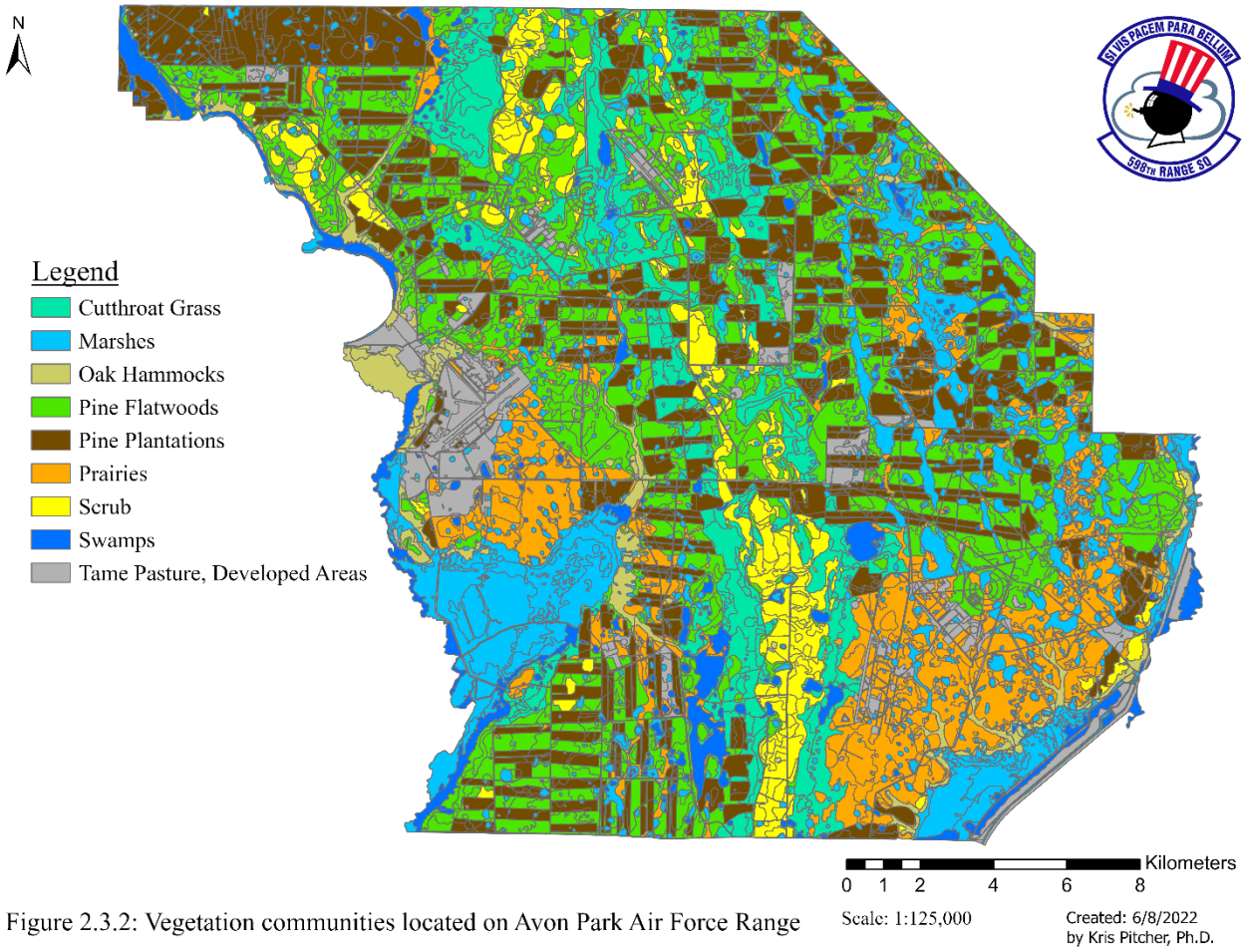

Figure 2.3.2: Vegetation communities located on Avon Park Air Force Range

2.3.2.1 Historic Vegetative Cover

The plant communities at APAFR are influenced primarily by the seasonal hydro-period and the elevational gradient, extending from the lowest elevation floodplain marshes along the Kissimmee River to xeric uplands atop the Bombing Range Ridge. The natural communities vary in response to environmental setting (i.e., hydro-period, edaphic, landscape position) and the fire regime (i.e., flammability, fire history, plant adaptations to fire, fire frequency, fire seasonality and fire intensity). With the exception of long hydro-period wetlands and some hammocks that burn only during severe La Niña droughts, all the remaining plant communities (e.g. pinelands, grasslands, seepage slopes, sandhills, and Florida scrub) are pyrogenic ecosystems. A 60,000 year pollen record from nearby Lake Tulane on the Lake Wales Ridge shows cycles of scrub oak, scrub oak-prairie, and pine-dominated phases, indicating that fire has been an important evolutionary driver in central Florida. The current pine-dominated pollen phase began about 5,000 – 8,000 years before present, when warm wet summers would have produced lightning in peninsular Florida, much like the present day climate. Furthermore, fire adaptations of the flora (i.e. re-sprouting, serotiny, fire-stimulated flowering, fire-resistant seedling stages, epicormic sprouting, fire cued germination, thick bark, underground storage structures, protected buds, and flammability) are well known in Florida.

2.3.2.2 Current Vegetative Cover

The Florida Natural Areas Inventory (FNAI) statewide natural community classification is used as the

framework for the discussion herein of the natural plant communities at APAFR. As defined by FNAI, a natural community is considered as a recurring assemblage of biota associated with a particular combination of environmental factors. Natural communities form a continuously varying pattern on the landscape rather than discrete biological entities. Further information on the statewide FNAI natural community classification can be found in the "Guide to the Natural Communities of Florida" and NatureServe. The natural communities can be broadly grouped into four community classes: upland, lowland, seepage wetlands and lacustrine types. The uplands include the mesic to wet savanna-grasslands (mesic and wet pine flatwoods; dry, mesic, and wet prairies; mesic hammock), the xeric communities (scrub; sandhill; scrubby flatwoods; xeric hammock; mesic hammock), and seepage wetlands (seepage slopes and bay galls). The lowlands include the wetlands (depression marsh; dome swamps; hydric hammocks). Lacustrine includes swamp lakes and sinkhole lakes.

MESIC TO WET SAVANNA-GRASSLANDS

PINE SAVANNA-GRASSLANDS

The pine savanna-grasslands encompass several FNAI recognized communities (wet and mesic flatwoods, Florida dry prairie, wet prairie). Pine flatwoods and prairies are herein referred to as savanna- grasslands because of the global recognition of these terms in the ecological literature in comparison to flatwoods and prairie. Pine savanna-grasslands are the most fire frequented communities at APAFR, covering approximately 60,000 acres, on nutrient-poor sandy spodosols or sandy alfisols. Overall, pine savanna-grasslands at APAFR are floristically similar to those found throughout subtropical south-central and south Florida. These pine savannas may have a scattered canopy of *Pinus palustris*, *Pinus densa*, or both. There may be rather vast treeless areas that have been referred to as “Florida dry prairie”, but these differ little floristically from pinelands with the obvious exception of pine trees. The term Florida dry prairie is somewhat of a misnomer because it actually comprises a landscape that includes many community types (e.g. hyperseasonal grasslands, palm savannas, subtropical hammocks, seasonal wetlands) and because the treeless grasslands are subject to both extreme seasonal drought and wet conditions.

Florida subtropical grasslands (known as Florida dry prairie) are found in three regions of central Florida, and are not simply an artifact of anthropogenic pine removal. The historical grasslands of peninsular Florida once covered about 5,000 km^2. The grasslands at APAFR are within the historical Kissimmee River valley Dry Prairie Region. These seasonally wet grasslands occur mostly on inter-drainage flat terrain with fewer barriers to frequent lightning-ignited landscape fires. Although the natural fire frequency in central Florida prior to Euro-American settlement is not known, some have reported it as annual to biennial, which would represent the highest fire return interval in central Florida and perhaps anywhere in the southeastern U.S.

The peninsular Florida pine savanna-grassland landscape is known to be exceptionally species-rich with some of the highest plant endemism on the southeastern coastal plain, with new species continuing to be discovered. At APAFR, the AF Botanist has sampled and recorded some of the highest fine-scale species richness values in North America (27 in $0.1m^2$, 49 in $1m^2$, and 171 in $1000m^2$). Within these savanna-grasslands there are significant groundcover differences between the various types (mesic and wet savanna-grassland subtypes), that exhibit considerable species composition differences, along elevational and hydro-edaphic gradients. The groundcover is rich with regionally endemic herbaceous plants and perennial warm-season C4 grasses (*Andropogon cabanisii, Andropogon decipiens, Aristida beyrichiana, Aristida rhizomophora, Coleataenia abscissa, Ctenium aromaticum, Schizachyrium stoloniferum, Sorghastrum secundum*), low stands of dwarf runner oaks (*Quercus minima* and *Quercus elliottii*), shrubs (*Lyonia fruticosa, Lyonia lucida, Geobalanus oblongifolious, Ilex glabra, and Vaccinium myrsinites*), and saw palmetto (*Serenoa repens*).

Two savanna-grasslands, the Cutthroat grass and Calcareous pine savanna-grasslands, are of very high botanical biodiversity significance. Cutthroat grass savanna-grasslands are remarkable in that the cutthroat grass (*Coleataenia abscissa*), a turf forming perennial C4 grass, is dominant in the groundcover and it is endemic to south-central Florida, and not found outside peninsular Florida. Runner oak, dwarf St. John's-wort, and dwarf wax myrtle may be prevalent, while fetterbush (*Lyonia lucida*) and South Florida slash pine tend to be more frequent. Cutthroat grass can cover nearly 100% of the groundcover. Bluestem grasses (*Andropogon brachystachyus, A. capillipes, glaucus, A. hirsutior*) and sedges (many species of *Rhynchospora*) are common. Other herbaceous species include milkwort (*Polygala rugelii*), sundew (*Drosera capillaris*), burmannia (*Burmannia capitata*), hairy chaffhead (*Carphephorus paniculatus*), meadow beauty (*Rhexia mariana*), bantam buttons (*Syngonanthus flavidulus*), and the yellow-eyed grasses (*Xyris platylepis, X. elliottii*).

Calcareous pine savanna-grasslands are a rare type in central Florida and are more characteristic of south Florida. The central Florida examples are the most species rich plant communities at APAFR and potentially the most speciose savanna-grasslands within the southeastern U.S., based on sampling of types on the base. Typical calciphilic groundcover plants include: *Heliotropium polyphyllum, Liatris garberi, Ipomoea sagittata, Iva microcephala, Scleria verticillata, Rhynchospora nitens, Polygala grandiflora, Polygala balduinii*, amongst many others, with over 100 plant taxa, which currently are not known elsewhere from APAFR, many being calcareous specialists. Most examples are from the Eight Mile Hammocks area.

UPLAND HARDWOOD FOREST (MESIC HAMMOCK)

FNAI lumps what would be referable as “Mesic Hammock” in central Florida into Upland Hardwood Forest. The best example lies just south of the entrance above the Arbuckle Creek floodplain. It is dominated in the canopy by Virginia live oak (*Quercus virginiana*), with laurel oak (*Quercus laurifolia*) dominating the sub-canopy, both being semi-evergreen trees. Marlberry (*Ardisia escallonioides*) and wild coffee (*Psychotria sulzneri*) are prevalent in the shrub layer. The herbaceous layer is a mixture of graminoids (*Dichanthelium commutatum, D. laxiflorum, D. portoricense, Oplismenus setarius*), sedges (*Carex longii, Rhynchospora caduca, Scleria triglomerata*), vines (*Gelsemium semipervirens, Toxicodendron radicans, Parthenocissus quinquefolia, Smilax bona-nox, Ampelopsis arborea, Mikania cordifolia*), herbs (*Mitchella repens, Centella asiatica*) and shrubs (*Serenoa repens, Sida acuta, Hypericum hypericoides, Urnea lobata*). Epiphytes, such as *Tillandisa recurvata, T. usneoides, T. fasciculata, Polypodium polypodioides* var. *michauxianum*, are common on the branches of the larger oaks.

Mesic hammock is often associated with and grades into wet-mesic hammock and eventually into hydric hammock. In more wet-mesic hammocks there is an increase in dominance in the canopy of laurel oak and cabbage palm (*Sabal palmetto*). Swamp dogwood (*Cornus foemina*) and myrsine (*Myrsine floridana*) are prevalent in the shrub layer. Toothed mid-sorus fern (*Blechnum serrulatum*) and lizard's-tail (*Saururus cernuus*) are usually common in the herb layer. Red maple (*Acer rubrum*), dwarf palmetto (*Sabal minor*), and groundsel (*Baccharis glomeruliflora*) are typical in the more wet-mesic portions of the hammock as it grades into the hydric hammock.

XERIC UPLANDS
SANDHILL

At APAFR there are sandhill types, which are more typical of xeric sandhill found in Florida, and a unique type found only in Highlands County. The sandhill vegetation in Highlands County is distinctive from those elsewhere in the southeastern U.S. in that it is dominated by South Florida slash pine rather than longleaf pine. It also has a high cover of evergreen oaks (*Quercus myrtifolia, Q. geminata, Q. chapmanii*)

and a lower cover of wiregrass (*Aristida beyrichiana*) and turkey oak than is typical elsewhere in the southern U.S. Hence, some ecologists coined them as a “southern ridge sandhill”, a type restricted in geography to the southern parts of Central Florida Ridges. The canopy is sparse and comprised of either South Florida slash pine (*Pinus densa*) or longleaf pine (*Pinus palustris*), turkey oak (*Quercus laevis*), and the endemic scrub hickory (*Carya floridana*). The pine canopy is typically 8-10 m tall, while the turkey oak sub-canopy is generally lower at 3-4 m. Mature turkey oaks on the southern ridge sandhills tend to be smaller in stature than comparable sandhills within north Florida.

Species in the shrub layer that are capable of reaching canopy height include myrtle oak, sand live oak, Chapman's oak and rusty lyonia. In long unburned stands, sand pine also frequently occurs in the canopy layer. Common shrubs may include scrub palmetto, saw palmetto, palafoxia (*Palafoxia feayi*), dwarf blueberry (*Vaccinium myrsinites*), hog plum (*Ximenia ameiricana*), pawpaw (*Asimina obovata*), and others.

Vine species occasionally present in this association include greenbrier (*Smilax auriculata*) and muscadine grape (*Vitis rotundifolia var. munsoniana*). The groundcover is species-rich with many xeric plants restricted to this community type and not found outside of peninsular Florida. Common herbaceous species in the ground layer include lupine (*Lupinus* sp nov.), prairie clover (*Dalea adenopoda*), sensitive brier (*Schrankia microphylla* var. *floridana*), Florida alicia (*Chapmannia floridana*), hoary peas (*Tephrosia chrysophylla*), yellow buttons (*Balduina angustifolia*), silk grass (*Pityopsis tenuifolia*), and gopher apple (*Geobalanus oblongifolia*). Wiregrass (*Aristida beyrichiana*) and broom sedges (*Andropogon gyrans*) are common, as is the beak-rush (*Rhynchospora grayi*). Patches of lichens (*Cladonia* spp.) and spike moss (*Selaginella arenicola*) are common in bare sand areas. The canopy is generally open, allowing substantial amounts of sunlight to reach ground level. Bare patches of sand occur in the herbaceous layer, even in areas long unburned.

The largest most intact frequently burned sandhill at APAFR is found on the ridgetop on the southern part of the Bombing Range Ridge to the north of the southern boundary of the base. Other significant sandhills on APAFR are found at Arnold Hammock and to the east of Billig Road. The exceptionally high diversity of endemic and sandhill specialist plants (i.e., *Galactia* sp nov.) coupled with the global rarity of peninsula Florida sandhills make them one of the most deserving plant communities of restoration efforts using seasonally timed prescribed fire.

SCRUB

Scrub vegetation at APAFR can either be characterized by sand pine (*Pinus clausa*) as the dominant tree (i.e., sand pine forest), or by one or more of four species of evergreen sclerophyllous oaks, with or without

sand pine. The most xeric scrub vegetation at APAFR has scattered sand pine, with scrub oaks and open sand gaps dominated by Florida rosemary (*Ceratiola ericoides*). Scrub with rosemary is the most uncommon type on the installation. There is much variation in both density and canopy coverage of the sand pine largely dependent upon the legacy of fire suppression and sometimes other site characteristics, with long-unburned stands often having a more closed canopy. The height and density of the xeric scrub oaks and evergreen shrubs is likewise strongly dictated by fire return interval and is site-dependent. Despite gradation and slight differences there are three main scrub types at APAFR: 1) predominantly evergreen sclerophyllous oak component; 2) sand pine with open to dense canopy; 3) and rosemary scrub.

Peninsular Florida scrub, a xeric shrubland, has been strongly evolutionarily influenced by fire regime, periodic drought, and excessively drained acidic, low-nutrient soils, and is rich in highly range restricted endemic forbs, many of which are considered rare. Some of these include: Curtiss' milkweed (*Asclepias curtissii*), pigeon wings (*Clitoria fragrans*), nodding pinweed (*Lechea cernua*), and wireweed (*Polygonella basiramia*). Oak scrub vegetation includes myrtle oak, sand live oak, Chapman's oak (*Quercus myrtifolia, Q. geminata, and Q. chapmanii*), and often times rusty lyonia (*Lyonia ferruginea*), scrub hickory (*Carya floridana)*, hog plum (*Ximenia americana*), and scrub bay (*Persea humili*s, found at APAFR only in Kissimmee River scrubs). Scrub palmetto (*Sabal etonia*) and saw palmetto (*Serenoa repens*) are often present in the shrub layer and maybe critical components of fuel continuity in scrub vegetation. Groundcover consists mostly of shrubby species; herbs are generally scarce, but many are sand-gap specialists with highly restricted distribution patterns within peninsula Florida. The most common herbaceous species include beak-rush (*Rhynchospora megalocarpa*), milk peas (*Galactia regularis, Galactia elliotti*), alicia (*Chapmannia floridana*), and a panic grass (*Dichanthelium breve*). Epiphytes, such as Spanish moss (*Tillandsia usneoides*) and ball moss (*Tillandsia recurvata*), true mosses, and lichens are often present on larger sand live oaks (*Quercus geminata*).

Rosemary-scrub typified by large bare sand gaps and scattered xeric shrubs harbors the most sand gaps specialist exclusive to peninsular Florida. Some of these sand gap specialist include (*Polygonella basiramia, Lechea deckertii, Lechea cernua, Paryonchia sp nov., Chrysopsis highlandensis*). Rosemary may form nearly pure stands, due to its allelopathic influences on the surrounding vegetation. The most frequent scrub oak in rosemary scrub is the diminutive scrub oak (*Quercus inopina*). Sand pine is often scarce and may even be absent in small patches. Consistently present, but making up less than 5% of the cover, are the palmettos (*Serenoa repens* and *Sabal etonia*), and rusty lyonia (*Lyonia ferruginea*).

There are three regions at APAFR with scrub vegetation on the base: 1) Bombing Range Ridge being a unique geomorphic feature distinct from the Lake Wales Ridge; 2) Kissimmee River escarpment; and 3) Osceola Plains not on the Bombing Range Ridge (i.e., Arnold Hammock). Differences in species composition and floristics between these scrub landscapes is striking, with numerous xeric species restricted to only one of the types and absent from all the others.

SCRUBBY PINELANDS (FLATWOODS)

Scrubby flatwoods are characterized as open canopy forests of widely scattered pine trees with a sparse shrubby understory and numerous areas of barren white sand. They have a seasonal high water table usually greater than 30 cm below the surface, with a dense shrub layer of evergreen scrub oaks (*Quercus geminata, Q. minima, Q. myrtifolia*), and ericaceous shrubs such as tar-flower (*Befaria racemosa*), fetterbushes (*Lyonia lucida, L. fruticosa*), and shiny-leaved blueberry (*Vaccinium myrsinites*). The canopy is variable, with occasional South Florida slash pine, sand pine or longleaf pine. Scrubby pinelands differ from that of other pinelands in having a higher frequency of shrub oak species and a sparser herb layer.
The average height of most shrubs is 1-2 m, but this will vary with the local site conditions (moisture and

perhaps nutrients) and time elapsed since the last fire. Herbaceous vegetation is sparse, consisting of wiregrass and forbs, but *Cladonia* lichens and *Selaginella* cover can be considerable in all but recently burned areas. One of the most characteristic herbaceous plants of the scrubby flatwoods and flat scrub is a lachnocaulon (*Lachnocaulon beyrichianum*) and a beak-rush (*Rhynchospora fernaldii*). The lachnocaulon is nearly endemic to Florida and is perhaps the best indicator of scrubby flatwoods in Florida. Gopher apple (*Geobalanus oblongifolia*) and frostweed (*Helianthemum nashii*) commonly form the groundcover in the more open areas; greenbrier (*Smilax auriculata*) is a frequent vine.

Floristically, the scrubby pinelands are intermediate between the oak understory phase of sand pine scrub and other pinelands. Scrubby pinelands differ from the typical pinelands in that they occur on well-drained soils where there is no standing water even under extremely wet conditions. They differ from typical sand pine scrub in that their soils tend to have a higher water table.

XERIC HAMMOCK

Xeric oak hammocks are typically dominated by a canopy closure of large sand live oak (*Quercus geminata*), laurel oak (*Quercus hemisphaerica*), pignut hickory (*Carya glabra*), and live oak (*Quercus virginiana*), with an occasional sand pine, longleaf pine, or scrub hickory. It can be characterized as either a scrubby, dense, low canopy forest with little understory other than saw palmetto or a multi-storied forest of relatively tall trees with an open or closed canopy. Xeric hammock can either represent long unburned sandhill or occur in places naturally protected from fire. Shrubs typically abundant in xeric hammocks include beauty-berry (*Callicarpa americana*) and saw palmetto. In general, the herbaceous species diversity is low. Nut-rush (*Scleria triglomerata*), bracken fern (*Pteridium aquilinum*), wild sarsaparilla (*Smilax pumila*), a beak-rush (*Rhynchospora megalocarpa*), Florida elephant's-foot (*Elephantopus elatus*) and a galactia (*Galactia elliottii*) are the typical herbs in the xeric hammock. Xeric hammock can often grade into mesic hammock where there is often times diamond-leaf oak (*Quercus laurifolia*) and water oak (*Quercus nigra*) in the overstory.

The two major areas of concentration are along the Kissimmee River Valley escarpment and approximately two miles west of the Bombing Range Ridge.

SEEPAGE WETLANDS

SEEPAGE SLOPE

Herbaceous-dominated seepage slopes are very rare in the Florida Peninsula, with intact fire maintained examples in south-central peninsular Florida having been found exclusively on the Bombing Range Ridge within APAFR. These communities support large populations of endemic taxa, such as the monotypic genus *Hartwrightia floridana* and cutthroat grass (*Coleataenia abscissa*). They also support disjunct populations of species which are more common in seepage slopes of the Florida Panhandle, such as *Myrica heterophylla* and *Rhynchospora oligantha*. The vascular flora encompasses 234 vascular plant taxa. The significance of the flora is exemplified by the fact that some 23% of these are Florida endemics and near-endemics, and 65% are restricted to the southeastern coastal plain, with many at their southern range limit. Vegetation sampling of these habitats indicates four identifiable types along the seepage gradient, each of which is delineated by changes in species dominance and characterized by differential species. The most significant community is the mixed herbaceous seepage slope, which has no clearly dominant species and supports most of the disjunct and peripheral species, and for which there are not any examples known outside of APAFR. Four other seepage slope types are: mesic cutthroat-wiregrass, cutthroat lawns, wet cuthroat lawns, and sphagnous cutthroat seepage slopes, each correlated with soils related to hydrology and characterized by differential species. The biodiversity significance of these globally imperiled seepage wetlands make them prime candidates for wetland restoration, to be safe guarded against destructive feral swine rooting behavior, which seriously alters the species composition. The only known examples of

seepage slope are from APAFR where the entire cutthroat grass landscape is embedded with different seepage types (see above), is being maintained by frequent fire and is of global biodiversity significance.

BAY GALL

Bay gall is typically a broad-leaved evergreen tree dominated community on strongly acid muck soils subject to seepage from the surrounding uplands and occasionally periodic flooding. The tree canopy is well-developed, thereby producing a shaded, highly humid microclimate ideally suited for a dense ground layer of ferns. Characteristic trees include loblolly bay (*Gordonia lasianthus*), red bay (*Persea palustris*), sweet bay (*Magnolia virginiana*), and slash pine in the drier parts of the bay gall. The shrubby undergrowth includes wax myrtle, dahoon holly (*Ilex cassine*), fetterbush, maleberry (*Lyonia ligustrina*), and high bush blueberry (*Vaccinium corymbosum*). Common climbers are yellow jasmine (*Gelsemium sempervirens*), muscadine grape, greenbrier, puncture vine (*Smilax laurifolia*), and Virginia creeper (*Parthenocissus quinquefolia*). These species often form a dense thicket around the periphery of the bay head and are less abundant in the interior sections. There are few herbaceous species in the most densely shaded areas, but cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), beak-rush (*Rhynchospora mixta* and *R. miliacea*), and bachelor's buttons (*Eriocaulon decangulare*) occur in slightly more open areas. The epiphyte *Tillandsia utriculata* is occasional on large trees.

Bay galls typically develop at the base of a slope where seepage usually maintains a saturated peat substrate or within unburned parts of seepage slopes at APAFR. Bills Bay, Twin Bay and Telephone Bay are examples of bay gall at APAFR.

LOWLAND WETLANDS

HYDRIC HAMMOCK

Hydric Hammock often occurs in close association with other wetland communities and is of very limited extent on APAFR. It differs from bay gall in that hydric hammocks do not usually occur in areas of strong seepage and lack loblolly bay, which is a conspicuous member of the bay gall community. It occurs on flat, poorly drained soils usually associated with large wetlands within APAFR. The flora of the hydric hammocks at APAFR is not as floristically rich compared to other central Florida hydric hammocks, primarily due to the loss of hydric hammock species like: *Carex chapmanii, C. bromoides, C. leptalea, Chasmanthium nitidum, Arisaema triphyllum, Carpinus caroliniana, Dryopteris ludoviciana, Platanthera flava, Pontheiva racemosa, Spiranthes odorata*, and *Ulmus americana*.

The overstory trees are usually live oak, diamond leaf oak, sweetbay magnolia (*Magnolia virginiana*), and cabbage palm (*Sabal palmetto*). The understory varies depending upon the canopy closure and the degree of soil moisture. Dahoon holly and cabbage palm are often in the understory. The shrub layer may or may not have saw palmetto. The herbaceous layer is often a mixture of mesic forest plants and some species from the bay galls.

On APAFR, there are two hydric hammock areas, one above the Arbuckle Creek floodplain near the entrance of the base and another at Eight Mile Hammock.

DEPRESSION MARSH

Much of the pineland in flat to nearly level landscape is pockmarked with seasonally wet ponds, rounded or irregularly shaped, and shallow depressions from tens to hundreds of meters in diameter. These seasonally wet ponds vary floristically, as reflected in the water depth of the ponds and their soil type. Hydro-period is extremely variable depending upon their elevation, basin characteristics, and also varies annually with precipitation. Some ponds tend to have surface water during the wet season and for longer periods in wet

years. Others have water only in the wettest years, whereas some of the peaty depression ponds along or next to the eastern base of the Bombing Range Ridge have permanent water. Depression wetlands associated with the savanna-grassland landscape on the Osceola Plain are clearly differentiated from depression ponds associated with the ridgetop of the Bombing Range Ridge. One of the primary differences is the pronounced dominance of cutthroat grass in depression wetland/ponds on the Bombing Range Ridge or those located within the topo-hydrologic influence of the ridge. The cutthroat grass ponds are another rare plant community type found only in central Florida. Many examples at APAFR are in near pristine condition due to frequent fire, which maintains the herbaceous species richness of these seepage influenced ponds.

Most commonly, the depression ponds have an outer most ring of saw palmetto surrounding them and a strongly concentric zonation pattern with the wettest part being the center of the pond. Typical seasonal pond plants at APAFR include maidencane (*Panicum hemitomon*), sandweed St. John's-wort (*Hypericum fasiculatum*), cutthroat grass, and broomsedge (*Andropogon perangustatus*). These species are zoned according to the water depth of the pond from 20-120 cm below the saw palmetto border. No single pond contains all of the zones discussed below and some ponds are unzoned. In a typical depressional wetland, one might encounter the following hypothetical plant zonation. The most common sequences encountered from center to edge are: 1) maidencane / *Hypericum* / mixed graminoids in the deeper ponds, and in the shallower ponds either 2) *Hypericum*/mixed graminoids or 3) pure cutthroat grass/mixed sedges. Many of the smaller, apparently shallower depressions, however, do not show the pronounced gradation or zonation and are instead dominated by wet prairie species or in some cases cutthroat grass.

In the center of the deepest ponds there may not be any emergent vegetation but only standing water. In more or less the center of the ponds there is typically a frequently inundated, peaty bottom zone dominated by either pickerelweed (*Pontederia cordata*), maidencane (*Panicum hemitomon*), or sawgrass (*Cladium jamaicense*). The next deepest zone, which is usually at least moist, if not covered by standing water during the winter dry season, is dominated by a sparse stand of blue maidencane often associated with *Xyris smalliana*, *Eriocaulon compressum*, and a continuous groundcover of *Sphagnum* spp. The next higher zone is characterized by the rhizomatous sandweed St. John's-wort, which may form dense, nearly pure stands in the deeper end of the zone and become sparser in the shallower end. Yellow-eyed grass (*Xyris elliottii*) or blue maidencane (*Amphicarpum muhlenbergianum*) may form a continuous cover in the shallow end of the zone. The species composition and vegetative cover of this zone are the most variable of any, with many of the dominants ranging into deeper and shallower zones as well. This zone usually dries out during the winter dry season. The outer pond margin is often bare white sand and maybe dominated by mixed graminoids and sedges.

DOME SWAMP (I.E., POND CYPRESS DOMES)

Dome swamps are characterized as shallow, forested, usually circular depressions that generally present a domed profile because smaller trees grow in the shallower waters at the outer edge, while bigger trees grow in the deeper water in the interior. They typically develop in sandy flatwoods in a depression. These generally are overwhelmingly dominated by pond cypress (*Taxodium ascendens*), with a few swamp tupelo (*Nyssa sylvatica* var. *biflora*), and sometimes slash pine. The ground layer varies considerably between those with either a shaded or sun condition, but chain fern (*Woodwardia virginica*) and a mixture of grasses and sedges, or dense maidencane (*Panicum hemitomon*) are somewhat typical. In cypress domes bordering frequently burned flatwoods, there is often a fringing wet prairie community type.

Some domes have a clay lens that helps retain water levels. Dome swamps often derive much of their water through runoff from surrounding uplands, but they may also be connected with underground channels, in which case subterranean flows would dominate the hydrological regime. The normal hydro- period for dome swamps is 200 to 300 days per year with water being deepest and remaining longest near the center of the dome.

Fire is essential for the maintenance of a cypress dome. Fire frequency is greatest at the periphery of the dome and least in the interior where long hydro-periods and deep peat maintain high moisture levels for most of the year. The profile of a dome swamp (i.e., smaller trees at the periphery and largest trees near the center) is largely attributable to differing fire regimes from the outer edges towards the interior of the dome swamp. The shorter hydro-periods along the periphery permit fires to burn into the edge more often, occasionally killing the outer trees. Cypress is very tolerant of light surface fires, but muck fires burning into the peat can kill them, lower the ground surface, and transform the interior of the dome swamp into a cypress pond.

Cypress dominated depressions and sloughs are lumped within this FNAI community type. Examples at APAFR include Long Cypress Cut.

LACUSTRINE

SWAMP LAKE

Swamp lakes are generally characterized as shallow open water zones, with or without floating and submerged aquatic plants, which may be surrounded by basin swamp or floodplain swamp. Swamp lakes are generally permanent water bodies, although water levels often fluctuate substantially, and they may become completely dry during extreme droughts. They are typically lentic water bodies occurring in confined basins or depressions. However, during floods or following heavy rains, they may exhibit decidedly lotic characteristics, flowing with the flood water or overflowing their banks into lower topographic areas. Some may even exhibit a slow perennial sheet flow, but water movement is generally so slow that lentic conditions prevail.

The substrates of swamp lakes are variable and may be composed primarily of peats, sands, alluvial clays, or any combination of these. Swamp lakes characteristically have highly colored, acidic, soft water with moderate mineral content and are generally mesotrophic to eutrophic (i.e., have moderate to high nutrient levels and primary productivity). However, they may sometimes exhibit partial oligotrophic characteristics, with low nutrient levels and primary productivity, because their darkly stained, acidic waters and surrounding tree canopy limit their productivity. Swamp lakes at APAFR most likely originated from the solution of the underlying limestone and subsequent collapse of the surface to form a depression.

Swamp lakes are important breeding areas for many terrestrial and semi-aquatic amphibians. They are frequently very important feeding areas for many wading birds, ducks, and reptiles. They are also important nursery grounds and habitats for several species of fish. Swamp lakes are extremely vulnerable to hydrologic manipulations that lower the water levels and hasten successional processes. They are also vulnerable to land clearing and timber harvest operations within the surrounding swamps or adjacent uplands. Upland activities generally increase sedimentation, while activities within the swamp may increase insolation levels and alter nutrient levels.

2.3.2.3 Future Vegetation

Eight major habitats on APAFR were deemed vulnerable to climate change scenarios; pine flatwoods, prairie, forest, scrubs, wetland, hammocks, pasture and open water (Table 2.3.2). In addition, habitat maps produced reflect the area of the installation containing former plantation, developed and barren land areas (Figure 2.3.2).

Table 2.3.2 Percent coverage of habitats deemed vulnerable under climate change scenarios.

Habitat Type	Coverage (%)

Pine Flatwoods	24.71
Prairie	20.86
Forest	14.50
Scrubs	14.21
Wetland	8.71
Hammocks	5.53
Pasture	2.38
Open Water	0.16
Former Plantation	1.44
Developed and Barren Land	7.49

The dominant habitats present at APAFR are Pine Flatwoods (24.71% coverage) and Prairie (20.86%), as seen in Table 2.3.2, and Figure 2.3.2. Climate change impacts to prairie bioregions include increased seasonal, annual, minimum, and maximum temperature and changing precipitation patterns. Because these ecosystems are relatively dry with a strong seasonal climate, they are sensitive to climatic changes and vulnerable to shifts in climatic regime.

Pine flatwoods (a mixture of cypress wetlands and managed pine uplands) is an important ecosystem (Lu et al.; 2009). However, long-term hydrologic impacts of forest management and climate change on this heterogeneous landscape are not well understood. Literature suggests that forest removal and climate change (i.e., warming and drying) would have pronounced impacts on the ground-water table during the dry periods, but these impacts may be minor under wet conditions at this typical flatwoods landscape. At the landscape scale, depressional wetlands may have higher responses to tree removal and climate change than surrounding uplands (Lu et al.; 2009).

Slight changes in temperature and precipitation can substantially alter the composition, distribution, and abundance of species, and the products and services they provide. The extent of these changes will also depend on changes in precipitation and fire. Increased drought frequency could also cause major changes in vegetation cover. Losses of vegetative cover coupled with increases in precipitation intensity and climate-induced reductions in soil aggregate stability will dramatically increase potential erosion rates.

Another important vulnerable habitat at APAFR are wetlands and freshwater marsh areas. These ecosystems will face increases in air and surface water temperatures, alterations in the magnitude and seasonality of precipitation and run-off, and shifts in reproductive phenology and distribution of plants and animals. Wetlands and marshes are naturally resilient, provide linear habitat connectivity, link aquatic and terrestrial ecosystems, and create thermal refugia for wildlife: all characteristics that can contribute to ecological adaptation to climate change.

Rising temperatures under various climate change scenarios will likely enhance soil decomposition. Together with reductions in rainfall, this may also reduce plant productivity over large areas. Changes in climate may also alter important biomes such as forests.

In general, forests and flatwoods are susceptible to climate change. There is a temperature below which the equilibrium state of the forest appears constant, but above which the equilibrium forest cover declines steadily. This threshold represents a point where some degree of loss of the forest is inevitable. As the threshold is exceeded, there is a gradual increase in the committed die-back, with changes that are more progressive than sudden. Therefore, forest vegetation at APAFR may experience some degree of die-back before impacts are observed. For example, if climate was stabilized at 2050, a significant die-back could still occur over the next 100-200 years.

A qualitative analysis of vegetation cover type maps in MC2 Dynamic Global Vegetation Model (from here on referred to as MC2) was done to assess potential changes to land cover and uses under the projected climate change scenarios. The vegetation type at APAFR did not show any changes from its current classification as Subtropical Evergreen Broadleaf Forest, under the current projected scenarios.

2.3.2.4 Turf and Landscaped Areas

These areas comprise a minor component of the vegetated landscape of APAFR. They are restricted to the airfield and support areas and constitute less than 2,000 acres. Jurisdiction of maintenance is divided between the Civil Engineering staff and the Avon Park Correctional Institution (AVPCI) staff. Grasses are a mix of turf (bahia and St. Augustine) and exotic species (torpedo grass and cogon grass). Tree cover is composed of native species, such as oak species (*Quercus sp.*), wax myrtle (*Myrica cerifera*), pine species (*Pinus sp.*), bay species, and cypress species (*Taxodium distichum*), and also include commonly used landscaping species for the region along with invasive and exotic plant species, such as Old World climbing fern (*Lygodium microphyllum*), coral ardisia (*Ardisia crenata*), rosary pea (*Abrus precatorius*), caesar weed (*Urena lobate*), that have been introduced through historical activities and development within the cantonment area**.**

2.3.3 Fish and Wildlife

2.3.3.1 Current Fish and Wildlife

APAFR supports a rich diversity of game and non-game wildlife due to the variety of habitats found on the installation. Because large portions of APAFR are undeveloped, the landscape found here is representative of natural south-central Florida habitats. These habitats support multiple rare and sensitive species (see Section 2.3.4) and provide an abundance of high quality fishing and hunting areas both on and adjacent to APAFR. Section 2.3.4 provides a list of the threatened or endangered animals (Table 2.3.4a) and plants (Table 2.3.4b), including species of concern that are found at APAFR. Section 2.3.2 provides a detailed description of the vegetation and ecosystems found at APAFR. Although many species of fish and wildlife can be attributed to those ecosystems and vegetation types at APAFR, a comprehensive list of fish and wildlife species is not currently available but is being developed.

2.3.3.2 Climate Change Vulnerabilities

Fish and wildlife communities on APAFR will experience moderate impacts due to climate change. Rising temperatures and rainfall are not likely to directly impact wildlife species. The changing climate is more likely to alter existing vegetation on APAFR, which will have a negative impact on specialist wildlife species that have historically depended on specific native plant species for their survival (Dukes & Mooney, 1999). Invasive plants such as kudzu and cogongrass, are likely to benefit from predicted changes in climate and will potentially become more prevalent on installation (Bradley et al., 2010). Altered plant communities and climate will also create open niches on APAFR for invasive wildlife species to exploit. Newly arriving non-native species often have the ability to outcompete native species which are already experiencing reduced fitness due to environmental conditions shifting away from historic standards (Hellmann et al., 2008).

Aquatic habitats such as floodplain marshes, depression marshes, dome swamps, swamp lakes and sinkhole lakes may be the most vulnerable environments from the perspective of a changing climate. Shallow aquatic habitats are particularly susceptible to rapid fluctuations in water parameters. Increasing air temperatures will likely cause water temperature to increase, creating conditions more likely to promote algal blooms (Paerl et al, 2009). As water temperatures rise in benthic systems, dissolved oxygen content will lower, further decreasing habitat quality for freshwater fish and amphibians.

2.3.4 Threatened and Endangered Species and Species of Concern

2.3.4.1 Current listed species

Table 2.3.4a Scientific (SCIENTIFIC NAME) and common (COMMON NAME) names of federally-listed (FED) and state-listed (STATE) animals that have the potential to occur at APAFR. Each species is listed as endangered (E), threatened (T), a candidate for listing (C), a species of special concern (SSC), a Florida experimental population (FXN), or a species that is listed because of similarity of appearance to a listed species (S/A). State-level listings can include federally endangered (FE) and federally threatened (FT), which both supersede state listings, or state threatened (ST) when species are not federally listed. Common names that include an * have the potential to occur but have not been documented at APAFR. Although the bald eagle is not listed at the federal or state level, it is protected under the Bald and Golden Eagle Protection Act (BEA).

SCIENTIFIC NAME	COMMON NAME	FED	STATE
Eumops floridanus	Florida bonneted bat	E	FE
Puma concolor coryi	Florida panther	E	FE
Ammodramus savannarum floridanus	Florida grasshopper sparrow	E	FE
Aphelocoma coerulescens	Florida scrub-jay	T	FT
Picoides borealis	Red-cockaded woodpecker	E	FE
Caracara cheriway	Northern crested caracara	T	FT
Mycteria americana	Wood stork	T	FT
Rostrhamus sociabilis plumbeus	Everglade snail kite	E	FE
Haliaeetus leucocephalus	Bald eagle	BEA	
Grus canadensis pratensis	Florida sandhill crane		ST
Egretta caerulea	Little blue heron		ST
Egretta tricolor	Tricolored heron		ST
Egretta rufescens	Reddish egret*		ST
Athene cunicularia floridana	Florida burrowing owl		ST
Falco sparverius paulus	Southeastern American Kestrel		ST
Ajaia ajaja	Roseate spoonbill		ST
Grus americana	Whooping crane		FXN
Laterallus jamaicensis ssp. jamaicensis	Eastern Black Rail	T	FT
Drymarchon corais couperi	Eastern indigo snake	T	FT
Gopherus polyphemus	Gopher tortoise	C	ST

SCIENTIFIC NAME	COMMON NAME	FED	STATE
Pituophis melanoleucus mugitus	Florida pine snake		ST
Alligator mississippiensis	American alligator	T(S/A)	FT(S/A)
Neoseps reynoldsi	Sand skink*	T	FT
Eumeces egregius lividus	Bluetail mole skink*	T	FT

Table 2.3.4b Scientific (SCIENTIFIC NAME) and common (COMMON NAME) names of federally-listed (FED) and state-listed (STATE) plants that have the potential to occur at APAFR. Each species is listed as endangered (E) or threatened (T). State-level listings can include federally endangered (FE) and federally threatened (FT), which both supersede state listings.

SCIENTIFIC NAME	COMMON NAME	FED	STATE
Asclepias curtissii	Curtiss' milkweed		E
Calopogon multiflorus	Many-flowered grass-pink		T
Centrosema arenicola	Sand butterflypea		E
Clitoria fragrans	Pigeon wings	T	FT
Coelorachis tuberculosa	Piedmont joint grass		T
Garberia heterophylla	Garberia		T
Harrisella filiformis	Threadroot orchid		T
Hartwrightia floridana	Hartwrightia		T
Hypericum edisonianum	Edison's ascyrum		E
Lechea cernua	Scrub pinweed		T
Lechea divaricata	Pine pinweed		E
Lilium catesbaei	Catesby lily		T
Matelea floridana	Florida spinypod		E
Ophioglossum palmatum	Hand fern		E
Panicum abscissum	Cutthroat grass		E
Pinguicula caerulea	Blue-flowered butterwort		T
Pinguicula lutea	Yellow-flowered butterwort		T
Plantanthera integra	Yellow fringed orchid		T
Plantanthera ciliaris	Orange fringed Orchid		T
Plantanthera conspicua	White fringed Orchid		T
Platanthera cristata	Crested fringed orchid		T
Platanthera integra	Orange rein orchid		E
Platanthera nivea	Snowy orchid		T
Pogonia ophioglossoides	Rose pogonia		T
Polygonella basiramia	Wireweed	E	FE
Pteroglossapis ecristata	Giant orchid		T
Rhynchospura megaplumosa	Large-plumed beak-rush		E
Sarracenia minor	Hooded pitcher plant		T

SCIENTIFIC NAME	COMMON NAME	FED	STATE
Schizachyrium niveum	Scrub bluestem		E
Spiranthes laciniata	Lacerate ladies-tresses		T
Spiranthes longilabris	Longlip ladies-tresses		T
Stylisma abdita	Scrub stylisma		E
Thelypteris serrata	Toothed maiden fern		E
Tillandsia balbisiana	Inflated and relaxed wildpine		T
Tillandsia fasciculate	Common wild-pine		E
Tillandsia utriculata	Giant wild-pine		E
Zephyranthes simpsonii	Rain lily		T

2.3.4.2 Climate Change vulnerabilities

Birds:

The bird species that are most vulnerable to climate change are species that are dietary specialists (e.g. Everglade snail kite; *Rostrhamus sociabilis plumbeus*), habitat specialists (e.g. red-cockaded woodpecker; *Leuconotopicus borealis*), reliant on aquatic habitat (e.g.wood stork; *Mycteria americana*), or susceptible to drought. There is some uncertainty regarding the impact(s) climate will have on the populations of these species since the vulnerability is reliant on an indirect though essential impact. Bald eagle (*Haliaeetus leucocephalus*) and Florida scrub-jay (*Aphelocoma coerulescens*) are moderately vulnerable due to the majority of the impact being to habitat and uncertain (Florida scrub-jay, bald eagle) or because direct impacts may be mitigated by generalist behavior (bald eagle).

Mammals:

There are two endangered species that occur on APAFR which are the Florida panther (*Puma concolor coryi*) and Florida bonneted bat (*Eumpos floridanus*). The projected increases in temperature could cause habitat loss and issues with food stashing.

Plants:

The number one threat to plant species on APAFR is habitat loss due to projected increases in temperature. Additionally, the projected increase in precipitation could benefit plants even more by helping reduce drought conditions that can negatively impact drought intolerance, germination, seed mortality, and/or overall population dynamics. The projected increase in temperature can also impact plant productivity or population dynamics. However, the projected increase in precipitation could counterbalance the negative impact of increased temperature on plant species.

Reptiles:

Overall, the largest threats to APAFR reptile species include the projected increase in temperature. The projected increase in temperature could impact APAFR reptile species by causing things such as desiccation, habitat loss, and hatchling deformities. However, the projected increase in precipitation on the base could offset the projected increase in temperature on reptile species' habitats and desiccation rates.

2.3.5 Wetlands and Floodplains

APAFR is dominated by large expanses of pine flatwoods with open prairies, emergent marshes, and forested swamps. APAFR is drained by several natural streams and man-made storm water management canals that flow, in general, either south and west to Arbuckle Creek or south and east to the Kissimmee River. APAFR also contains numerous natural ponds, manmade ponds, marshes,

springs, sloughs and other wetlands. These wetlands constitute approximately 54,300 acres of the installation (Figure 2.3.5).

An extensive review of the wetlands within the installation was conducted in 1993-1994 and resulted in a determination of jurisdictional wetland boundaries in 1996 IAW USACE jurisdictional criteria at that time. Adjustments to these delineations have been completed to reflect hydrologic changes associated with work done on the installation and to reflect updated jurisdictional criteria, which were developed and implemented by the USACE since 1996. No significant additions to or removal from jurisdictional lines have occurred as a result of the updated criteria. Wetlands within the installation boundary are considered for both Federal and state jurisdiction during project and/or impact analysis. Since the 2006 ruling on wetland delineations, USACE and SFWMD are consulted to determine whether impacted wetlands have a significant nexus to navigable waters. Original wetland inventories and delineations are available in the original hard copy form and also in geospatial formats for use in mapping purposes IAW AF data standards.

APAFR contains 28,647 acres of floodplains as determined by the Federal Emergency Management Agency in 2009. EO 11988 directs federal agencies to avoid building in floodplains. Many components of APAFR's existing infrastructure (buildings, utilities, transportation networks) were constructed in floodplains, but were completed prior to EO 11988 and will therefore be maintained in their current locations. Through the NEPA review process, careful consideration is given to proposed projects occurring in floodplains and a Finding of No Practicable Alternative is requested if floodplains cannot be avoided.

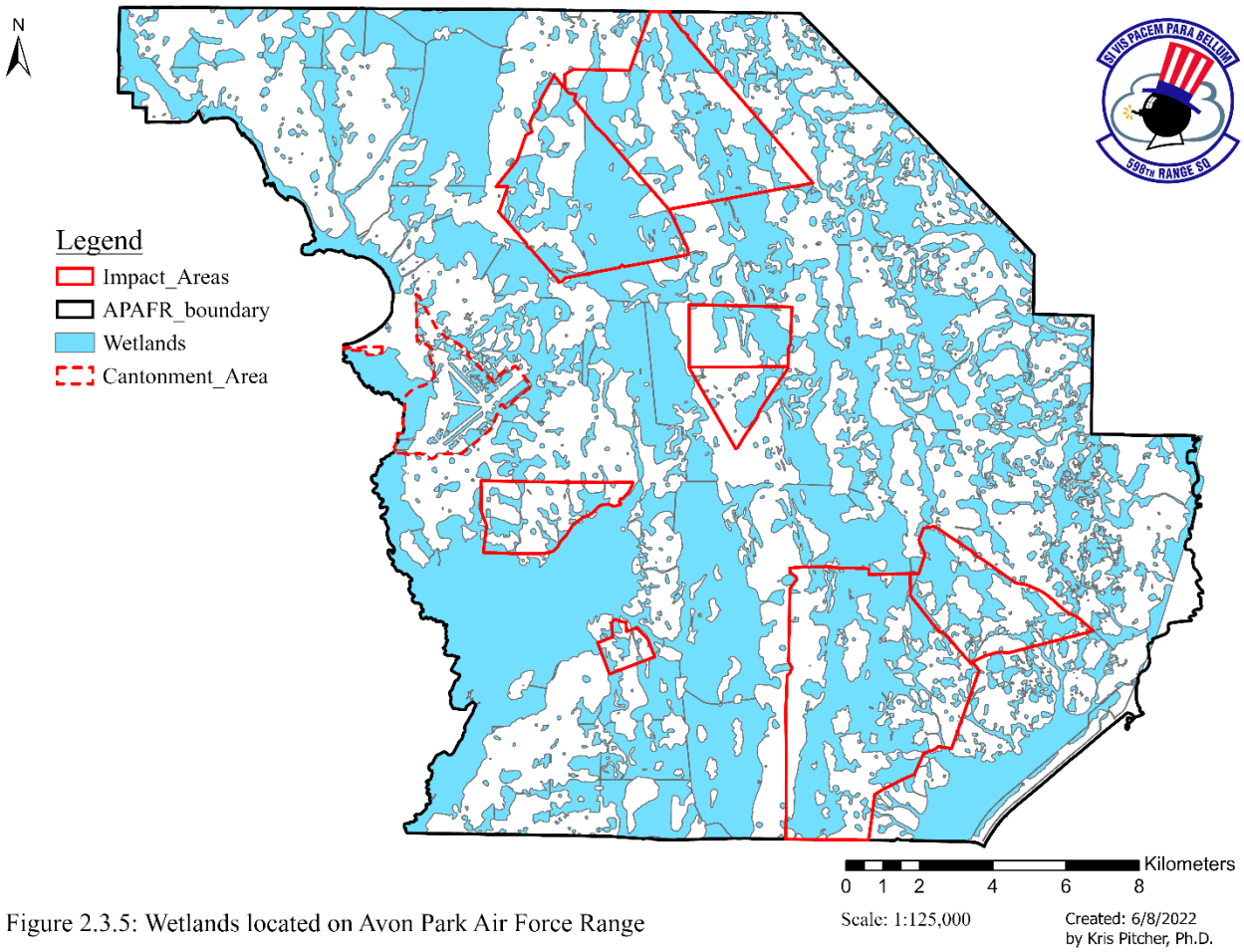

Figure 2.3.5: Wetlands located on Avon Park Air Force Range

2.3.6 Other Natural Resource Information

APAFR works closely with state, regional and local conservation and research organizations for biological inventories of plant and animal species not maintained by APAFR staff. These include, but are not limited to:

- Yearly white-tailed deer spotlight surveys conducted through the Outdoor Recreation department.

- Quail surveys conducted through the Outdoor Recreation department.

- Florida scrub lizard surveys to detect the presence or absence throughout suitable habitat at APAFR.

- Gopher frog audio monitoring and dip net tadpole surveys for the presence or absence in suitable habitat at APAFR.

- Flora surveys, monitoring, and data collection for use in university and other scientific projects.

2.4 Mission and Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

There are inherent limitations to the ability of the physical and biotic components of the APAFR landscape that may present constraints for military training. A primary constraint is the presence of wetlands. These sites are generally unsuitable for training missions due to the instability of the soil and the presence of water. A second primary constraint is the presence of a variety of federally protected T&E plant and animal species. APAFR has been successful in de-conflicting potential constraints by ensuring advanced natural resource/range operations planning while maintaining an open and constructive dialogue between range operations staff, natural resources staff and outside regulatory agencies. The natural resources staff makes a concerted effort to support the military mission and training requirements while implementing ecologically sound management practices. The APAFR GeoBase includes spatial data related to the possible constraints that might arise if further development of training or other infrastructure is needed. The GeoBase includes spatial information on all federal T&E species located at APAFR, hydrologic information, vegetation communities, and other important natural resource information. It also includes information on other state or globally-imperiled species occurring at APAFR that might not be protected under federal regulations but are still monitored by natural resource staff.

APAFR's mission as a year-round air and ground forces training area requires a diverse assemblage of vegetation communities to provide varied and realistic training opportunities. The primary threat to the military mission at APAFR due to climate change is the potential for shifts in vegetation communities due to an increase in temperature, decrease in precipitation, and an increase in wildfire frequency and/or intensity. Changing habitat due to vegetation community shifts could lead to an increased regulatory environment or loss in training realism.

Future impacts to the mission at APAFR linked to climate change could include:

- increases in temperature and wind velocity leading to unsafe environmental conditions for the launch of current and planned weapons and equipment, resulting in increased maintenance requirements, requirements for new equipment, or decreased launch capacity (DoD, 2014);

- increased dust generation affecting equipment and visibility (DoD, 2014);

- increased wind velocities damaging vital mission infrastructure (Sydeman et al., 2014); increased drought potential (Glick et al., 2011);

- potential loss of future training areas that may be needed in light of a changing geopolitical landscape and base realignment.

In addition to these direct effects, climate change has the potential to disrupt the acquisition and transportation of materials required for the maintenance, construction, and storage of the equipment required for these systems (DoD, 2014).

2.4.2 Land Use

While all approximately 106,000 acres of APAFR are reserved for current and future military training opportunities, the areas are broken down into three major categories. They are: Impact and Training Areas, Safety Buffer Zones and Mission Support Areas. Current use allocation, as of 2016, is as follows:

Safety Buffer Zones (Unimproved)	81,532 Acres
Training and Impact Areas (Semi-Improved)	22,677 Acres
Mission Support Areas (Improved)	1,791 Acres

2.4.3 Current Major Impacts on Natural Resources

Current impacts to the environment at APAFR result from flight training activities with training ordnance delivery, ground training activities and industrial activities (e.g. vehicle maintenance, facility maintenance). Typical impacts resulting from the APAFR mission include generation of regulated substance due to industrial activities, noise from overflights and training ordnance use, fire from ordnance, ground disturbance resulting from range maintenance activities such as target placement, road repair and cross country travel with military equipment, access restrictions during ordnance delivery and restoration of historically contaminated sites. The current major impacts are described in the subsections below. Further environmental remediation and compliance procedures can be found in the 2016 APAFR Integrated Solid Waste Management Plan (ISWMP; Appendix G).

Hazardous Waste and Petroleum Products

Hazardous wastes are generated as a result of routine mission activities. The primary hazardous waste generating activities at APAFR include vehicle and target setup and maintenance. Prior to their use on the range, targets are “sanitized” to remove hazardous constituents. Materials removed from targets include petroleum, oil, and lubricants, batteries, radioactive dials, refrigerants, and antifreeze, among other things. Fluids are tested to determine whether they should be disposed as hazardous or non-hazardous waste. Other materials, including batteries and refrigerants, are collected and recycled, when possible. APAFR stores and uses relatively small amounts of oils, paints, solvents, thinners, adhesives, gasoline, cleaners, batteries, acids, bases, and compressed gases. APAFR is classified as a conditionally exempt small quantity generator as defined by federal regulations. APAFR typically produces between 100 and 1,000 kg of hazardous waste per month.

The Hazardous Waste Management Plan (HWMP) (Appendix H) identifies hazardous waste generation areas and addresses the proper packaging, labeling, storage, and handling of hazardous material. The plan also addresses: record keeping. spill contingency and response requirements, education and training of appropriate personnel in the hazards, safe handling and transportation of the materials, and a waste analysis plan for each hazardous waste stream associated with the range. The development, maintenance, and implementation of the HWMP are the responsibility of Environmental Flight, as administered through the Hazardous Waste Program Manager. The overall responsibility of the hazardous waste management program (through which the HWMP is implemented) resides with Range Management. There are several

areas where hazardous waste is collected and/or stored. The Central Accumulation Point, located in Building 27, is used as the central collection point for the installation, where hazardous waste may be stored for up to 180 days prior to off-site disposal. There are also numerous Satellite Accumulation Points (SAPs) located throughout the installation. SAPs are located at or near the point of generation of a hazardous waste. Once their storage capacity is met, hazardous wastes are transported to the Central Accumulation Point for off-site disposal. SAPs are located at the FLARNG UTES facility and the Vehicle Maintenance shop (Building 28). The variety of wastes includes contaminated soil, waste paint and paint thinner, wash rack residue, spill absorbent material and debris, and used batteries and fluorescent bulbs.

All generated wastes are disposed of at permitted off-site facilities. Oily rags, lead-acid batteries, and waste paint material are disposed through the Defense Reutilization and Marketing Organization. Fuel filters from UTES are recycled through the FLARNG. Used oil generated at APAFR is managed as recyclable material. Characterization of waste is conducted IAW 40 CFR 279.11 to ensure the used oil meets specifications for exclusion as hazardous waste. Used oil removed from vehicles and power equipment is containerized at the Vehicle Maintenance shop and transferred to an oil recovery storage tank.

Environmental Restoration Program

The Environmental Restoration Program (ERP) is a DoD program designed to identify and remediate past environmental contamination on its installations. Procedures for handling, storing, and disposing of hazardous waste prior to the mid-1970s have resulted in contamination of the environment, although the procedures were standard at the time. The ERP process evaluates past disposal sites, controls migration of contaminants, controls potential hazards to human health and the environment, and conducts environmental restoration activities. Preliminary assessments are followed by site inspections, remedial investigations, and feasibility studies. Responses may include Land Use Controls (LUCs), which could restrict future land use activities. Sites closed with LUCs are identified on APAFR Geographic Information System (GIS) maps and any proposed land uses on these sites will be reviewed during the approval process to ensure actions are in conformance with established LUCs. DoD coordinates ERP activities with U.S. Environmental Protection Agency and appropriate state agencies.

Historical ERP sites have been investigated and/or remediated on APAFR since 1981. The “72” ERP sites plus “2” Areas of Concern (AOCs), previously managed in the Air Force Restoration Information Management System under the ERP, are listed as Solid Waste Management Units (SWMUs) in the Hazardous Solid Waste Amendments (HSWA) portion of the Resource Conservation and Recovery Act (RCRA) permit (issued 14 Dec 07). One additional compliance site (Munition Burial Site [MBS] No.31, NE Echo Range), which was investigated during 2007 and 2008, is listed in the Corrective Action Management Plan under the HSWA portion of the RCRA Permit. Since this MBS is within an active impact area, the site is restricted to public access.

From the “72” ERP sites, 28 MBSs plus the Old Abandoned Foxtrot Range (AOC-109 - SWMU 70) were transferred to the Range’s Compliance Program around 2006. AOC-109 was closed as No Further Action (NFA) on 22 September 06. Approximately ½ of the MBSs are within active impact areas and the remaining ½ are outside the impact areas. The MBSs within the impact areas have restricted public access and the MBSs outside the impact areas have been remediated (swept and covered) via the Compliance Program. Four (4) additional compliance sites (Bldg 74/75 former petroleum, oil and lubricants storage - SWMU 30, Bldg 73 OWS - OW-C500, Charlie Range Center Tower AST - Bldg 1059A - SS-C502, and Bravo Range Center Tower AST - Bldg 1052 - SS-C503) were validated by URS as eligible Compliance Restoration Program Sites in their September 2009 Final Evaluation Report. This validation resulted in the transfer of these 4 sites from the Compliance Program to the Compliance Restoration Program on 1 October 2009.

With the exception of the contaminated vat water remaining in Cattle Dip Vat A and C (ERP site OT-59), none of the ERP sites, MBSs, Compliance Program sites, or Compliance Restoration Program sites would

be considered to have a substantial impact on natural resources. Currently, a Statement of Basis is being prepared for FDEP review, which will follow with a review period of 45 days for public comment to address any contamination and/or archeological issues at these two dip vats, as well as any other dip vats (e.g. Charlie Range dip vat D). During early 2009, soil was removed from vats A, C, and D. Groundwater was treated at dip vat D. Currently, the groundwater is being monitored at all dip vat sites; A, C, and D. Dip vat B was closed years ago as No Further Action.

Water Management Program

The APAFR Water Management Program monitors the domestic water distribution system, wastewater distribution system and water supply availability for the installation. Water wells, monitoring wells and water quality at specified sites and buildings are monitored for impacts and consistency. There are 21 non-potable shallow aquifer water wells located within APAFR. These wells are not regulated and supply a non-potable water source outside of the cantonment area (e.g. campgrounds, impact areas). There are 10 cattle wells located throughout the grazing units. These wells provide water to cattle during times of drought. The facility also has 44 deepwater monitoring wells (>20 feet), as well as 444 shallow monitoring wells (<20 feet) that are located on the facility; these monitoring wells provide many different functions, which range from monitoring the environmentally-regulated program sites to the testing of groundwater contaminants throughout the installation.

APAFR currently does not own or operate a wastewater treatment plant (WWTP). Industrial wastewater that is generated from APAFR is hard piped to the AVPCI WWTP. All sanitary wastewater that is generated is also hard piped and sent to the AVPCI WWTP. AVPCI is responsible for all compliance reporting and submittals of monthly discharge monitoring reports; however, these reports are also sent to the Water Program for analysis and in response to data requests from the AF.

AVPCI currently operates 4 domestic deepwater wells that facilitate two water treatment plants for the facility. AVPCI is responsible for all compliance reporting and submittals of the monthly operating reports and, again, these reports are also maintained by the APAFR Water Management Program for analysis and response to data calls from the AF. APAFR also monitors the information provided by the prison facility to insure that continued usage is available to the installation facilities.

Stormwater that is generated on APAFR is discharged into the surrounding water bodies by a series of drainage ways and streams (e.g. Morgan Hole Creek, Tick Island Slough, and Rim Canal). The only stormwater that is monitored is from the containment area surrounding the airfield. This stormwater is monitored per the National Pollutant Discharge Elimination System (NPDES) Multi-Sector Generic Permit for Industrial Activities, which was issued to APAFR by FDEP.

Noise

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses (e.g. housing tracts or industrial plants). Transient noise sources move through the environment, either along established paths such as roads, or randomly such as military vehicles operating in a maneuver area. Responses to noise are widely diverse, varying according to the type of noise, the characteristics of the sound source, the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source and the receptor (a person or animal).

Noise level zones are analyzed and mapped so the installation, public, and local city planners can work together employing compatibility guidelines and land use planning techniques to ensure the land uses in these noise-impacted areas are compatible (AFI 32-7063; 2005). Noise level zones are mapped as part of the Air Installation Compatible Use Zone (AICUZ). These noise levels are depicted by a series of yearly

day-night average sound level (Ldn) contours. The noise contours are defined by three noise zones:

- Zone I - Acceptable (less than 65 Ldn)
- Zone II - Normally Unacceptable (65 Ldn - 75 Ldn)
- Zone III - Unacceptable (greater than 75 Ldn)

Compatibility zones are used in planning to prevent conflicts with noise-sensitive land uses, such as housing and hospitals. Generally, residential land use is not recommended at noise levels greater than 65 Ldn. Commercial, industrial, and agricultural (except livestock) land uses are compatible with most noise environments. In some cases, noise impacts can be mitigated by the incorporation of sound attenuation measures in new construction and renovated facilities.

Noise exposure around APAFR results primarily from aviation activities. The principal causes of noise at APAFR include: 1) aircraft operating at the airfield, 2) aircraft operating in airspace, and 3) ground-to-ground and air-to-ground ordnance deliveries. Aviation operations occur on a continuing basis and often involve fixed- and rotary-wing aircraft flight and the delivery of air-to-ground ordnance. In addition to aviation activities, ordnance delivery, including the firing of projectiles from weapons (muzzle blast at firing points) and the detonation of HE ordnance in the vicinity of the targets, results in blast noise, which is impulsive in nature and of short duration. Blast noise results from the FLARNG maneuver training using the Multiple Launch Rocket System (MLRS). These activities result in blast noise that is intermittent and confined to relatively small and contained areas. Although some additional noise on APAFR results from routine human presence and activities as well as vehicular traffic, noise from aircraft operations and their associated activities dominates the acoustic environment on APAFR.

Training Activity Impacts

Training activity impacts are classified as direct and indirect. Direct impacts include those activities that impact and alter affected sites. Such activities include ordnance release, target and training area construction and maintenance, off-road vehicle and equipment operation, and human activities, including site occupation during training. Indirect impacts include access and land use restrictions.

Of the approximately 40,000 acres utilized for military training, direct impacts vary according to types of activities, as described below:

- Air-to-ground targets. Approximately 25% of the land within target areas is altered by target construction and maintenance and ordnance impact. Ordnance generated wildfires will also occur in these areas.
- Training Areas. These sites include access trails and firing points for individual and crew-served weapons, maneuver areas for tracked weapons, bivouac areas and areas utilized for dismounted training. Virtually 100% of the lands approved for this type of use over time will be affected by training activities. Impacts vary from complete removal of vegetation for access routes to temporary or permanent damage to vegetation and soils.

Indirect impact includes access and land use restrictions that primarily result from safety restrictions as a result of military activities. Land use restrictions apply to over 25% of the installation as a result of on-going and historic military land use. Land uses such as forest management, habitat management, grazing and public access are all restricted in these areas. Temporary access restrictions in safety buffer zones also restrict support activities. At times, up to 100% of the range is closed to access as a result of military training activities. Restriction will require close cooperation with Range Operations so that access to active ranges can be obtained to monitor T&E species as required by terms and conditions identified in various Section 7 consultations.

2.4.4 Potential Future Impacts

The Five-Year Mission, outlined in the CRP, is a combination of the current mission at APAFR and the emerging missions. The emerging missions are activities that APAFR will begin to phase in over five years to move towards its vision to be the AF's premier East Coast air-ground training complex, relevant and sustainable, focused on the joint interagency multinational air-ground combat team while supporting compatible missions for National Defense. The emerging missions are defined below.

Air-Ground Training: Avon Park is a prime location for disparate elements to train for the air-ground battle. The ranges and airspace complemented by the Deployed Unit Complex (DUC) provide a unique opportunity for both air and ground units from all across the AF and DoD to deploy to APAFR and train on the lessons learned from the recent conflicts. The DUC and the airspace allow flying units to rehearse deployment into theater and flight into the threat environment. The combination of the ranges, barracks, dining facilities, landing strips, and support infrastructure allows ground units to deploy to field or cantonment area conditions capable of supporting rotary- and fixed-wing insertions, ground maneuver, and live fire. This unique capability to support ground training year-round makes APAFR best suited to support the air-ground mission. Its availability and flexibility make the complex an ideal place for large-scale exercises. The proximity of the Army divisions of the 18th Airborne Corps and the Navy's Amphibious Ready Group/Marine Expeditionary Unit training in the Atlantic Ocean and the Gulf of Mexico make Avon Park the perfect location for a joint exercise focused on coordinating and controlling the air-ground battle. AF Air Operations Centers can deploy to either MacDill AFB or APAFR. Army Corps and Division G-3 (Air) shops can deploy to APAFR, and the Navy can operate over either coast to control and de-conflict air operations over APAFR. Other smaller exercises could replicate this concept of operations (CONOPS) to exercise lower levels of command and staff utilizing the same facilities and airspace. As the complex develops, the focus will continue to be on the air-ground battle, but the operational tempo will level out as the mission shifts to training smaller units and developing joint doctrine for the air-ground fight.

RPA Operations: As Remotely Piloted Aircraft (RPA) and Uninhabited Combat Aerial Vehicles (UCAVs or UAV) are integrated further into the tactical mission of all services, their prominence in the air-ground fight is growing and will continue to grow. They will need to be integrated into the training environment both as reconnaissance and strike platforms. What makes APAFR so well suited to UAV operations is the airfield within restricted airspace completely under the control of the range operating agency. The combination of this element with the deployment capabilities of the DUC at MacDill AFB makes APAFR a unique asset where UAV units can deploy and operate their UAVs remotely or locally.

Bare Base Training: APAFR has a unique asset in that few ranges have a complete airfield within their restricted airspace. This airfield is an excellent location to conduct bare base training. APAFR has supported some of this training in the past but the new focus on the Expeditionary AF will turn into a need for additional training opportunities. The common link between all of these elements of the mission is the air-ground battle. Due to the nature of the enemy and terrain in the recent conflicts, services worked together for the first time in combat since the advent of information as an element of combat power. Managing the air-ground support for the ground commander was a major challenge. Since this part of battle is the nexus for information flow that must be correct and highly reliable, each facet of the enterprise had developed robust systems that had difficulty operating with each other. Hence, the focus of the vision and mission: bringing together the components of the air-ground battle to facilitate interoperability. Each of these components has been identified as a part of the air-ground battle.

Access Restrictions: As new weapons platforms, training activities and ordnance are fielded, access restrictions have the potential to impact the AF's ability to carry out land management activities. As these restrictions increase, the AF will be forced to review the practicality of continuing activities, such as forest management, agricultural outleasing, public access, game management and all associated activities required to maintain ecosystem health, such as monitoring, prescribed burning and habitat improvements**.**

3 Environmental Management System

The AF environmental program adheres to the Environmental Management System (EMS) framework and it's Plan, Do, Check, Act cycle for ensuring mission success. Executive Order (EO) 13693, *Planning for Federal Sustainability in the Next Decade*, U.S. Department of Defense Instruction (DoDI) 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and international standard, ISO 14001:2004, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the EMS framework.

The natural resources program employs EMS-based processes to achieve compliance with all legal obligations and current policy drivers, effectively managing associated risks, and instilling a culture of continuous improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

4 General Roles and Responsibilities

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in the table below. Specific natural resources management-related roles and responsibilities are described in appropriate sections of this plan.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Installation Commander	The 598 RANS commander ensures that the INRMP is developed and maintained, and serves the official signatory to the INRMP. The Commander also ensures that funding and staffing are sufficient to implement the INRMP.
Environmental Flight Chief	Provides guidance and oversight of the INRMP while working with the installation commander to ensure funding for natural resource management. Works with cooperating partners, agencies, and local municipalities for natural resource implementation.
Air force Civil Engineer Center (AFCEC)/Installation Support Team (IST)	Provide support to APAFR Natural Resources Program to plan, program, budget and execute natural resource projects, and support INRMP reviews, guidance and implementation.
Installation Natural Resources Manager/POC	Provides direct oversight for wildlife, outdoor recreation, and wildland fire management programs under the direction of the 598 RANS Environmental Flight Chief.
Installation Wildland Fire Program Manager	The Fire Management Officer (FMO) oversees the implementation of all wildland fire management at APAFR. Further information can be found in the Wildland Fire Management Plan.
Pest Management	A federal contracting agency (ASRC Federal) is responsible for the implementation and oversight of pest management at APAFR. Invasive and exotic species management within natural areas falls under the guidance of the AF Botanist and CSU/CEMML Invasive Species Coordinator.
Range Operating Agency	AF has control over the airspace and facilities at APAFR.
Conservation Law Enforcement Officer (CLEO)	APAFR CLEO is operated through FWC to provide law enforcement during peak times when outdoor recreationalists are on installation.
NEPA/ EIAP Manager	Provides coordination and oversight of the NEPA and EIAP between contracting agencies and Environmental Flight.
US Fish and Wildlife Service	APAFR has a USFWS/AF Liaison that handles all proposed AF actions regarding ESA Section 7 consultations. USFWS employs several individuals at APAFR for wildland fire management through the AF Wildland Fire Center.
Colorado State University/Center for Environmental Management of Military Lands (CSU/CEMML)	Provide support for wildland fire management through the AF Wildland Fire Center, invasive species management, wildlife monitoring, and cultural resource management.

5 Training

AF installation NRMs/POCs and other natural resources support personnel require specific education, training and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change, or to fulfill a permitting requirement.

Installation Supplement – Training

Natural resources management training is provided to ensure that base personnel, contractors, and visitors are aware of their role in the program and the importance of their participation to its success. Training records are maintained IAW the Recordkeeping and Reporting section of this plan. Below are key natural resources management-related training requirements and programs:

1. NRMs at Category I installations must take the course, DoD Natural Resources Compliance, endorsed by the DoD Interservice Environmental Education Review Board and offered for all DoD Components by the Naval School, Civil Engineer Corps Officers School.
2. All pesticide applicators at APAFR are required to have a Florida Commercial Pesticide Applicator's License with appropriate endorsements (e.g. Natural Areas, Aquatic, Right-of-Way). AF civilian personnel are required to complete the required DoD Pesticide Applicator certification. Further information can be found in the 2016 Integrated Pest Management Plan (IPMP) (Appendix F).
3. All Federal CLEO personnel must receive specialized, professional training on the enforcement of fish, wildlife and natural resources in compliance with the Sikes Act. This training may be obtained by successfully completing the Land Management Police Training course at the Federal Law Enforcement Training Center.
4. All personnel involved in wildlife and federally-protected plant capturing, translocations, and movement shall need to obtain the proper vaccinations and permits through state (FWC) and federal (USFWS) wildlife organizations.
5. BASH personnel receive flight line driver's training, training in identification of bird species occurring on airfields, and specialized training in the use of firearms and pyrotechnics as appropriate for their expected level of involvement. Further information can be found in the 2016 BASH Plan (Appendix C).
6. All Wildland Fire Management personnel receive National Wildfire Coordinating Group (NWCG) training. Further information can be found in the Wildland Fire Management Plan (WFMP) (Appendix B).

6 Recordkeeping and Reporting

6.1 Recordkeeping

The installation maintains required records IAW Air Force Manual 33-363, *Management of Records*, and disposes of records IAW the Air Force Records Management System (AFRIMS) records disposition schedule (RDS). Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook and in referenced documents.

Installation Supplement – Recordkeeping

APAFR follows the guidelines and recommendations set out in AF Manual 33-363, *Management of Records*.

6.2 Reporting

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting AFCEC Media Manager and Subject Matter Specialists should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement –Reporting

APAFR follows the guidelines and recommendations set out in the Environmental Reporting Playbook for proper guidance and execution of data gathering, quality control/assurance, and report development.

7 Natural Resources Program Management

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

Installation Supplement –Natural Resources Program Management

Natural resources management is an inherently integrated process. While this chapter discusses each program separately, it must be noted that each of the strategic priorities of the APAFR Environmental Flight involves multiple program elements. Projects involving multiple programs will be described under the program with primary responsibility for the project, and referenced in subsequent sections. All INRMP projects support achievement of the four overarching principal goals stated in the Work Plan of this INRMP.

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation IS required to implement this element.

Program Overview/Current Management Practices Demand for hunting, fishing and recreation

Outdoor Recreation Program issues approximately 900 hunt permits, and 1000 non-hunt recreation permits annually. Non-hunt recreation permits include non-hunt companion, annual recreation, and weekend passes. APAFR is an important regional location for hunting, fishing, camping, birding, hiking and bicycling. APAFR provides recreation opportunities to military forces, being centrally located, two hours from MacDill AFB and two and half hours from Patrick AFB. As one of the largest public lands that offers hunting and fishing opportunities to the public, APAFR provides a vital link between the military and local citizens. The cultural significance for outdoor recreation opportunities is rooted in decades of access to APAFR for these opportunities.

Suspension of Outdoor Recreation Privileges System

If a CLEO cites an individual, a written report will be filed with the Outdoor Recreation Program in addition to a citation for violation of any federal, state, or APAFR-specific law(s) or regulation(s). Outdoor Recreation Personnel will file a written report to the Installation Commander if a law enforcement officer gives a warning. The Outdoor Recreation Program Manager will send a report of all violations documentation to the installation commander with a recommendation for the action to be taken: this report will be routed through the Outdoor Recreation Program supervisor and the Environmental Flight Chief for their coordination prior to being received by the Installation Commander. The installation commander will then decide the level of intervention, including but not limited to a warning, suspension of outdoor recreation privileges, or recommended barrment from APAFR. The individual will be informed of this decision by mail.

Nuisance wildlife problems and techniques used for control

The BASH program handles nuisance wildlife problems within the cantonment area and airfield. See INRMP section 7.12.

Feral animals

The Outdoor Recreation Program, in conjunction with the Invasive and Exotic Species program, controls feral hogs via hunting. USDA traps hogs outside of hunting seasons.

Requirements for Fish and Wildlife Habitat Improvements

Outdoor Recreation Program works with the Forest Management program and Wildland Fire Management program to make improvements to wildlife habitats. Refer to Section 7.4, 7.8, and 7.9 for further information.

Measures to protect significant fossil resources

Archaeological resources on the installation are protected by the Archaeological Resources Protection Act (ARPA) of 1979 (Public Law 96-95; 16 U. S. C.470 aa-mm) as amended. Removal of protected materials is punishable according to the rules and regulations laid out in ARPA.

Archaeological resources are defined as “any material remains of past human life or activities that are of archaeological interest.” To qualify, these materials must be at least 100 years old. This definition applies to all prehistoric materials, except arrowheads found on the surface, and to historic remains over 100 years old. Many homesteads at APAFR were founded in the late 1800s and are protected under ARPA. All outdoor recreationists and permit holders are briefed when their permit is received about the presence of cultural resources at APAFR and the proper method of contact if encountered. Please see the APAFR Integrated Cultural Resources Management Plan (ICRMP; Appendix E) for further information.

Climate Change Vulnerabilities

Fish and wildlife management on APAFR is not likely to change greatly in response to climate change. Invasive wildlife species are likely to persist in the future. Fish and wildlife surveys should be conducted routinely in order to monitor changing wildlife communities. Spread of new vector-borne diseases or increased rate of vector-borne diseases are likely to rise due to a combination of climate change (Githeko et al., 2000) and spread of invasive species driven by climate change. Invasive species management strategies should be flexible enough to adapt and accommodate an evolving array of issues (Hellmann et al., 2008).

Potential for algal blooms will increase as temperatures rise, which will further deplete dissolved oxygen content, decimating freshwater fish and amphibian population. Management efforts should focus on removal of non-native aquatic plants and algae as well as reducing nutrient rich run-off into water supplies to help maintain stable dissolved oxygen levels, which will reduce the chances of algal blooms. Providing shade through planting trees around water sources will help to prevent excessive increases in water temperature (Poff et al, 2002).

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation IS required to implement this element.

Program Overview/Current Management Practices

The Outdoor Recreation Program at APAFR is responsible for supporting the military mission while providing a location for military personnel and the general public to hunt, fish, camp, and hike. The program supplements the sustainable management of wildlife populations and habitat at APAFR. Fish, wildlife, and outdoor recreation resources are managed to support the military mission through an ecologically adaptive approach that is consistent with DoD and AF principles for ecosystem management and biodiversity conservation.

The Outdoor Recreation Program Operating Instructions (OI) (Appendix I) are referenced several times throughout this document. The Outdoor Recreation Program OI are updated yearly to reflect changes in the program's rules and regulations, made through an ecologically adaptive management process.

Hunting and Fishing Organization and Management

Classification of Recreational Opportunities

AFI 32-7064 requires the classification of AF managed property into the following categories to describe outdoor recreation opportunities.

- Class I areas (general outdoor recreation areas) are suitable for intensive recreational activities such as camping, winter sports, and water sports and usually have additional amenities and infrastructure in place that can better support more intensive activities.
- Class II areas (natural environmental areas) can support dispersed recreational activities, such as hunting, fishing, birding, hiking, sightseeing, jogging, climbing, and riding. These areas have the landscape, terrain and soils to withstand and absorb moderate traffic impacts.
- Class III areas (special interest areas) contain valuable archeological, botanical, ecological, geological, historic, zoological, scenic, or other features that require protection.

APAFR has no Class I developed recreational areas that are run by the Outdoor Recreation Program.

APAFR has two separate Class II dispersed recreational areas (Public Recreation Areas (PRAs) (Figure 7.2.1a) and Military Recreation Areas (MRAs) (Figure 7.2.1b)) as described in Outdoor Recreation Program OI section 6.1.

APAFR has many Class III special-interest areas that are not administered by the Outdoor Recreation Program. Their management is addressed elsewhere in the INRMP.

Off-Limits Areas: Areas designated by the installation commander as being off-limits to recreational hunting, fishing, trapping, and dispersed outdoor recreation by any person at any time. These are areas where mission security and safety concerns will not allow such use. These areas are delineated on maps for the PRA and MRA and marked according to AFI 13-212. No individuals participating in the Outdoor Recreation Program are eligible for access.

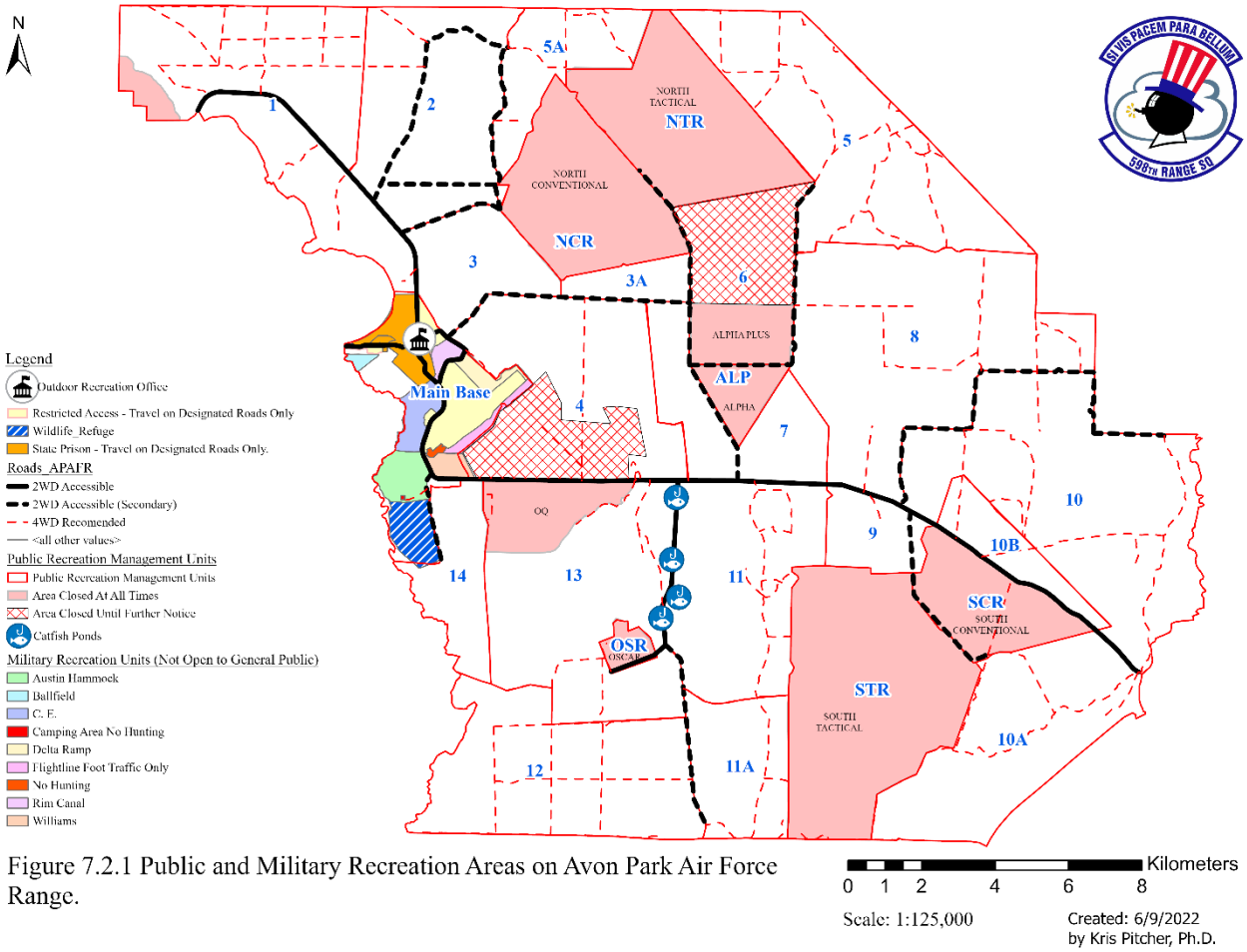

Figure 7.2.1 Public and Military Recreation Areas on Avon Park Air Force Range.

Participant Categories

Participant categories for permit holders are broken down into PRA and MRA categories. Refer to Outdoor Recreation Program OI Section 6.2.

Fee Structure

The fee structure is outlined in Outdoor Recreation Program OI for the PRA and MRA (Appendix I).

Providing Public Access

All permit holders are required to watch an UXO safety video before a permit can be issued. In addition to the UXO video, hunting permit holders are required to watch a hunt safety briefing. The PRA rules and regulations are explained in the briefing. All permit holders receive a copy of the Regulation summary and either an MRA or PRA map.

Once permit holders have been issued the appropriate permits they are instructed to follow the PRA access procedures outlined in Outdoor Recreation Program OI Section 8.4 (Appendix I).

Management Unit Concept

Outdoor Recreation Program OI Section 6.1 explains the management units in both the PRA and the MRA. Management unit configuration will remain compatible with current military weapons delivery system footprints to ensure the availability of the largest amount of recreation area without impact to the military mission.

Hunting Program

Deer (*Odocoileus virginianus*) and turkey (*Meleagris gallopavo osceola*) hunting are the most popular types of hunting at APAFR. The Sikes Act was also implemented to ensure that sustainable and ecologically-sound hunting and fishing opportunities were made available to the public on military installations when deemed compatible with the military mission.

APAFR includes the following hunting seasons: archery, muzzleloading, general gun, small game (squirrel, quail, and rabbit), and spring turkey seasons. Waterfowl and migratory bird season dates and bag limits are set by USFWS annually and those regulations are then adopted by FWC. Feral hogs may be harvested during archery, muzzleloading, general gun and specialized hog hunts. For specific season dates, refer to the Outdoor Recreation Program OI (Appendix I).

Hunting Program Management Activities

APAFR Outdoor Recreation Program conducts the following monitoring and management activities to maintain or improve hunting opportunities:

- Annually collect biological data from game species harvested on installation and during youth hunts.
- Monitor and analyze trends in game species populations using harvest data, call count transects and deer spotlight surveys, following established survey protocols.
- Annually adjust work schedules to have staff on-site during weekends and peak use days.

Youth Hunts

Youth deer, turkey and alligator hunts have been established to promote sustainable, quality hunts for youth and the Outdoor Dream Foundation. Youth deer hunts are held annually. Youth alligator hunts are held in ponds and streams located in the PRA, in partnership with the Federation of Christian Sportsman. All youth hunts are conducted within established FWC hunting season parameters and follow Florida Administrative Code rules and regulations. An educational program is given prior to any youth hunt.

Recreational Fisheries Program

Outdoor Recreation works with the USFWS fish hatchery for stocking three ponds and one lake at APAFR. The ponds are stocked primarily with catfish once every two years during spring. The primary purpose for pond stocking is to provide fish for an annual youth fishing derby every June.

Fishing Regulations

All ponds and streams within the areas open to outdoor recreation are open to fishing. State fishing regulations apply. APAFR specific fishing regulations are found in Outdoor Recreation Program OI Section 10.2.

General Recreation Program

APAFR Outdoor Recreation sells Annual Recreation, weekend permits that include the opportunities to fish, hike, bird watch, camp, and bicycle. Individuals who possess a valid hunt permit are not required to purchase a recreation permit. Camping and hiking regulations are outlined in Outdoor Recreation Program OI Sections 10.1 and 10.3. Bicycle regulations are located in Section 8.5.12.

Off Road Vehicles

Vehicle regulations are outlined in Outdoor Recreation Program OI Section 8.5.8. Trail blazing and cross country driving is not permitted.

Climate Change Vulnerabilities

Outdoor recreation and public access to natural resources at APAFR is not likely to be significantly impacted by climate change. Activities such as hiking, camping, walking, jogging, cycling, boating, fishing, and bird watching should remain intact and unimpeded by climate change in the future. Hunting and fishing opportunities will likely persist assuming native fish and wildlife populations remain healthy enough to sustain those activities. Hunting and fishing of non-native invasive species should continue and may become increasingly important wildlife management tools.

7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation IS required to implement this element.

Program Overview/Current Management Practices

APAFR does not provide law enforcement by AF personnel. The Outdoor Recreation Program currently works in cooperation with FWC officers to provide routine patrols within the PRA and MRA and on the Kissimmee River. The increased law enforcement presence has helped to reduce the number of permit holders violating APAFR OI regulations.

The Outdoor Recreation Program and FWC have a cooperative agreement that will provide 60 man hours per week of FWC law enforcement to patrol the PRA and MRA units.

State and Federal Jurisdiction of Fish and Wildlife

Florida owns and has jurisdiction over resident fish and wildlife throughout the state, including APAFR. The FWC, established by Article IV, Section 9 of the Florida State Constitution, is the governmental body responsible for the conservation of resident fish and wildlife. FWC establishes rules, regulations and season dates governing the taking of resident fish and wildlife species.
The USFWS has jurisdiction over migratory birds, federally-listed T&E species, and freshwater and anadromous fish. APAFR is required to comply with federal fish and wildlife laws such as the Endangered Species Act (ESA), which prohibits the unauthorized taking of a federally-listed T&E species. ESA requires that federal agencies conserve these species and consult with the USFWS on actions that may affect them.

7.4 Management of Threatened and Endangered Species, Species of Concern and Habitats

Applicability Statement

This section applies to AF installations that have T&E species on AF property. This section IS applicable to this installation.

Program Overview/Current Management Practices

The management of state and/or federally-listed T&E species at APAFR is one of the cornerstones of the natural resources program. The monitoring and management of these species is a collaborative effort between AF, federal, state, private, and non-governmental organizations. Each T&E species managed at APAFR is described in this section with a brief overview of the species and its listing status, followed by the past management efforts, historical population trends, conservation measures and terms and condition associated with USFWS consultations and proposed future management efforts at APAFR.

Audubon's crested caracara

The Audubon's crested caracara, hereby referred to as caracara, (*Polyborus plancus audubonii*; more recently *Caracara cheriway*) is a federally threatened bird that received protection in 1987 (USFWS 1999). The caracara's primary threat at the time of listing was habitat loss, as much of the dry prairie habitat on which it depends had been destroyed or modified for agriculture and residential development.

The caracara is a medium-sized, diurnal, non-migratory raptor species that occurs in Florida as well as the southwestern U.S. and Central America. This species is found in prairie habitat of central and south Florida. It ranges from northern Brevard County throughout the southern regions of Florida with the largest concentration found in Glades, Desoto, Highlands, Okeechobee, and Osceola counties (USFWS 1999). It commonly occurs in dry or wet prairie areas with scattered cabbage palms (*Sabal palmetto*) but may be found in lightly wooded areas and improved or semi-improved pastures. Caracara are highly opportunistic in their feeding habits, eating carrion and capturing live prey including invertebrates, fish, snakes, turtles, birds, and mammals (USFWS 1999). Nests are usually well-concealed and constructed of interwoven vines, tree stems, woody shrubs, grasses, as well as synthetics that are trampled down to form a depression (Smith and Scholer 2013). Nesting usually occurs in the tops of cabbage palms but may be found in other tree species that provide concealment.

Caracaras have been viewed at APAFR routinely, engaging in all types of behavior including foraging and nesting. Previous monitoring efforts have found the presence of at least one nest, with the possibility of more nests occurring within the Kissimmee floodplain portion of APAFR (Figure 7.4.1). APAFR natural resources staff work closely with state (SFWMD, FDEP) and other federal agencies (USFWS) to monitor caracara activity in the Kissimmee floodplain. Surveys at APAFR are conducted according to the current USFWS monitoring protocol from the beginning of December through April, or until nests have been located and fate has been determined. Potential caracara habitat (dry and wet prairie, semi- and improved pastures) occurs in several locations throughout APAFR, including the South impact areas complex, pastures around the cantonment and airfield area, and Hard Luck/Tick Island Slough system. In February of 2021, APAFR staff worked with Dr. Joan Morrison of Trinity College to trap and fit an adult caracara from the one known nest on the property with a GPS transmitter. A GPS point is collected from the transmitter every 6 hours and is used to help determine if military training activities have any effect on the bird's movements.

As of March 2021, caracaras are covered under the CIP (2011), FLARNG HIMARS (2019), Upland Ridge Habitat Restoration (2019), Capturing Volant, Non-listed Animals and Range Operations (2020) BOs and Range Infrastructure Concurrence. All BOs and the concurrence contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the caracara, to enable the Air Force to

quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species.

Future restoration projects will focus on increasing and improving the amount and quality of prairie habitat to increase potential foraging and nesting areas for both caracara and the FGSP (*Ammodramus savannarum floridanus*). These will be concentrated within the South impact areas complex initially, with progression towards historic dry prairie habitat.

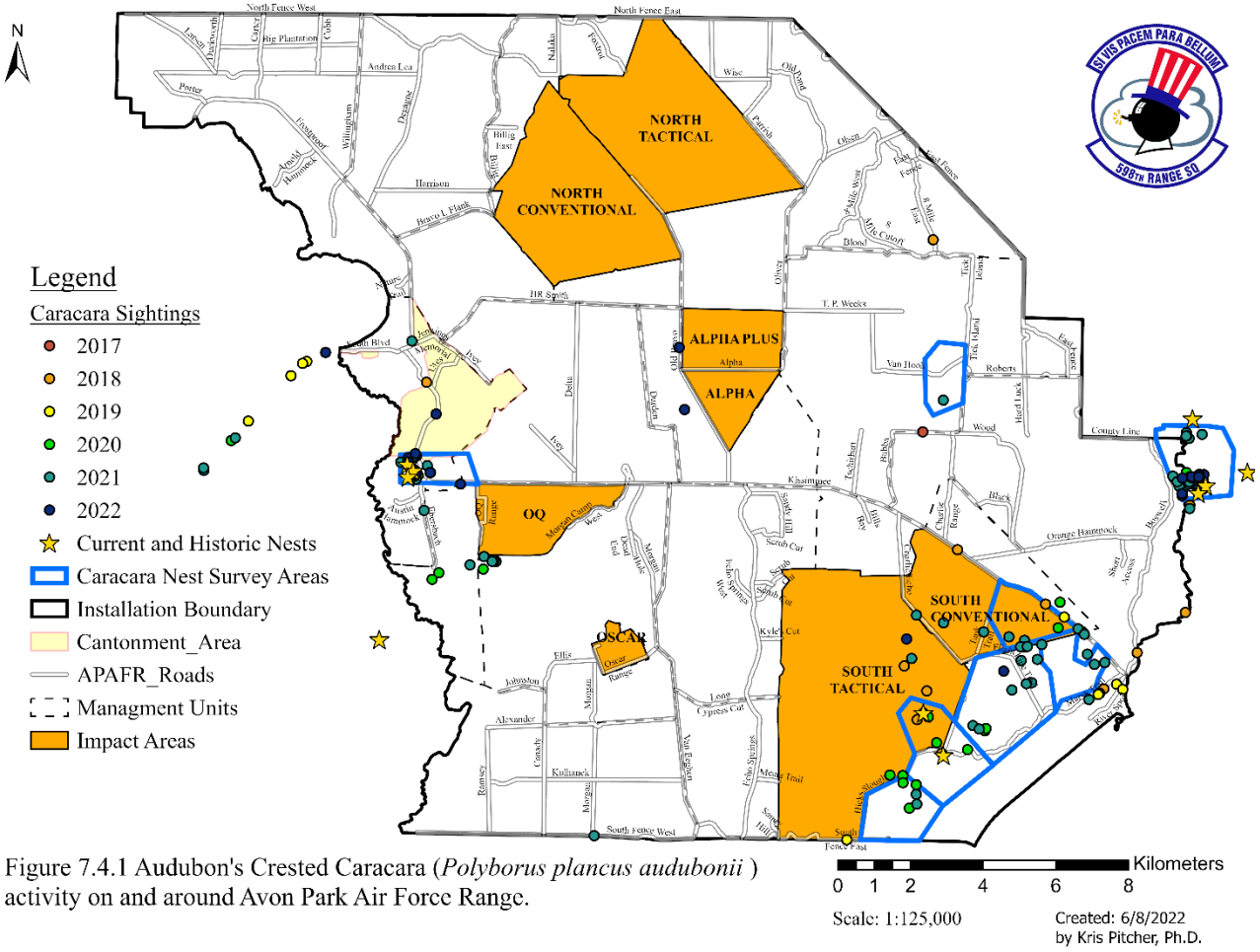

Figure 7.4.1 Audubon's Crested Caracara (*Polyborus plancus audubonii*) activity on and around Avon Park Air Force Range.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal T&E species list in 2007 and was removed from the State of Florida threatened species list in 2008 (FWC 2008). Although the bald eagle has been removed from the federal and state endangered and threatened species, it is still afforded protection through the Bald and Golden Eagle Protection Act (Eagle Act), the Migratory Bird Treaty Act and a state statue 68A-16.002, which requires a permit for activities occurring within 660-ft of an eagle nest.

The bald eagle was adopted by the U.S. as a national symbol in 1782, and is the only eagle unique to North America. Bald eagles may live 30 years in the wild and males and females pair for life. Bald eagles sometimes use nests year after year, and nests can become quite large after several years of use, weighing as much as 4,000 pounds. In hot climates, like Louisiana and Florida, bald eagles often begin nesting during the early winter (Buehler 2020). Bald eagles are known for their distinctive white head and tail, which they get after reaching maturity at 4 to 5 years old.

Although it would seem that ample potential nest trees and open water are available, there have been only six confirmed nests at APAFR (Figure 7.4.1). All known bald eagle nests are monitored on an annual basis for activity and are surveyed until nesting is completed. Bald eagles are reasonably common (albeit in low numbers) across APAFR with most occurrences near Lake Arbuckle, Kissimmee River, and along the south fence. In these areas where the presence of nests has been confirmed, APAFR will employ the guidance provided by USFWS to the fullest extent possible while operating under the constraints of the mission.

As of March 2022, the bald eagle does not have any active BOs at APAFR with specific conservation measures or terms and conditions because it is not a federally listed species. In addition, APAFR does not have any incidental take permits for the bald eagle via the Bald And Golden Eagle Protection Act.

APAFR utilizes an ecosystem approach to maintain its natural ecosystems and rangelands in as healthy a state as possible while still maintaining the integrity of the military mission. To avoid disturbing nesting bald eagles, USFWS makes the following general recommendations: (1) keep a distance between land management and military activities and active nest trees (distance buffers), (2) maintain preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoid certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers will be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

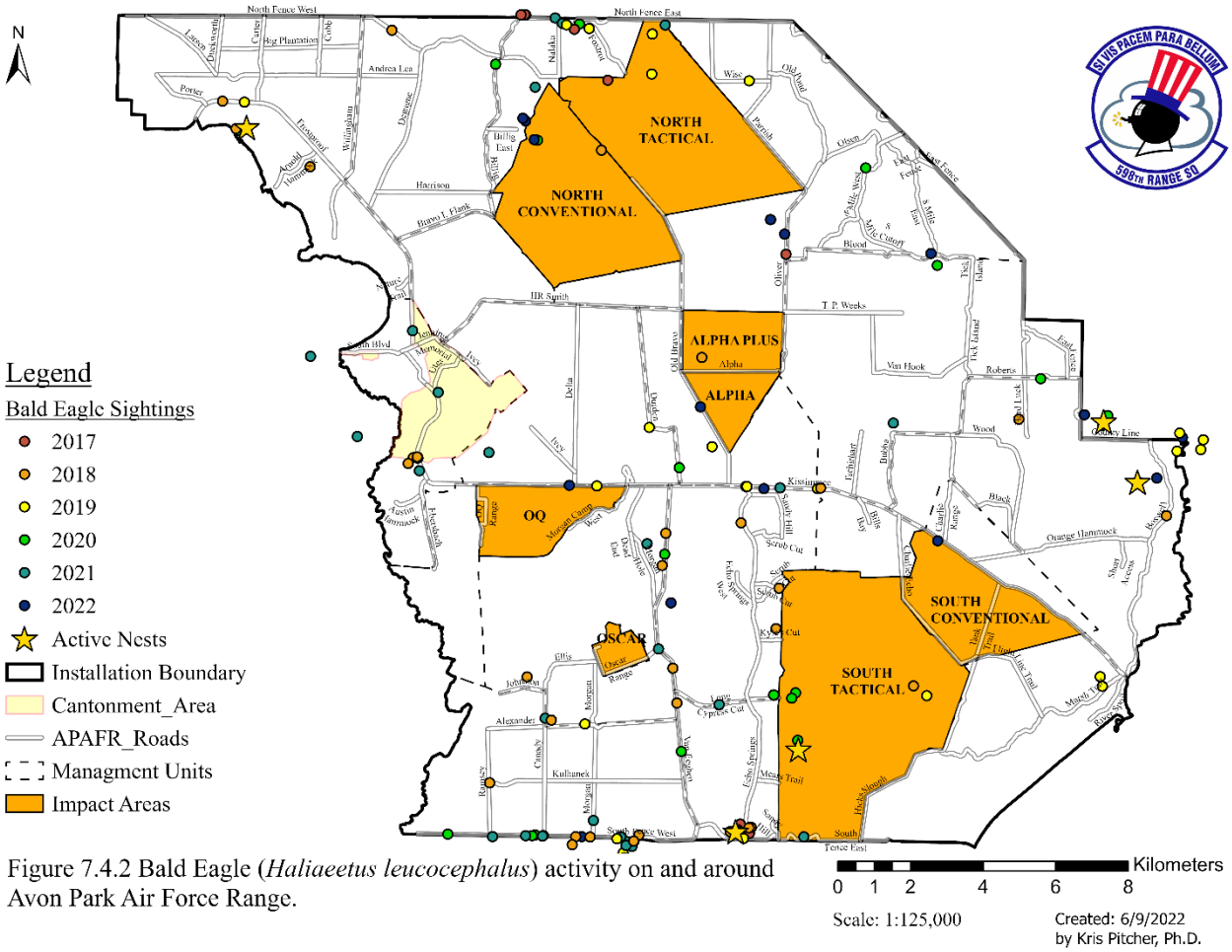

Figure 7.4.2 Bald Eagle (*Haliaeetus leucocephalus*) activity on and around Avon Park Air Force Range.

Eastern Black Rail

The eastern black rail, hereafter referred to as black rail (*Laterallus jamaicensis jamaicensis*), was listed as federally threatened in November 2020 and is protected under the ESA (USFWS 2020). Threats to this bird include loss and degradation of suitable habitat, particularly as marsh areas are lost to dredging, filling, and ditching or disturbed by grazing or agriculture (Eddleman et al. 2020).

The black rail is an extremely secretive marsh bird, making survey efforts difficult. The birds nest in salt marshes, shallow freshwater marshes, wet meadows, and flooded grassy vegetation. Due to their diminutive size, they require sites with shallower water than other rails. Coastally, their habitat is dominated by cordgrasses and characterized by infrequent tidal inundation (Eddleman et al. 2020). Much less is known about their habitat requirements and distribution inland and during the nonbreeding season. Up to three individuals were detected incidentally at APAFR in summer 2017, where they were believed to be using the edges of seasonal depression marshes and flooded areas of dry prairie (Figure 7.4.2). Black rails likely move around the landscape with changes in water levels, which occur not only seasonally but annually as well. It is unknown whether APAFR hosts a population of breeding, nonbreeding, and/or transient birds.

As of March 2022, the black rail is covered under the Range Operations (2020) BO at APAFR with specific minimization and conservation measures and terms and conditions. Most notably to monitor and manage federally listed species, such as the black rail, to enable the Air Force to quantify the amount of take from military and land management activities. APAFR natural resources staff works closely with federal (USFWS), state (FWC), and regional (Atlantic Coast Joint Venture) partners to design surveys and began formal acoustic surveys of black rails in spring 2021. APAFR will continue to monitor potential habitat for the presence and possible breeding activity of rails annually.

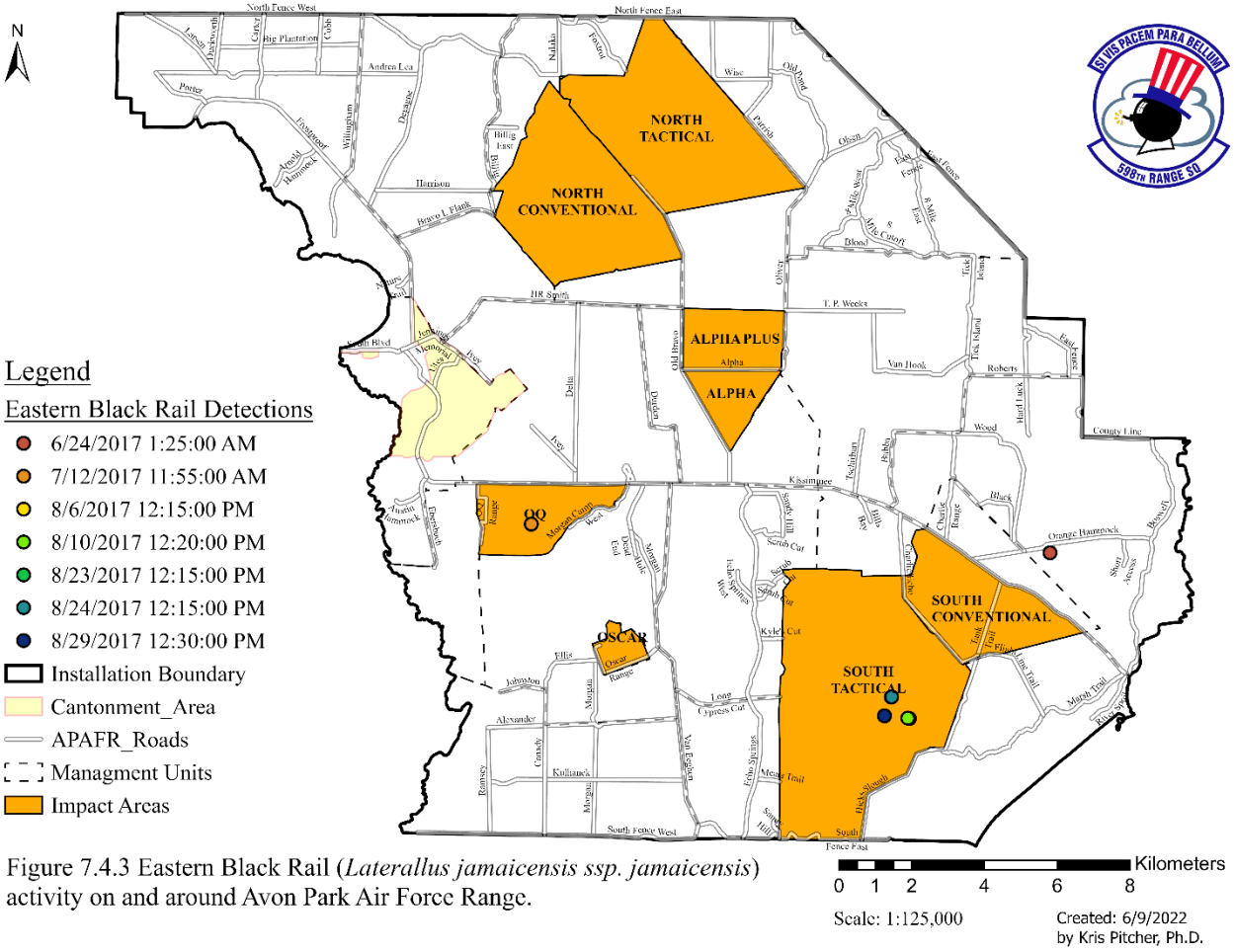

Figure 7.4.3 Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*) activity on and around Avon Park Air Force Range.

Everglade Snail Kite

The Everglade snail kite, hereafter referred to as snail kite (*Rostrhamus sociabilis plumbeus*) is a federally endangered bird that received protection with the passage of the ESA in 1973 (USFWS 1999). The snail kite's threats include degradation of the watersheds on which it depends as a result of urban development and agricultural activities.

The snail kite is a raptor species found primarily in lowland freshwater marshes throughout central and southern Florida. The Florida population of snail kites is considered to be a single population with a range largely restricted to Lake Okeechobee and the watersheds of the Everglades, Kissimmee Basin, and upper St. Johns Basin (USFWS 1999). APAFR falls within the boundaries of the Kissimmee watershed. The snail kite has a diet composed almost entirely of apple snails (*Pomacea paludosa*) and builds its nests primarily over water, which makes the snail kite's survival directly dependent on the hydrology and water quality of these watersheds (USFWS 1999, Reichert et al. 2020).

Historically, APAFR was in the floodplain of the Kissimmee River before the channelization accomplished by the USACE during the 1960s and 70s. This channelization dramatically reduced the amount of water that was allowed to breach the banks of the river and provide the necessary requirements for apple snail survival and reproduction. The restoration of the Kissimmee River, starting in the 1990s, allowed for the flooding of land directly adjacent to the river to occur again. This flooding includes the southeastern portion of APAFR, which is referred to as the Kissimmee Marsh. Water levels within the Kissimmee River are maintained through a series of locks controlled by the SFWMD. SFWMD's main goal is to provide flood control and water supplies to the citizens of central and southern Florida. These goals can result in water levels of the Kissimmee River, and associated floodplains, being kept at levels that are not within the historic hydrologic periods. This reduces the amount of access that natural resource staff have to the areas where snail kites can be found. With each portion of the restoration project, the likelihood of snail kites found utilizing APAFR as a nesting or foraging location increases. In the recent past, snail kites have been found incidentally on the Kissimmee River adjacent to APAFR but no nesting activity has been detected. However, evidence of nesting has occurred along the Kissimmee River just south of the APAFR boundary within the last 5 years

As of March 2022, the Everglade snail kite is covered under the CIP (2011) and Range Operations (2020) BOs at APAFR with specific minimization and conservation measures

APAFR natural resources staff works closely with federal (USFWS) and state (SFWMD, FDEP) personnel to conduct surveys and report any nest findings to the USFWS, FWC, and the One Florida Ecological Services office.

Florida grasshopper sparrow

The FGSP (*Ammodramus savannarum floridanus*) is a federally endangered bird that received protection in 1986 (USFWS 1999). The FGSP's endangered status is attributed to the loss and degradation of as much as 90% of the dry prairie habitat on which the species depends. This habitat loss is a result of conversion of native vegetation to improved pasture and agriculture. The historic distribution of the FGSP included most central counties in Florida from Alachua to Miami-Dade. Currently, there are six known populations of FGSPs, four occurring on public land (APAFR, KPPSP, TLWMA and Corrigan Ranch), one that recently was donated (2021) to the University of Florida (DeLuca Ranch), and a privately-owned tract of land north of KPPSP. All known properties have relatively small population sizes, most of which were declining or functionally extirpated until recently. A captive breeding and release program was initiated in 2015 and 2019, respectively, to bolster wild populations of this critically endangered bird and now two of the six public lands have seen significant increases in their populations.

The FGSP is a small, short-tailed, flat-headed sparrow endemic to the dry prairies of central and south-central Florida. It is a non-migratory subspecies of the migratory eastern grasshopper sparrow (*Ammodramus savannarum*). FGSPs are an elusive species that can be difficult to find outside of the breeding season. However, during the breeding season, males conspicuously perch on small bushes and sing a song with a definite insect-like quality (Sprunt 1954). Males sing this short primary song when establishing territories and a longer warbling song when mated. Females can usually be seen making paired flights with their mate.

Florida grasshopper sparrows have been monitored at APAFR since 1996 (Abraham et al. 2021). In 2018, the Air Force partnered with the Service to oversee monitoring and management of the threatened and endangered species program, including the FGSP, with work primarily done by researchers from Archbold Biological Station. The Archbold staff conduct point count surveys to identify the number of singing males, as well as nest searching and monitoring to locate females and identify if singing males are paired, and determine annual productivity. All the nests found are protected with predator-exclusion fencing, fire ant eradication, and preemptive nest lifting prior to periods of expected flooding (Hewett Ragheb et.al. 2021). The FGSP population at APAFR reached a peak estimate of 298 individuals in 1997. However, the population began to decline in 1999 and has been estimated at fewer than 15 individuals per year since 2003. At least four males (and possibly five) were detected during the 2021 breeding season, one of which was paired with a female and produced 8 fledglings from 3 successful nests. As seen in previous breeding seasons within the last decade, all males that were detected for more than one day set up and defended territories in the South Tactical impact area (Figure 7.4.5). Three of the males were banded and first detected at APAFR during previous breeding seasons. One un-banded male was detected in the High Explosives (HE) area and an additional male, which could have been the male from the HE area, was detected for one day on the Delta prairie and not seen again. It is unclear whether the HE and Delta males were different individuals.

In addition to being involved in the recovery efforts on APAFR, the Service and Air Force have provided support to initiate and maintain some of the efforts of the captive breeding and release program and to monitor and manage FGSPs on some of the non-public properties outside of the installation boundaries. These off-installation efforts have had the follow positive impacts:

1) The first multi-year increases for the largest population on public lands (TLWMA).

2) Reduced population decline at the second largest known population (DeLuca), which formerly occurred on private lands but recently was acquired by the University of Florida.

3) Built a strong case for the acquisition of an additional private property (Corrigan Ranch), which may be the third largest population of FGSPs.

All of these efforts exemplify the dedication of APAFR as a strong federal partner in the conservation of listed species and should provide increased regulatory certainty and mission flexibility both now and into the future.

As of March 2022, FGSPs are covered under the Critical Infrastructure Program (CIP: # 41420-2011- F-0310) (2011), Upland Ridge Habitat Restoration (2019), Capturing Volant, Non-listed Animals and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the FGSP, to enable the Air Force to quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species. In addition, the Range Operations BO has minimization and conservation measures to reduce disturbance at FGSP nests, especially with respect to fire, and requirements for EOD escorts to identify occupancy and nesting status of FGSPs in HE areas. FGSPs also are covered under their own Captive Breeding (FGSP: # 04EF2000-2015-F-0194) BO (2016) and an associated amendment (2016), which guides much of the current work done on this species, as well

as BOs covering the recovery work (2018), the 5 Year Vision for the FGSP program (2019) and an amendment to the 5 Year Vision BO (2021).

A critical step for FGSP recovery involves working to increase and maintain the amount of dry prairie habitat at APAFR. This includes frequent prescribed fires at the most ecologically relevant time of year, as well as using mechanical restoration to maintain the dry prairie habitat as a treeless ecosystem. The Service and Air Force continue to work collaboratively to maintain the suitability of dry prairie habitat at APAFR. Future work should continue to maintain and improve the core FGSP habitat that is occupied during the breeding season, improve the non-core (unoccupied) habitat where FGSPs have occurred historically, and connect core and non-core habitats through mechanical restoration and fire. This habitat management will promote expansion of the population from primarily occupying the HE area on the active southern range to other prairie habitat on the installation, thus enhancing military flexibility.

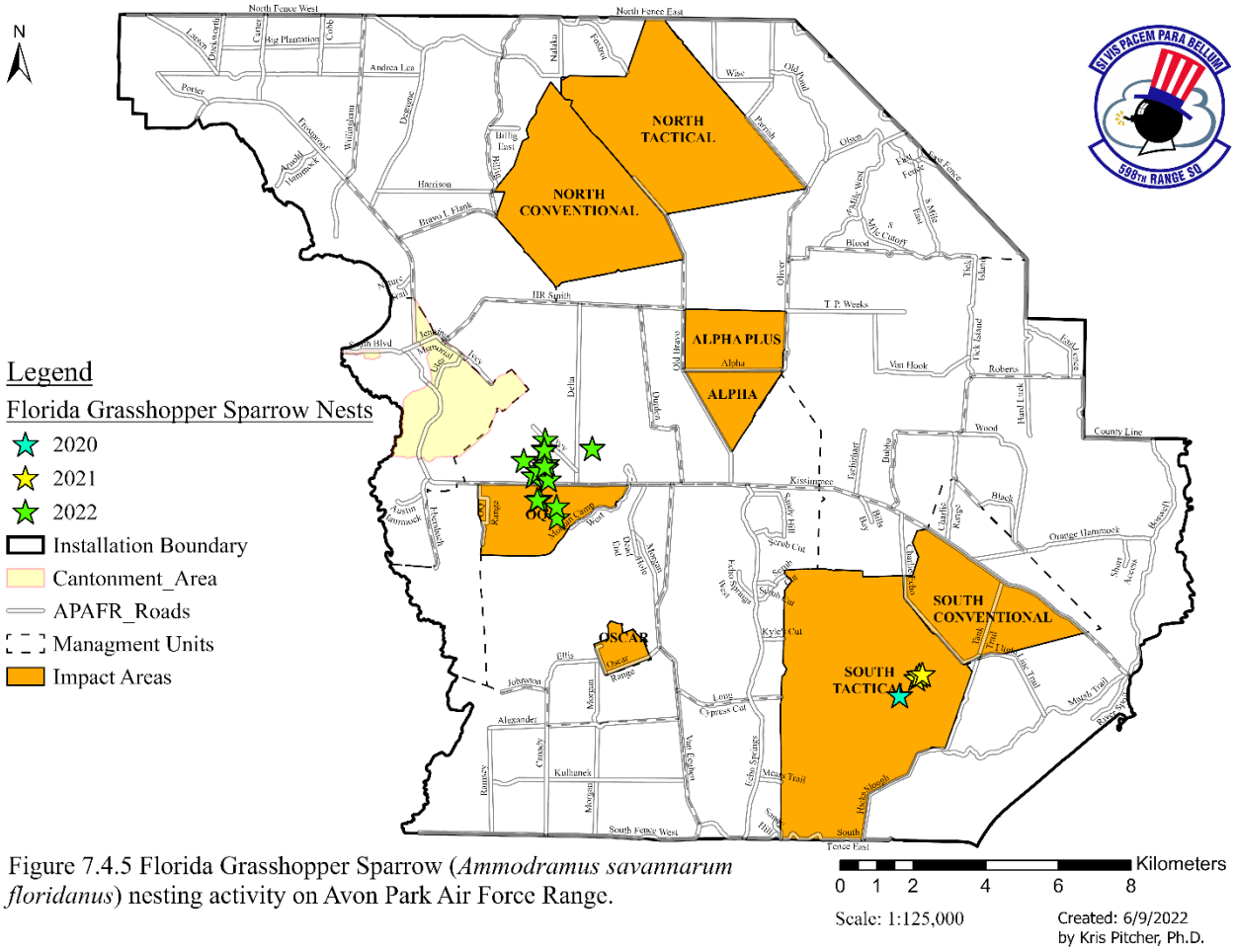

Figure 7.4.5 Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*) nesting activity on Avon Park Air Force Range.

Florida scrub-jay

The FSJ (*Aphelocoma coerulescens*) is a federally threatened species that received protection in 1987 (USFWS 1999). The FSJ's threatened status can be attributed to the loss, fragmentation and degradation of scrub habitats throughout Florida, due primarily to urbanization, agriculture and fire suppression. Florida scrub-jays are the only bird species endemic to Florida, and recent evidence suggests that scrub-jays can be divided into 10 distinct genetic units that can exhibit as much differentiation as seen between different scrub-jay species (Coulon et al. 2008).

FSJs have specific habitat requirements and are found only in xeric oak shrub-dominated habitats with

well-drained, nutrient-poor soils that are maintained through periodic fire. Post-fire recovery times can vary with location but optimal conditions are usually found between 5-20 years post-fire (Woolfenden and Fitzpatrick 1996). FSJs eventually become extirpated if the habitat goes too long without fire (Woolfenden and Fitzpatrick 1996). FSJs are cooperative breeders with each social group consisting of a breeding pair and usually one or more helpers. Helpers assist breeders, which usually are their own parents, with feeding nestlings and year-round territorial defense.

FSJs have been monitored at APAFR since 1993 (Tringali et al. 2021). In 2018, the Air Force partnered with the Service to oversee monitoring and management of the threatened and endangered species program, including with the FSJ, with work done primarily by researchers from Archbold Biological Station. The work done by Archbold staff primarily includes intensive monitoring/inventory efforts. Like RCWs, the FSJ population is fairly fragmented, occurring in up to eight distinct regions (Figure 7.4.6), but unlike RCWs, immigration still occurs from populations outside of APAFR. Despite this natural immigration, the population size has declined by about 57% (from 213 to 113 individuals) over the last couple decades, and the number of family groups has been cut by more than half (from 100 to 43 groups; Tringali et al. 2021). Most family groups are located in the central area of "optimal" scrub on the Bombing Range Ridge.

As of March 2022, FSJs are covered under the CIP (2011), FLARNG HIMARS (2019), Upland Ridge Habitat Restoration (2019), Capturing Volant, Non-listed Animals and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the FSJ, to enable the Air Force to quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species. The Upland Ridge Habitat Restoration and Range Operations BOs also require the Air Force to minimize the effects of tree felling, construction and maintenance activities on FSJ nesting and the Range Operations BO requires the avoidance of complete burns over extensive acreages of occupied FSJ habitat and EOD assistance to document presence of FSJs in HE areas during the nesting season.

APAFR is considered a core area for FSJ recovery, and USFWS has identified a goal of reaching approximately 209 family groups, although this number is being re-evaluated. FSJs at APAFR are managed using an adaptive ecosystem approach with wildland fire being the cornerstone management tool that often is supplemented with mechanical treatment of pine encroachment and oak overgrowth. The Service has implemented an Air Force funded project to remove sand pine encroachment since 2018 and jays have moved into this restored habitat. One group bred successfully in an area with no evidence of breeding since 1993 and two other groups moved into a second area of restored scrub after the 2021 breeding season.

A large area (6,368 acres) of potential habitat exists at APAFR, and work to assess the installation-wide availability of suitable habitat and quantify what work needs to be done to restore scrub habitat is ongoing. In 2019, the Service began working with Archbold Biological Station to assess the availability of suitable scrub habitat at APAFR for FSJs. Each year, one quarter of the scrub habitat is assessed, meaning that three quarters of the available habitat were assessed as of January 2022. Once the first round of these habitat assessments are completed, and the results are quality controlled and analyzed, this information will be used to guide and optimize land management recommendations aimed at restoring scrub habitat at APAFR.

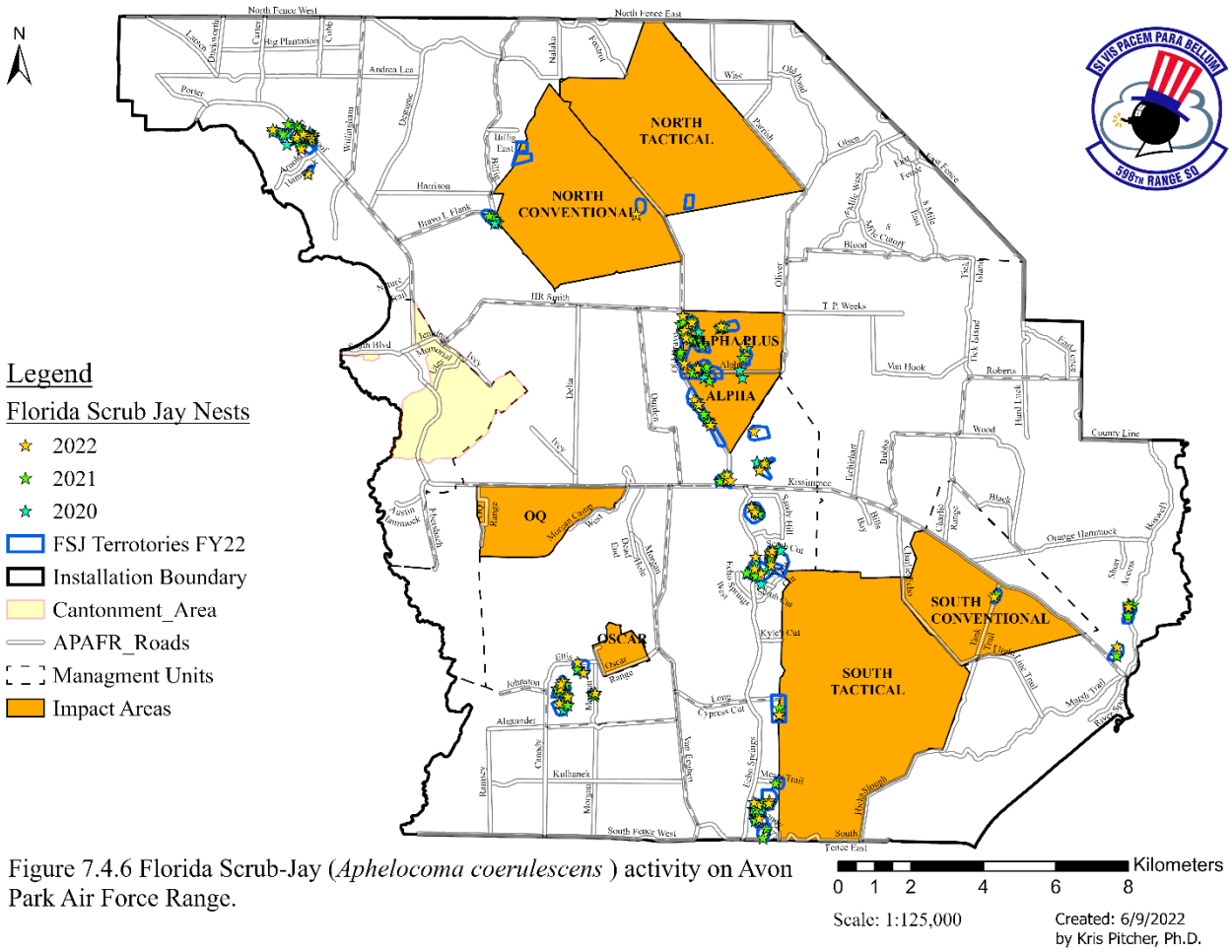

Figure 7.4.6 Florida Scrub-Jay (*Aphelocoma coerulescens*) activity on Avon Park Air Force Range.

Red-cockaded Woodpecker

The RCW (*Picoides borealis*) is a federally endangered species that received protection with the passage of the ESA in 1973 and is in the process of being down listed to threatened, likely because of the work that the Department of Defense has done for the conservation of this species. The RCW was first listed under the precursor to the ESA in 1970. Despite this protection, all monitored populations (with one exception) declined in size throughout the 1970s and into the 1980s. In the 1990s, most populations were stabilized and many showed increases, presumably as a response to intensive management (e.g. prescribed fire, cavity management, and translocation) based on a new understanding of population dynamics and new management tools (USFWS 2003). Habitat loss associated with human activity and habitat degradation associated with changes in fire regimes are likely some of the biggest threats to the continued existence of RCWs.

RCWs are endemic to mature pine forests in the southeastern U.S. Unlike many woodpeckers, they excavate cavities in living pines for roosting and nesting. When not utilized by RCWs, these cavities provide a refuge for a host of other species. RCWs are cooperative breeders, which means that offspring will sometimes stay with their parents and assist with incubating and feeding chicks during subsequent nesting seasons.

RCWs have been monitored at APAFR since 1993 (Thompson et al. 2021). In 2018, the Air Force partnered with the Service to oversee monitoring and management of the threatened and endangered

species program, including the RCW, with work done primarily by researchers from Archbold Biological Station. The work done by Archbold staff includes intensive monitoring/inventory efforts, installing and maintaining artificial cavities and working with regional RCW biologists to translocate birds from larger source populations. APAFR is located close to the extreme southern range of the historical longleaf pine (*Pinus palustris*) ecosystem, which is the primary habitat used by RCWs. As such, RCWs at APAFR utilize longleaf and, to a lesser extent, South Florida slash pines (*Pinus elliottii var densa*) for roosting, nesting, and foraging. Plantations of North Florida slash pine (Pinus elliottii var elliottii) are also utilized as foraging habitat. The RCW population at APAFR is fragmented and receives little dispersal from outside populations, although a few have occurred. Since monitoring began in 1993, the population size at APAFR has almost tripled (from 62 to 168 individuals) and the number of distinct family groups, also known as potential breeding groups (PBGs), has more than doubled (from 19 to 44 PBGs). In fact, APAFR has surpassed their Service recovery goal of 40 PBGs and is working toward their installation goal of 68 PBGs. Much of this increase can be attributed to intensive translocation both within APAFR and from other source populations, cavity management, and frequent fire. Currently, RCWs at APAFR exist across 3 spatially distinct aggregations (Figure 7.4.7), and we hope to build corridors to link some of these other aggregations.

As of March 2022, RCWs are covered under the CIP (2011) , FLARNG HIMARS (2019), Upland Ridge Habitat Restoration (2019), Capturing Volant, Non-listed Animals and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the RCW, to enable the Air Force to quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species or protect cavity trees from prescribed fire and other land management and military activities.

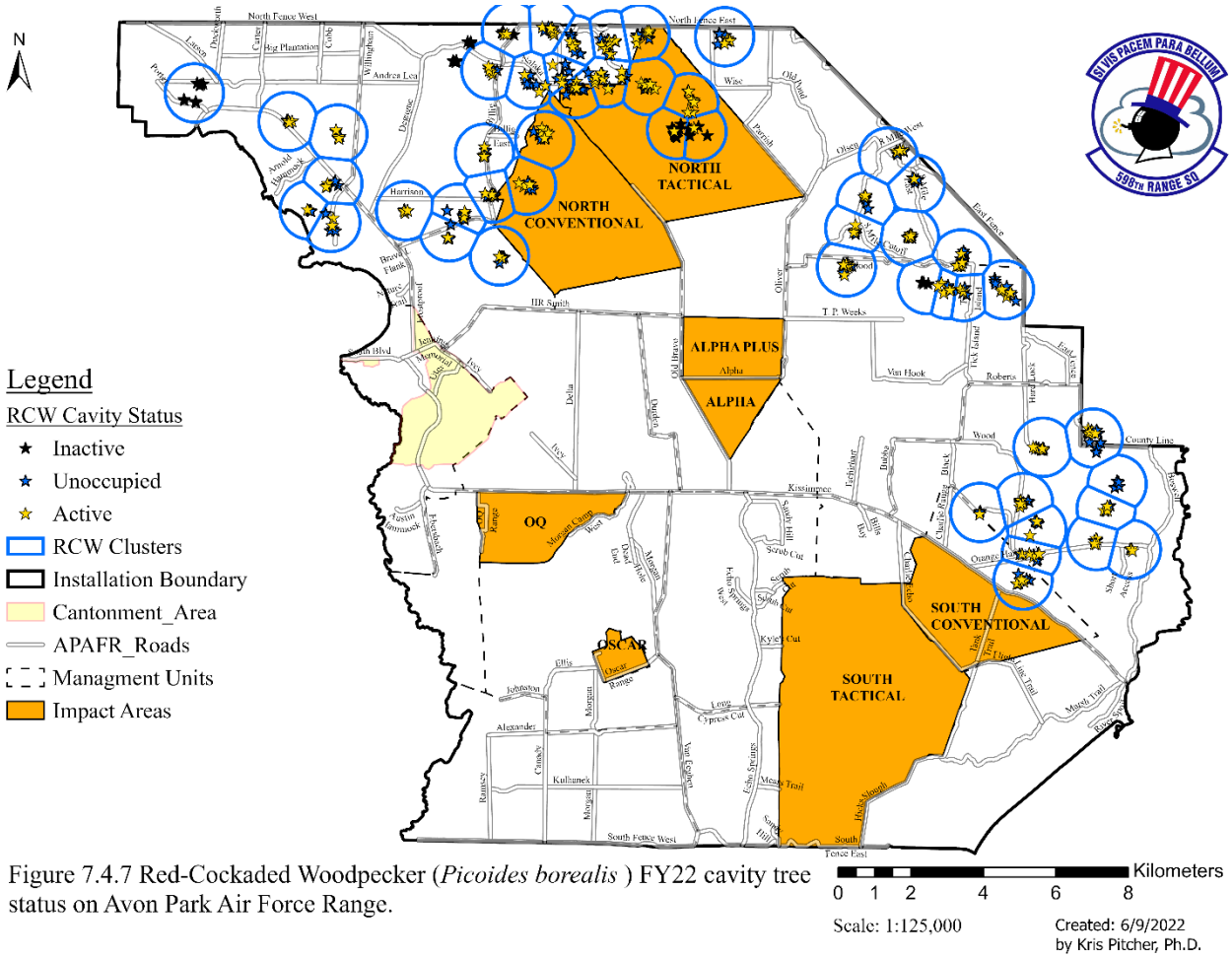

Figure 7.4.7 Red-Cockaded Woodpecker (*Picoides borealis*) FY22 cavity tree status on Avon Park Air Force Range.

Wood Stork

The wood stork (*Mycteria americana*) is a federally threatened bird that received protection in 1984 (USFWS 1999). The wood stork's historical threats included reduced food availability (primarily small fish) to support breeding colonies, which is thought to have been influenced by the loss of wetland habitats and also by the changes in water hydro-periods. Current threats to the wood stork include the loss of nesting habitat, changes in water hydro-periods, nest predation by raccoons and human disturbance of rookeries.

Wood storks are large, long-legged wading birds typically found within marshes, cypress swamps, and mangrove swamps within the southeastern U.S. Ecologically, wood storks represent an important species that should be used as a bio-indicator of the health of shallow wetlands throughout the southeastern U.S. and are a sentinel species used to measure the success of the Everglades restoration (USFWS 1999). Wood storks typically breed in colonies with great egrets, snowy egrets, and other wading birds. Long-term monitoring of wood stork nesting at colony sites will provide insight into the health of the surrounding wetland habitats within the core foraging area of each colony. In 2014, the breeding population of wood storks was reclassified from an endangered species to threatened based on available scientific and commercial data that showed the breeding population was no longer in danger of extinction (USFWS 2014).

Wood storks have been observed foraging at APAFR but there has not been an emphasis on structured and routine monitoring efforts at APAFR in past years (Figure 7.4.8). As of March 2022, wood storks are covered under the CIP (2011), FLARNG HIMARS (2019), Upland Ridge Habitat Restoration (2019),

Capturing Volant, Non-listed Animals and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the wood stork, to enable the Air Force to quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species.

APAFR will utilize an adaptive ecosystem management approach of prescribed fire, precise treatments of invasive plant species, and implementation of the best management practices (BMP) to protect water quality and provide year-round foraging habitat for wood storks. Continued management of the wood stork foraging and nesting habitat will allow for the continued success of this and other wetland species and their associated ecosystems at APAFR.

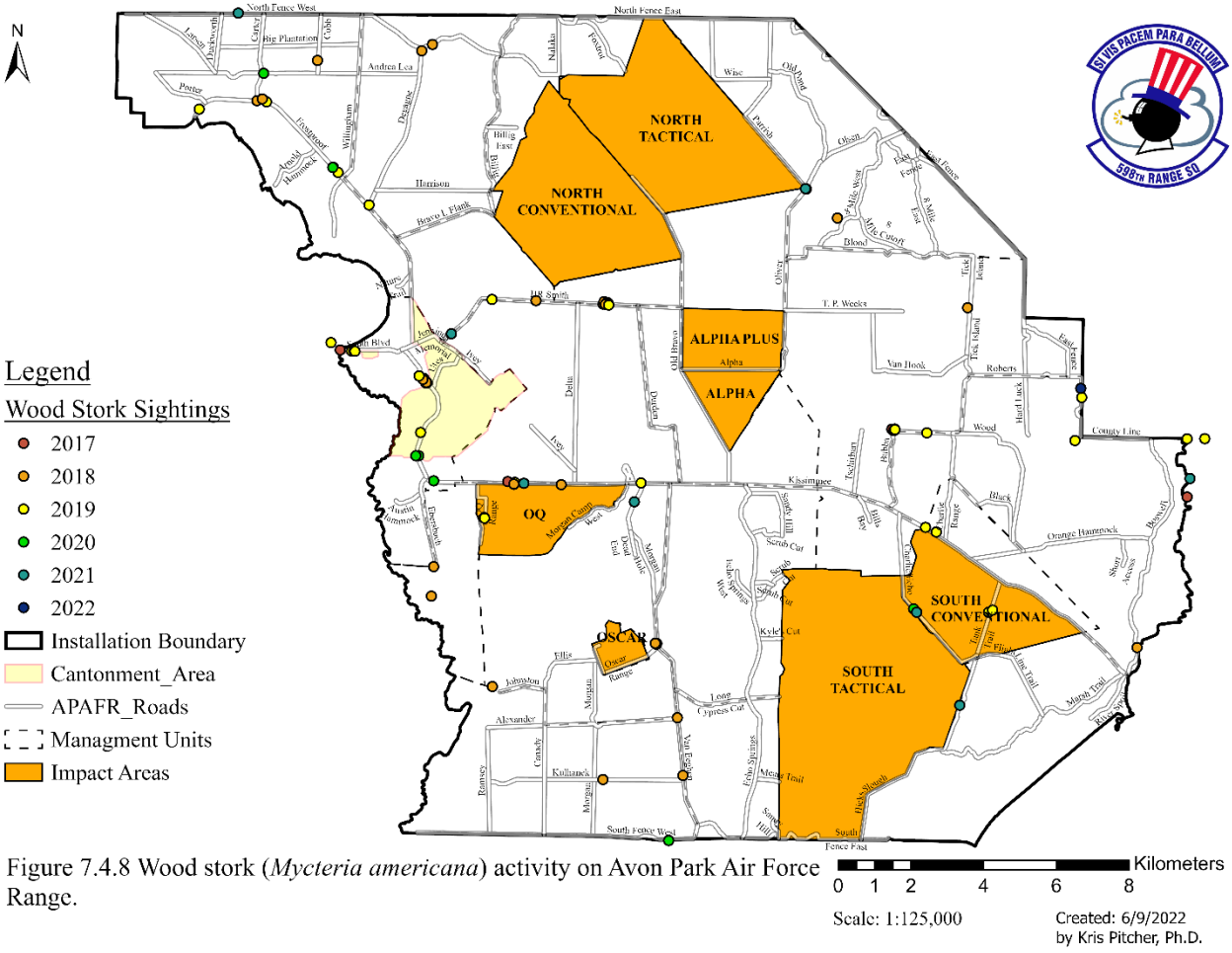

Figure 7.4.8 Wood stork (*Mycteria americana*) activity on Avon Park Air Force Range.

Florida Bonneted Bat

The Florida bonneted bat (*Eumops floridanus*; EUFL) was listed as endangered under the Endangered Species Act (ESA) in 2013 (United States Fish and Wildlife Service [Service] 2013). Endemic to Florida, EUFL has one of the most restricted distributions of any species of bat in the New World (Belwood 1992; Timm and Genoways 2004). The primary threats to this species include loss of forested habitat, particularly roost trees, and changes in both land use and management. In the northern extent of their range EUFL appear to prefer large pines with red cockaded woodpecker (*Picoides borealis*; RCW) cavities that they exploit as roosting habitat (Belwood 1992, Angell & Thompson 2015). However, they may also occupy

several other natural (e.g., royal palms [*Roystonea regia*], limestone outcroppings, pine snags) and artificial roost types (e.g., Spanish-style barrel roof tiles, buildings, bat houses; Belwood 1992; Timm and Genoways 2004; Gore et al. 2011; Braun de Torrez et al. 2016; Ridgley et al. 2022) throughout their range. EUFL may roost singly but more often occur in communal harems consisting of a few males and several females with 4 to greater than 20 individuals (Belwood 1992; Angell and Thompson 2015; Braun de Torrez et al. 2016; Ober et al. 2017; Alvarez et al. 2018; Braun de Torrez et al. 2020). For example, at APAFR approximately 16 bats emerged from a natural roost in October 2014 while 4 other adults and at least 2 juveniles remained inside the roost after emergence (total # of bats ≥22; Angell and Thompson 2015). EUFL harem groups may be structured with a size-based hierarchy and exhibit resource-defense polygyny of roost sites, whereby the largest male is dominant over smaller, subordinate males and defends the roost from competing males that would otherwise mate with the females in the harem (Braun de Torrez et al. 2020).

As a subtropical species, EUFL are active year-round and have a comparatively extended breeding season relative to temperate bat species (Timm and Genoways 2004; Ober et al. 2017; Braun de Torrez et al. 2020). Research done at Fred C. Babcock-Cecil M. Webb Wildlife Management Area (BWWMA) has observed pregnant bats in both April and late August (Ober et al. 2017). Pups have also been observed within a natural roost at APAFR in mid-October (Angell and Thompson 2015). Evidence from BWWMA suggests that EUFL females are aseasonally polyestrous, with females exhibiting different periods of estrous across a larger portion of the year, though peak pregnancy may occur in the spring (Ober et al. 2017; Bailey et al. 2017a; Braun de Torrez et al. 2020). It is unknown when EUFL copulate and how long the gestation period is (Braun de Torrez et al. 2020). The fecundity of EUFL is low, with observed litter sizes of one (FBC 2005; Timm and Arroyo-Cabrales 2008). Recent evidence from bat houses on BWWMA suggests that juveniles have lower apparent survival compared to adults, and the species has apparent survival estimates lower than most other bat species (Bailey et al., 2017a). Foraging habitat for EUFL includes freshwater, forested, suburban, and agricultural land cover types where they feed primarily on noctuid moths (Bailey et al. 2017b). Like other molossids, the EUFL's morphological characteristics (e.g., narrow wings, high wing-aspect ratios) make it capable of flying quickly at high altitudes relative to other bat families (>500m), giving them the capability to forage or disperse long distances (>32km) from their roosts (Findley et al. 1972; Belwood 1992; Webb 2018). EUFL home range sizes at APAFR are unknown but have been documented spanning >260 km^2 at BWWMA (Webb 2018).

The Florida bonneted bat may be fire-adapted and benefits from fire (Braun de Torrez et al. 2018a; Braun de Torrez et al. 2018b; Taillie et al. 2021). Braun de Torrez et al. (2018a) found that EUFL activity increases in the short-term post-fire because of a temporary increase in the availability of insect prey, particularly during the dry season. Florida bonneted bat activity appears to decrease with early wet season (April-June) and increase with dry season (November-March) burn intervals (Braun de Torezz et al. 2018b). The highest general and foraging activity for EUFL occurred in pine flatwoods and prairie sites with >3- to 5-year burn intervals during the early wet season and >5-year burn intervals during the dry season (Braun de Torrez et al. 2018b). In contrast, short burn intervals of 1-5 years and very long burn intervals of >13 years during the dry season appeared to have negative effects on EUFL activity (Braun de Torrez et al. 2018b). Prescribed fire programs that mimic historic fire frequency and seasonality may optimize habitat for bats by increasing insect prey availability, flight space, and numbers of suitable roosts (Braun de Torrez et al. 2018b). However, it remains unknown how burns influence EUFL roosts and roosting behavior, and fires could negatively affect EUFL if alternate roosts are unavailable near burn sites (Braun de Torrez et al. 2018a). Fire has the potential to both create and destroy dead tree snags that can serve as roosts for a number of cavity dependent species similar to EUFL (Haslem et al. 2012; Perry 2012; Stojanovic et al. 2016; Braun de Torrez et al. 2018b). To date, the majority of the long-term EUFL roosts at APAFR occur within abandoned natural RCW cavities located in living long leaf pines that are less susceptible to loss from fire. However, in order to protect EUFL roosting habitat in both living long leaf pine and dead snags it is important to identify active EUFL roost and prep these roosts similar to RCW

cavity trees ahead of prescribed fires.

On 21 August 2013, an active EUFL roost was discovered at APAFR in a natural red cockaded RCW cavity located in an old-growth longleaf pine (hereafter RT01) in North Tactical Range (Angell and Thompson 2015). Since then four additional roosts have been found in management unit (MU) 5A and 1 in 010 (Fig. 7.4.9). Subsequent acoustic monitoring coupled with occasional emergence counts suggest that these roosts and the surrounding area have been consistently used by EUFL since 2013, apart from the one in management unit 10 (Table 7.4.9). The APAFR roosts are highly significant in that they are some of few known roosts in the northern part of the EUFL's range and represent a valuable link in the regional ecosystem for this federally endangered species.

As of March 2022, EUFL are covered under the Florida Army National Guard's (FLARNG) Training of High Mobility Artillery Rocket Systems (HIMARS) (2019); Upland Ridge Habitat Restoration (2019); Capturing Volant, Non-listed Animals (2019); and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures, and the Range Operations BO contains terms and conditions associated with monitoring and managing T&E species, such as the EUFL, to enable the Air Force to quantify the amount of take from military and natural resource management activities. Most of the minimization measures in BOs are to obey the 35-mph speed limit to minimize collisions between vehicles and listed species, and to avoid nests, roosts, tree cavities, and colonies of listed species by a minimum of 500 ft. In addition, the Range Operations BO has minimization and conservation measures to reduce disturbance at EUFL roosts, especially with respect to fire and timber removal.

Currently, APAFR's management strategy for EUFL consists of continued bat acoustic monitoring and emergence counts, and active management of RCW habitat, particularly with prescribed fire. Some of the acoustic monitoring conducted by APAFR is carried out in advance of anticipated prescribed burn activities to identify areas that may contain roost sites to mitigate possible negative impacts on EUFL.

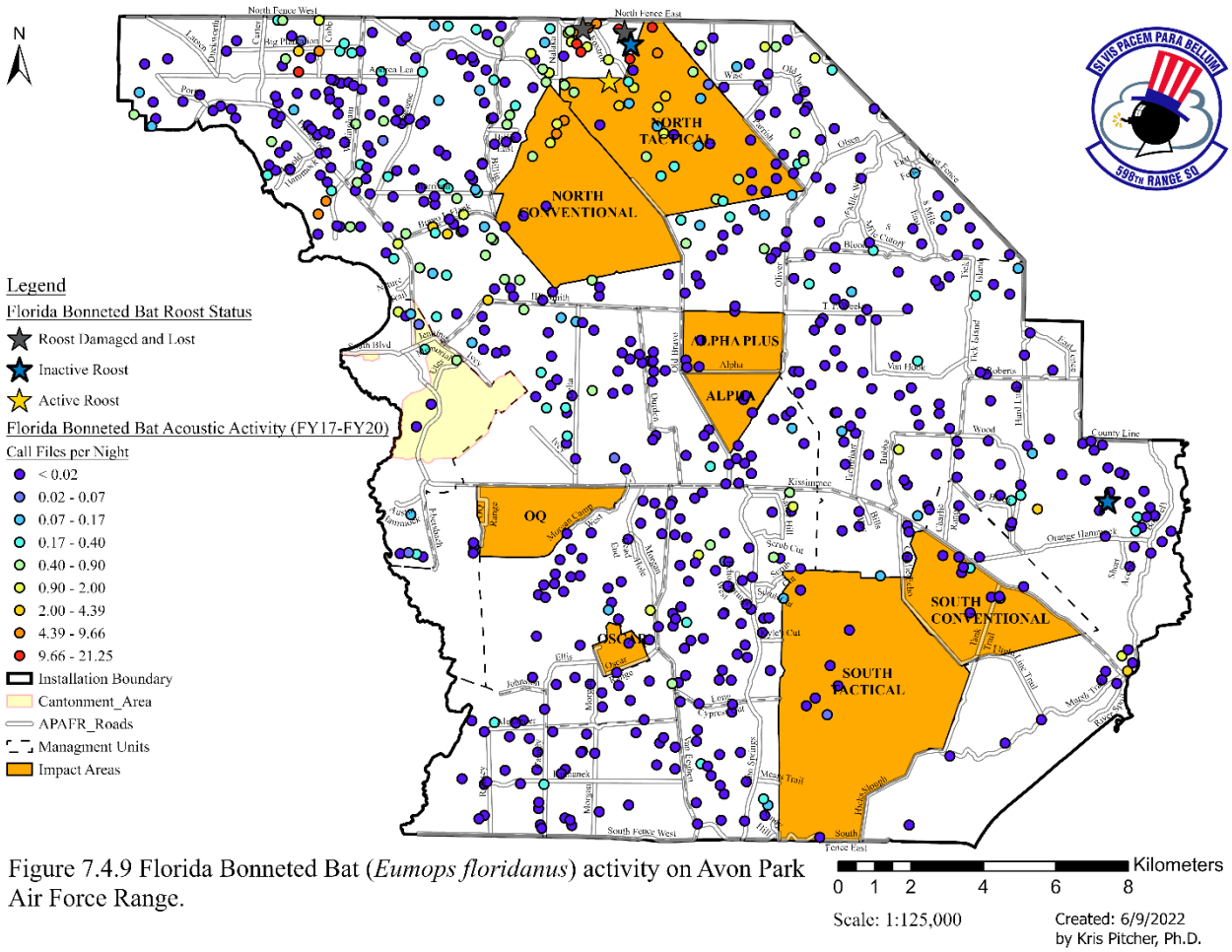

Figure 7.4.9 Florida Bonneted Bat (*Eumops floridanus*) activity on Avon Park Air Force Range.

Florida Panther

The Florida panther (*Puma concolor coryi*) was listed as endangered throughout its range in 1967 (32 FR 4001) and received Federal protection under the passage of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.). It represents the only known breeding population of *Puma* in the eastern U.S. (USFWS 2008). Several factors attributed to the historic decline in the Florida panther population, including eradication attempts, prey declines, habitat fragmentation, small population size, and geographic isolation (USFWS 2008). The continued decline of available habitat due to increasing anthropogenic disturbances (e.g., residential development, infrastructure development, and an increase in mining and agricultural land) is a persistent threat to the panther's existence in the southern Florida region, where panthers exist on <5% of their historic range (USFWS 2008). The total population size was estimated to be between 120-230 adult and sub-adult panthers in 2021 (FWC 2021). This information is based on several factors including trail camera recording, GPS collar monitoring, live captures, and mortalities (FWC 2021). The Florida panther is wide-ranging, cryptic, and occurs at low densities (USFWS 2008 and sources therein). Panthers require large contiguous areas to meet their social, reproductive, and energetic needs, with mean home ranges sizes in southern Florida documented ≥650km^2 for males and >390 km^2 for females (Comiskey et al. 2002; Beier et al. 2003; USFWS 2008). Resident male (i.e., not transient) home-range overlap is limited and is more extensive among resident females (Maehr et al. 1991). Panthers tend to select habitat based on prey availability, and their primary prey in southern Florida is thought to be white-tailed deer (*Odocoileus virginianus*) and feral hog (*Sus scrofa*; Maehr et al. 1990; Dalrymple and Bass 1996). Panthers

also consume mammals such as raccoons (*Procyon lotor*), marsh rabbits (*Sylvagiculs palustris*), and nine-banded armadillos (*Dasypus novemcinctus*; Maehr et al. 1990), and even alligators (*Alligator mississippiensis*; Dalrymple and Bass 1996). Dense understory vegetation made of saw palmetto provides some of the most important feeding, resting, and denning cover for panthers (Maehr 1990; Shindle et al. 2003). Panthers predominantly use forested habitat types, especially pinelands, upland hardwood forests, cypress swamp, and hardwood swamp, while also using other habitat types in proportion to their availability within their home ranges (USFWS 2008 and numerous sources listed therein).

Although APAFR has suitable prey species and forested habitats with the potential to support Florida panthers, they have rarely been documented on the installation. APAFR began monitoring in 2017 for Florida panther presence and habitat use using motion-activated trail cameras after an adult male panther was photographed on a hunter's trail camera. Additional panther sightings have been documented subsequently, and it is likely these were all re-sightings of a single male (Figure 7.4.10). Unfortunately, because of a lack of sightings after 2019 this solitary male is suspected to have died from a train collision northeast of the installation in Polk County on 04 January 2020. APAFR may be able to support new transient individuals, and the range and surrounding area was identified as potential habitat for the expansion of the panther breeding population by Belden and McBride (2006). In 2022 a solitary male, which is assumed a new individual, was observed on the installation. Although no panther reproduction has been documented at APAFR, at least 2 female panthers were discovered in Charlotte and Highlands Counties in 2017, representing the first evidence of female panthers north of the Caloosahatchee River since 1973 (FWC 2017; Kelly and Onorato 2020). The female panther documented in Charlotte County was confirmed to have successfully reproduced in March 2017 (FWC 2017). As recently as 2021, FWC observed at least two adult female panthers north of the Caloosahatchee River (FWC 2021). Therefore, the potential for APAFR to support female panthers and a natural expansion of the breeding range is greater than at any time since the panther first received Federal protection in 1967.

As of March 2022, Florida panthers are covered under the Critical Infrastructure Program (CIP: # 41420-2011- F-0310) (2011); FLARNG HIMARS (2019); Upland Ridge Habitat Restoration (2019); Capturing Volant, Non-listed Animals (2019); and Range Operations (2020) BOs. All these BOs indicate that the military training and natural resource management activities on APAFR are not expected to adversely affect Florida panthers using the installation. Should new individuals occupy the area, the minimization measure of obeying the 35-mph speed limit at APAFR that is defined in all these BOs should minimize the risk for vehicle-related panther deaths on the installation.

Since 2017, APAFR has substantially increased its management efforts for Florida panthers by implementing a camera trap array that continuously monitors for this species (Figure 7.4.10). Additionally, the ongoing, large-scale ecosystem management of APAFR (e.g., by protecting wetlands, forested areas, and rare communities; conducting prescribed burns to maintain historic fire regimes) could facilitate occupancy by new transient panthers or a breeding population on APAFR and surrounding lands in the future.

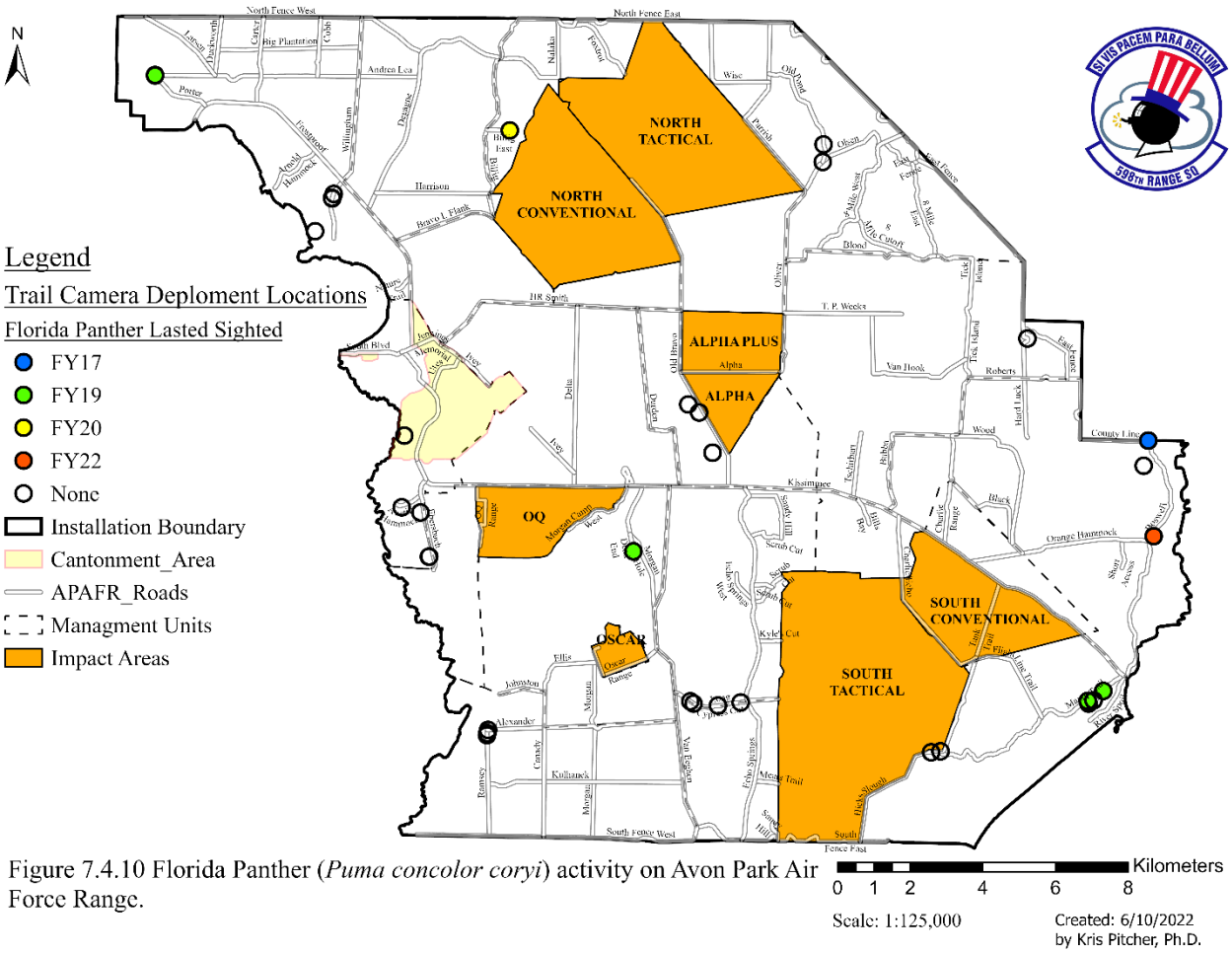

Figure 7.4.10 Florida Panther (*Puma concolor coryi*) activity on Avon Park Air Force Range.

Blue-tailed Mole Skink

The blue-tailed mole skink (*Eumeces egregious lividus*) is a federally threatened small lizard that is currently only known to occur on the Lake Wales Ridge (LWR) in peninsular Florida in Polk, Highlands, and Osceola counties, and are rare throughout their range (USFWS 2021). The limited range of the bluetail mole skink makes it especially vulnerable to habitat loss and natural and environmental catastrophes (USFWS 2021). Blue-tailed mole skinks are more frequently found in sand pine (*Pinus clausa*)/ rosemary scrub (*Ceratiola ericoides*) plant communities, and less so in longleaf pine (*Pinus palustris*)/turkey oak scrub (*Quercus laevis*) plant communities. Optimal xeric upland habitat has few plant roots, open canopies, scattered shrub vegetation, and patches of bare, loose sand. This species is usually found under leaves, palmetto fronds, and logs (USFWS 1999).

The legs of the blue-tailed mole skink are fully formed, but small and only used for surface locomotion. As the name “mole” suggests, this species spends some of its life underground, surfacing to forage on spiders, cockroaches, and crickets. Not much is known about the reproductive habits of blue-tailed mole skinks due to incubation happening below the surface; however, it is thought that their reproductive strategies are similar to that of the Peninsular mole skink (USFWS 1987). The females may lay three to seven eggs less than a foot below the surface in a small nesting cavity. The eggs are incubated anywhere from 31-51 days (USFWS 1999).

Protecting habitat is the most important management tool for this species. In xeric upland habitats that the

blue-tailed mole skink occupies, fire is the primary management tool that maintains a mosaic of open patches along with patches of vegetation. While we have potential Blue-tailed mole skink habitat along the Bombing Range Ridge at APAFR, this species has not positively been identified on the installation. However, with the proximity to confirmed sightings on the nearby LWR it is possible this species occurs on the installation. In 2021, we found the first possible evidence of a blue-tailed mole skink at APAFR using a camera trap study aimed at detecting eastern indigo snakes. However, the image quality did not support a positive identification. The current camera trap surveys implemented for eastern indigo snakes at APAFR may detect and help monitor possible blue-tailed mole skinks on installation. However, this survey method may not be sufficient for such a cryptic fossorial species. Possible future work could include working with cooperators to conduct surveys for the species throughout suitable habitat on the property.

Eastern indigo snake

The eastern indigo snake (*Drymarchon couperi*; Collins 1991) is a federally threatened species that received protection in 1978 (USFWS 1999). The eastern indigo's threatened status was a result of dramatic population declines caused by over-collecting for the domestic and international pet trade as well as mortalities caused by rattlesnake hunters (Kendrick and Mengak 2010). Since its listing, habitat loss and fragmentation have become significant threats to the eastern indigo's recovery.

The eastern indigo snake historically occurred across the coastal plain of the southeastern US, but now is found exclusively in Florida, Georgia, and Alabama. There is little information on population viability and habitat needs; therefore, several educated guesses have been made regarding the amount of land needed to protect eastern indigo snakes. Early estimates suggested several thousand acres may be sufficient to ensure the local survival of a small number of individuals (Speake et al. 1978). More recently, Moler (1992) and Breininger et al. (2004) suggested that protected areas containing at least 2,500 acres may provide enough habitat for populations to persist. Effective techniques to model populations will need to be developed if isolated populations of this size can be expected to persist into the future.

Eastern indigo snakes are thought to occur throughout most habitats at APAFR, as the species is a habitat generalist that occurs in habitats ranging from swamps, seasonal ponds and wet prairies to xeric pinelands and scrub (Lawler 1977; Moler 1992; Layne and Steiner 1996). They are also known to use scrub extensively, in part because of the importance of gopher tortoise burrows as temperature refuges. Dave Breininger captured more than 24 eastern indigo snakes in surveys conducted at APAFR using trap lines in the mid-2000s. Castellón and Rothermel (2012) recorded one indigo snake using a tortoise burrow in scrub, and other records have been reported across the range (Figure 7.4.12). Franz et al. (1998) also documented indigo snakes in scrub habitats at APAFR, and indigos have been observed in pine flatwoods. In addition, Franz et al. (1998) sighted indigos in dry prairies, pine plantations, oak hammocks, hardwood swamps, and disturbed sites. Recent gopher tortoise studies have documented the presence of eastern indigo snakes utilizing burrows within pine flatwoods at APAFR; however, eastern indigos are cryptic and secretive with huge home ranges, which makes detection and hence estimating population sizes difficult.

In May 2021, a new study began using camera traps and drift fence arrays to detect indigo snakes. The drift fence arrays were set up in areas where eastern indigo snakes were sighted previously and where suitable habitat was present. As of April 2022, no eastern indigo snakes have been found using this method.

As of March 2021, eastern indigo snakes are covered under the CIP (2011), FLARNG HIMARS (2019), Upland Ridge Habitat Restoration (2019), Capturing Volant, Non-listed Animals and Range Operations (2020) BOs and Range Infrastructure Concurrence. All BOs and the concurrence contain specific minimization and conservation measures and the Range Operations BO contains terms and conditions associated with 1) monitoring and managing T&E species, such as the indigo snake, to enable the Air Force to quantify the amount of take from military and natural resource management activities and 2) to design at least one study to estimate the number of indigo snakes at APAFR and derive more robust quantification of the amount of take that results from land management activities. The Air Force worked

closely with the Service to start an indigo snake study in 2021. The primary minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species and to stop vehicle traffic until it is confirmed that snakes and other herpetofauna have moved off of roads and trails.

Utilizing an adaptive ecosystem management approach, eastern indigo snake habitat will be managed using practices such as prescribed fire, exotic species control, and mechanical restoration treatments. In addition, natural resource managers will try to minimize the removal of stumps, which could provide refugia for many animals, including eastern indigo snakes.

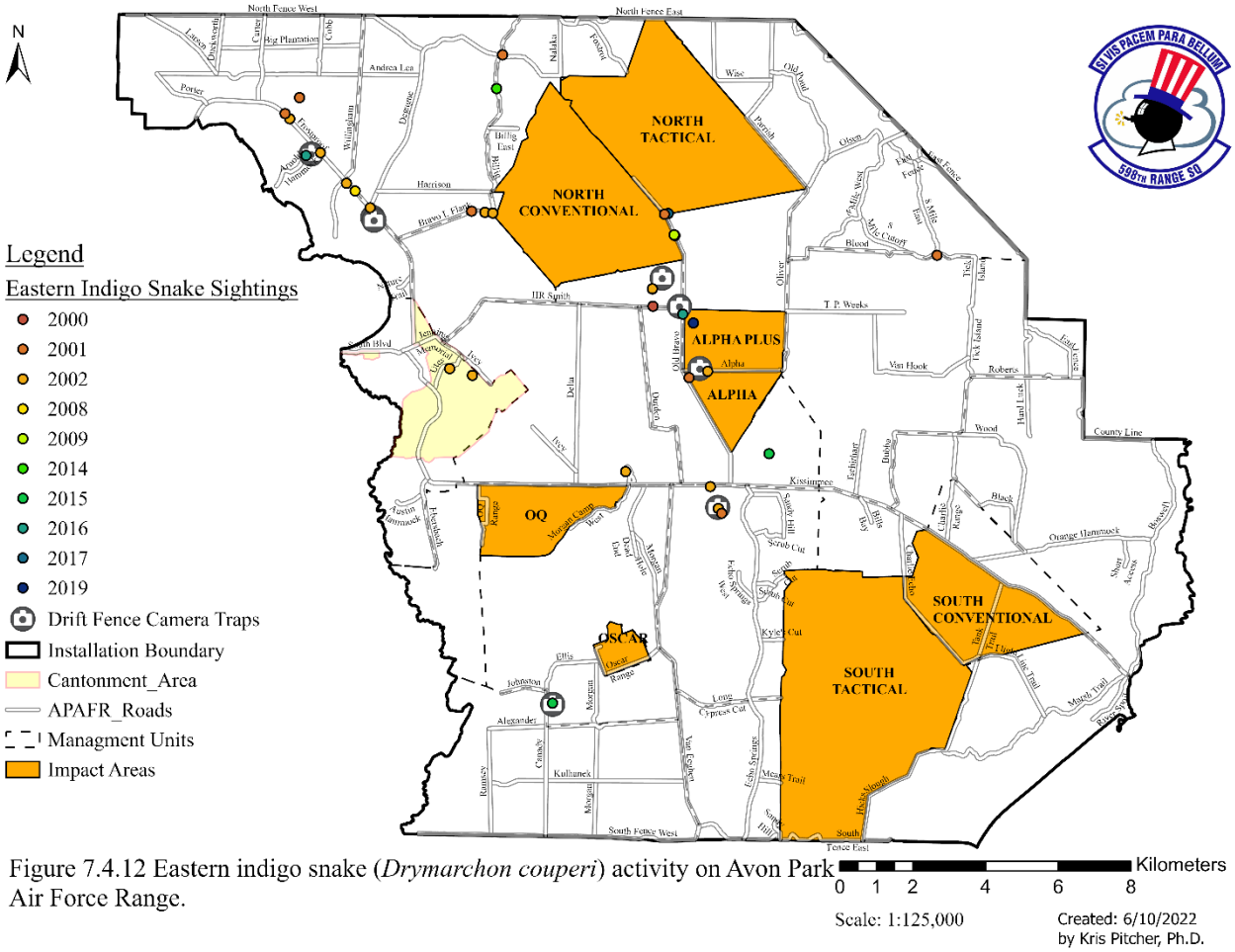

Figure 7.4.12 Eastern indigo snake (*Drymarchon couperi*) activity on Avon Park Air Force Range.

Gopher Tortoise

The gopher tortoise (*Gopherus polyphemus*) is not a federally threatened or endangered species within the State of Florida but is a Federal Candidate species that is protected under a Candidate Conservation Agreement (CCA) (USFWS 2016a). Habitat fragmentation, reduction, and human interference has combined to restrict both the gopher tortoise population and its available suitable habitat in the Southeast.

The gopher tortoise is a ground-dwelling burrower found in a vast number of ecosystems throughout the Southeast including pine flatwoods, dry prairie, and coastal dunes. They are most closely associated with well-drained, sandy xeric ecosystems such as scrubby flatwoods, sandhill, scrub, and xeric hammocks.

The burrows they excavate can extend up to 4.5 meters in length and 2 meters in depth. These burrows provide protection and habitat refugia for over 350 species, including other federally-listed species (e.g. eastern indigo snake) from natural disturbances, including fire that naturally occurs and maintains the landscape. This is why the gopher tortoise is considered a keystone species.

Since 2008, the AF has partnered with other agencies and organizations to develop and implement conservation of the eastern population of gopher tortoises. As part of the CCA, a three-year project initiated in 2008 at APAFR was done with the following goals:

1) Survey gopher tortoise burrows and vegetation in scrub, flatwoods, and pine plantations.

2) Monitor movement and burrow use patterns by adult tortoises in scrub and flatwoods using radio telemetry.

3) Map and monitor burrow status and use in reference habitats (one each in scrub and flatwoods) at APAFR.

The survey delineated 50,410 acres of potential gopher tortoise habitat consisting of flatwoods, plantations, scrub, mixed scrub, sand pine, sandhill, dry prairie, oak hammock, and disturbed land. Results indicated the presence of a large tortoise population at APAFR, with highest densities in the more xeric habitats (scrub and scrubby flatwoods), and a lower-density, patchy distribution in mesic flatwoods/plantations (Figure 7.4.12) (Castellón and Rothermel 2012). The densities of active and possibly active gopher tortoise burrows in scrub and flatwoods/plantations were used to generate an index of population densities and produce a total abundance estimate of 1,435 adult tortoises in scrub habitats at APAFR, and an estimated abundance of 2,694 in flatwoods/plantations (Castellón and Rothermel 2012).

In 2015, gopher tortoises were surveyed again as part of the CCA to monitor approximately every five years. This time, gopher tortoises were surveyed using line-transect distance sampling, which resulted in an estimate of 1,525 adult tortoises and population estimate of 1,847 tortoises occupying only scrub habitats. A conclusion from this second round of surveys suggests that the tortoise population at APAFR likely exceeds 4,500 individuals and may be much higher. In fact, only a handful of other publicly owned sites in peninsular Florida are known to support tortoise populations numbering in the thousands. Currently, the Service is working with Archbold Biological Station on a third round of line-transect distance sampling surveys in 2022 and 2023. Our goals for this third round of surveys is 1) to continue to estimate the population size of gopher tortoises at APAFR as outlined in the CCA and 2) to get population estimates in habitats other than scrub that can be used in regulatory documents (i.e., BOs) and recovery decisions at APAFR.

APAFR staff also survey for gopher tortoise burrows using line-transect distance sampling surveys in pine plantations prior to timber harvests. As of April 2022, no gopher tortoises or active burrows have been found in plantations.

As of March 2021, gopher tortoises are covered under the CIP (2011), Upland Ridge Habitat Restoration (2019), and Range Operations (2020) BOs and Range Infrastructure Concurrence. All BOs and the concurrence contain specific minimization and conservation measures for gopher tortoises. The primary minimization measures in BOs are to obey the 35 mph speed limit to minimize collisions between vehicles and listed species and to stop vehicle traffic until it is confirmed that gopher tortoises and other herpetofauna have moved off of roads and trails. In addition, terms and conditions are included in the FLARNG BO (2007) to survey and monitor gopher tortoise burrows prior to training.

Utilizing the ecosystem management approach, gopher tortoise habitat will be managed using practices such as prescribed fire, invasive and exotic species control, and mechanical treatments. Additionally, APAFR will employ the conservation measures listed in the CCA to the fullest extent possible while operating under the constraints of the AF mission. Natural resources staff coordinates with range operations and contractors to survey proposed project locations for tortoise burrows and avoid them during project

construction. Incoming military units and contractors are briefed on presence and avoidance of gopher tortoise and their burrows on a regular basis.

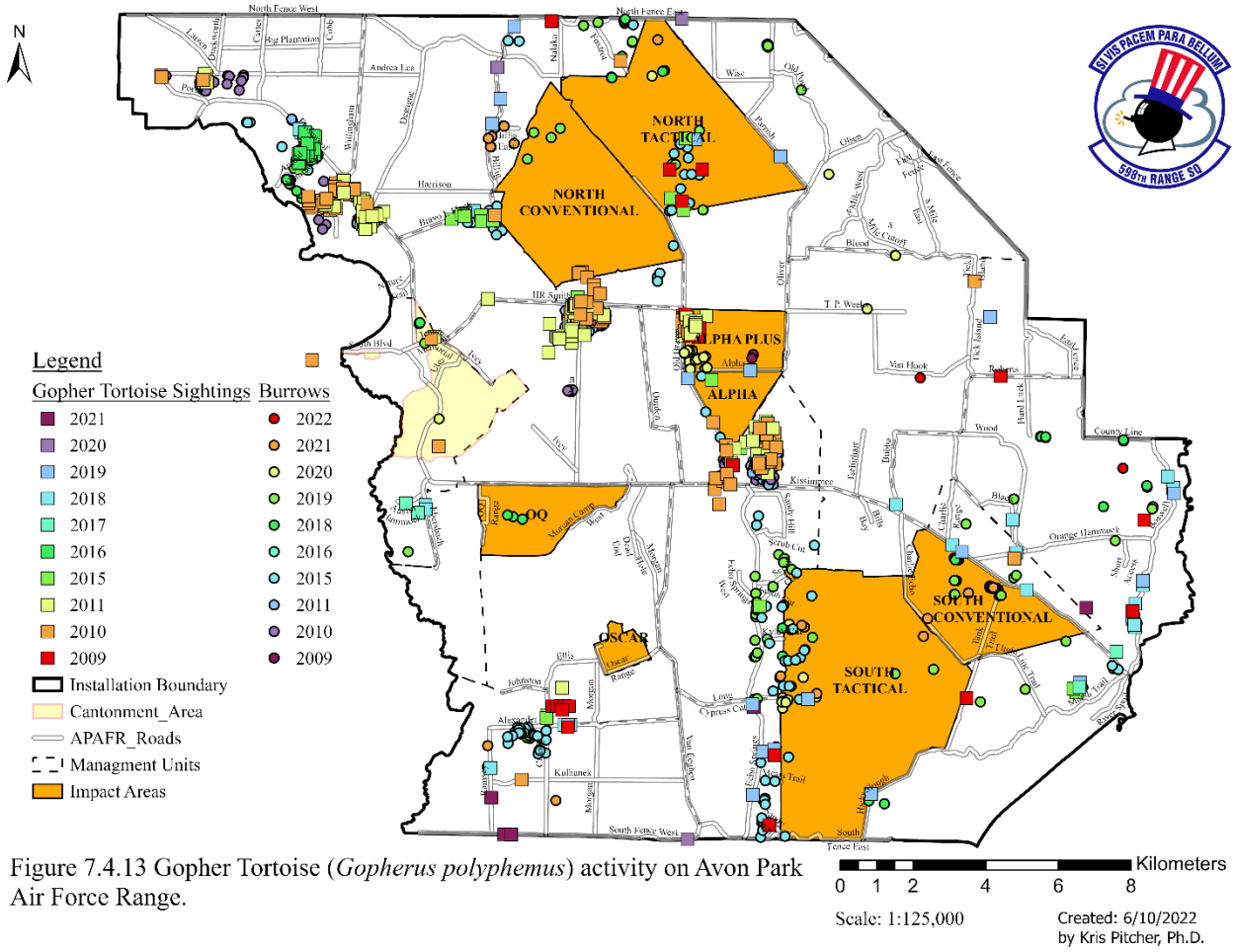

Figure 7.4.13 Gopher Tortoise (*Gopherus polyphemus*) activity on Avon Park Air Force Range.

Sand Skink

The sand skink (*Neoseps reynoldsi*) is a federally threatened fossorial, nearly legless lizard. This species is endemic to sandy ridges in central Florida that contain either sand pine (*Pinus clausa*)/ rosemary scrub (*Ceratiola ericoides*), or a longleaf pine (*Pinus palustris*)/turkey oak (*Quercus laevis*) plant communities (USFWS 1987). Agricultural and residential encroachment threaten these habitats. Habitat loss and modification was the primary threat cited when listing this species in 1987 (USFWS 1999).

The sand skink spends much of its life underground burrowing through sandy substrates. Sand skinks are crepuscular and most active from mid-February to mid-May and late summer to early fall. Their diet consists mainly of belowground arthropods such as beetle larvae, termites, spiders, and larval antlions (USFWS 1987). Sand skinks reach sexual maturity at 1 or 2 years of age. Females usually lay two eggs under sand, logs, or debris and these eggs hatch in June or July.

The small size (10-13 cm) and fossorial nature of this species make its study difficult. Previous studies on APAFR have not found sand skinks on the property, but the species does occur in similar habitat found on the surrounding Lake Wales, Winter Haven, and Mt. Dora Ridges in Highlands, Lake, Marion, Orange, Osceola, Polk and Putnam counties (USFWS 1999). Similar to the blue-tailed mole skink, the sand skink

need protected scrub and sand hill habitat actively maintained with prescribed fire at natural fire return intervals (USFWS 2007). Current camera trap surveys implemented for eastern indigo snakes at APAFR may also detect and help monitor possible sand skinks on installation. However, this survey method may not be sufficient for such a cryptic fossorial species. Future monitoring using more appropriate sand skink specific survey methodology may be necessary if we detect the species at APAFR.

Pigeon wings

Pigeon wings (*Clitoria fragrans*) is a federally threatened species that received protection in 1993 (USFWS 1999). Pigeon wings' threatened status can be attributed to loss of habitat due to agriculture and residential development.

Pigeon wings is an erect perennial herb belonging to the pea family. It is 15-100 cm tall; long-lived with a thick horizontal root that can grow more than 2 meters long and bears one to several purplish, glaucous, wiry stems. The flowers occur in pairs, have a pale purplish hue, and are inverted with the anthers and stigma being able to touch the backs of visiting insects (USFWS 1997) The distribution is limited mainly to the scrub habitats of the Lake Wales Ridge in Highlands and Polk County. Studies at Archbold Biological Station have documented positive post-fire responses in flowering and vegetative growth of pigeon wings (Menges, E. pers. comm.). Decreased flowering within one year after burning suggests fire suppression and canopy closure adversely affect this plant, resulting in reduced vegetative vigor and reproduction. Even though plants may persist with infrequent fire, fire management is thought to be essential to the long-term survival of this species. Pigeon wings' dependence on fire is particularly evident when considering the quick and profuse blooming in response to fire.

Pigeon wings has been monitored and studied on a consistent basis at APAFR for over two decades. Stout (2010) surveyed and identified APAFR sites for pigeon wings, and Stout's project resulted in both tagging stems and GPS recording of populations. Subsequent to the multiple year inventory for pigeon wings conducted by Stout (2010), both known and potential sites for pigeon wings are surveyed for plants by the AF Botanist at APAFR in the year a plot is burned (Figure 7.4.15). Post-burning sites are surveyed for re-sprouting pigeon wings.

As of June 2022, pigeon wings is covered under the Plant Collections BO (2015), which contains no specific conservation recommendations or terms and conditions. In addition, pigeon wings is covered under the Critical Infrastructure Program (CIP: # 41420-2011- F-0310) (2011), Upland Ridge Habitat Restoration (2019) and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures, including avoiding parking and driving on roadsides with known or visible populations of pigeon wings and reducing the chance that felled pines will crush or cover these listed plant species.

Because pigeon wings occurs in fire-maintained habitats (sandhill and scrub-high pine ecotones), the application of prescribed fire is the proposed management action with the most potential to benefit pigeon wings. As part of the INRMP, the AF Fire Management Officer (FMO) develops an annual burn plan, which is reviewed by the AF Botanist and other natural resource staff. This review process includes identifying specific locations of pigeon wings plants to avoid mechanical disturbance. APAFR implements other management practices to prevent the disturbance or loss of pigeon wings populations. These include the treatment of invasive and exotic plant species, including cogon grass (*Imperata cylindrica*), the reduction of feral hog (*Sus scrofa*) disturbance, and any possible silvicultural disturbance to known populations.

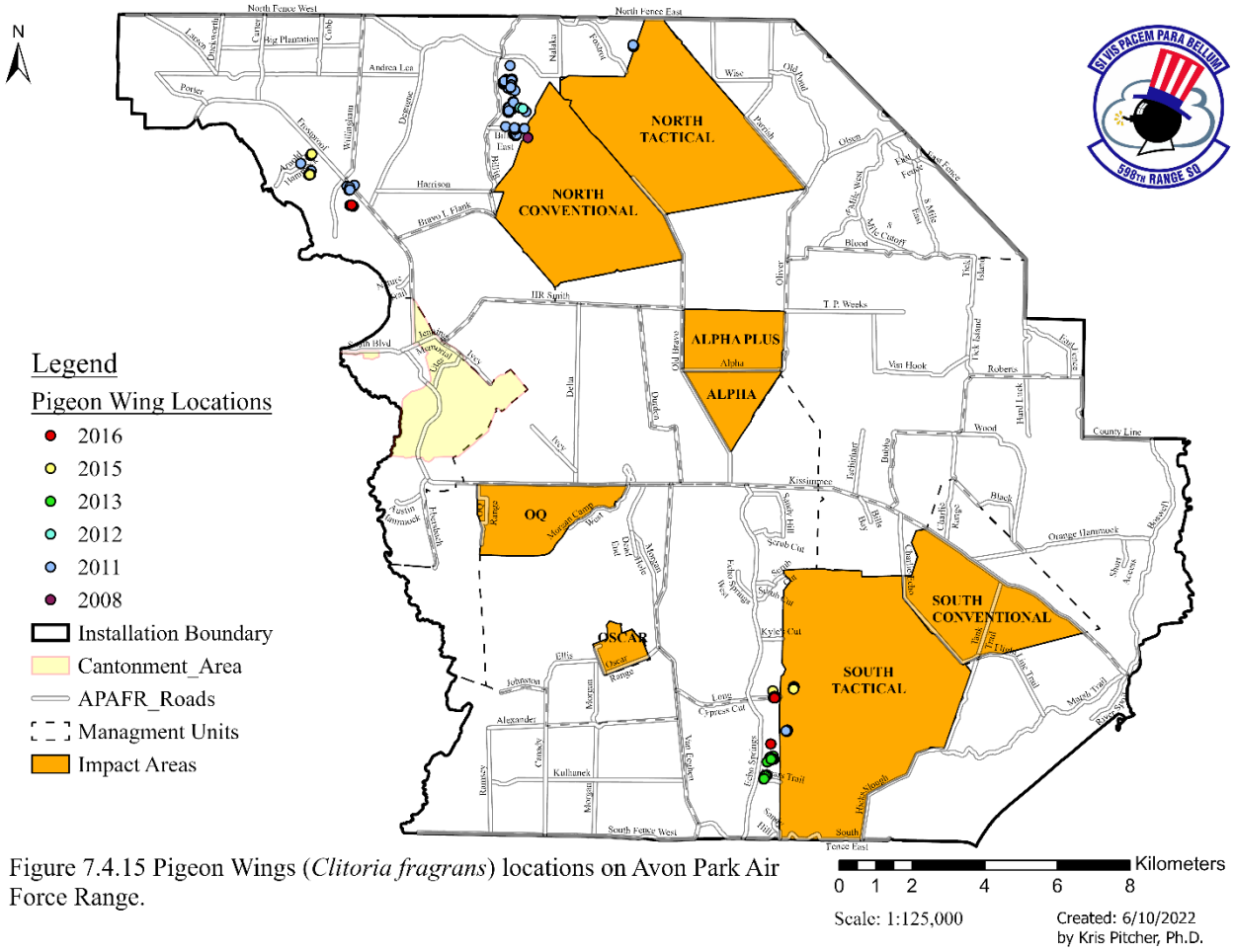

Figure 7.4.15 Pigeon Wings (*Clitoria fragrans*) locations on Avon Park Air Force Range.

Wireweed

Wireweed (*Polygonella basiramia*) is a federally endangered plant that received protection in 1987 (USFWS 1999). Wireweed's primary threats include destruction of scrub vegetation and a lack of large-scale disturbance events, such as periodic fires.

Wireweed is a herbaceous perennial endemic to the Lake Wales Ridge ecosystems. It is primarily found in the rosemary phase of sand pine scrub, requiring periodic disturbance, such as fire, to maintain habitat suitable for its survival (USFWS 1999). During its vegetative stage it consists of basal, compressed stems with narrow, alternate leaves. Wireweed is an obligate seeder (Menges and Kohfeldt 1995) often not present in the first few years after fire, but whether it recovers through delayed post-fire germination from a soil seed bank or disperses into sites remains unknown. Wireweed seedlings require about 1 year to mature and set seed, so populations would not recover if fires occur at intervals insufficient for sprouting and maturity (Hawkes and Menges 1995). Long fire-return intervals may not negatively affect wireweed if openings persist, but it may be harmful to other species that share the habitat (Hawkes and Menges 1995).

Wireweed was first identified at APAFR by Delaney (1993) based on presence/absence in xeric soil polygons and whether or not it was recorded as present on a statewide scrub inventory species list (Christman 1988). Subsequent to these studies, all known sites for wireweed at APAFR were digitally tagged using GPS as polygon coverages by Stout (2010). This level of GPS coverage was used by Christman (2006) in his range wide review of the status of wireweed.

As of June 2022, wireweed is covered under the Plant Collections BO (2015), which contains no specific conservation recommendations or terms and conditions. In addition, wireweed is covered under the Critical Infrastructure Program (CIP: # 41420-2011- F-0310) (2011), Upland Ridge Habitat Restoration (2019) and Range Operations (2020) BOs. All BOs contain specific minimization and conservation measures, including to avoid parking and driving on roadsides with known or visible populations of wireweed and reduce the chance that felled pines will crush or cover these listed plant species.

Prescribed burning at APAFR within the range of wireweed should benefit this plant as long as the fire is managed to provide a mosaic of burned and unburned areas. Mosaic burns, such as are conducted at APAFR, facilitate the recolonization of burned areas from plants in unburned areas. As part of the INRMP, the AF FMO develops an annual burn plan, which is reviewed by the AF Botanist and other natural resource staff. This review process includes identifying specific locations of wireweed plants to avoid mechanical disturbance (Figure 7.4.16). APAFR implements other management practices to prevent the disturbance or loss of wireweed populations. These include the treatment of invasive and exotic plant species including cogon grass (*Imperata cylindrica*), the reduction of feral hog (*Sus scrofa*) disturbance, and any possible silvicultural disturbance to known populations.

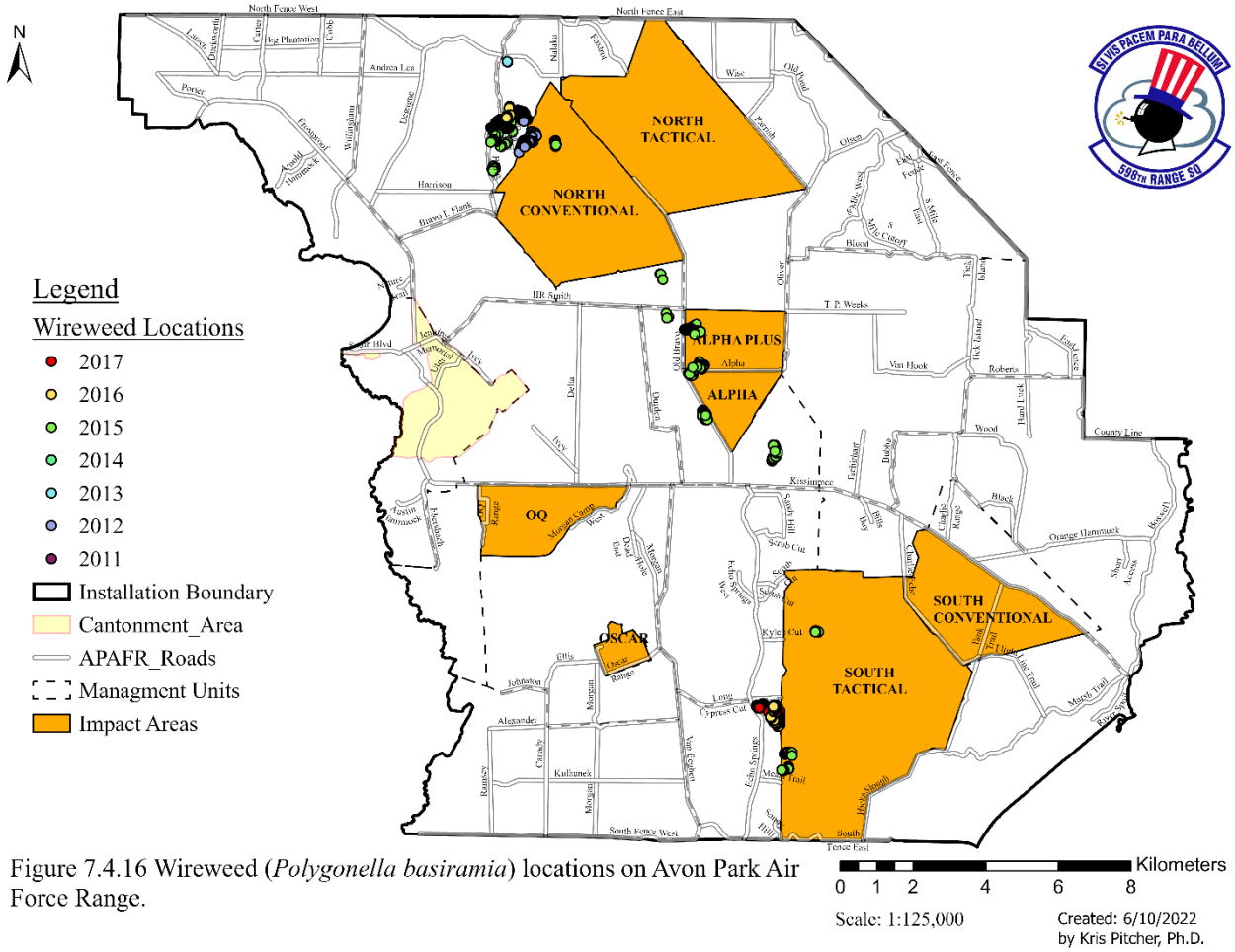

Figure 7.4.16 Wireweed (*Polygonella basiramia*) locations on Avon Park Air Force Range.

7.5 Water Resource Protection

Applicability Statement

This section applies to AF installations that have water resources. This section is applicable to this

installation.

Program Overview/Current Management Practices

The hydrology of APAFR presents challenges in environmental management due to the potential for flooding and erosion in many areas of the installation. The Florida Watershed Restoration Act of 1999 (403.067, Florida Statues [FS]) was passed to meet the requirements of Section 303(d) of the CWA. This act provided legal authority for the FDEP to enact water quality criteria and enforcement actions, such as Total Maximum Daily Loads (TMDLs), the Impaired Waters Rule, and Basin Management Action Plans (BMAPs). The Lake Okeechobee BMAP (January 2020) identifies all lands within the drainage basin of Lake Okeechobee, including APAFR, which includes water quality impairments, nutrient management within agricultural activities, and lists projects and programs aimed at nutrient reduction. APAFR supports' DEP's Watershed Monitoring Program (WMP) by allowing the state to take water monitoring samples from rivers, streams, lakes, canals, and wells within APAFR. APAFR entered a Notice of Intent (NOI) with Florida Department of Agriculture and Consumer Services (FDACS) in 2016 to address nutrient management requirements associated with two active cattle grazing leases within the installation. Based upon the FDEP Impaired Waters, TMDLs, and Basin Management Action Plans Interactive Map website: Impaired Waters, TMDLs, and Basin Management Action Plans Interactive Map | Florida Department of Environmental Protection there are now six impaired waters that are identified within APAFR boundaries:

Impaired Waterbody	WBID	Parameter
Blue Jordan Swamp	1710	DO
Willingham Creek	1761D3	DO
Morgan Hole Creek	1761D1	Bacteria
Eight Mile Slough	3186D	Bacteria
Kissimmee River below S-65A	3187-D	DO
Arbuckle Creek above Morgan Hole Creek	1761-B	Nutrients

Regular coordination with USACE and SFWMD is necessary to stay informed of emerging water quality issues in the watershed and assist with information needed to manage water levels within Lake Istokpoga, Lake Okeechobee, and the Kissimmee River regulation schedules. Regular inspection of storm water management systems is conducted to ensure flooding is minimized, erosion and sedimentation are minimized, and water quality is protected. BMP are employed when necessary and during all construction-related projects. The APAFR Approved BMP Guidance Manual was developed specifically for the APAFR landscape and was updated in 2015.

7.6 Wetland Protection

Applicability Statement

This section applies to AF installations that have existing wetlands on AF property. This section is applicable to this installation.

Program Overview/Current Management Practices

Wetlands constitute approximately 54,300 acres of the installation, and include large wetland systems such as the Arbuckle Marsh, Kissimmee Marsh, Long Cypress Slough, Deadins Pine Swamp, Eight Mile Slough, Tick Island Slough and numerous small isolated wetlands.

APAFR acquired an Individual Section 404 permit from USACE in 2000 to cover specific wetland impact

activities on the five active impact areas. This permit (*199403890(IP-LC)*) specifies a cumulative maximum acreage of repeated wetland impacts on an annual basis for the impact areas – 905 acres annually. The repeated impacts caused by semiannual range maintenance activities and general range operations, as well as ordnance impacts are included in this acreage. All impacts to new locations in wetlands require consultation.

In 2010, APAFR acquired approval to modify the 2000 Section 404 permit to expand the allowed wetland impacts to the entire installation. The expanded permit, known as the installation-wide Section 404 permit, allows for the use of specific nationwide permits and Florida statutes to cover general operations and maintenance activities across the entire installation as well as some new impacts. This expanded permit was consulted on by both USACE and SFWMD as the regulatory agencies with jurisdiction over wetlands on the installation and provides for pre-consulted actions, but also requires consultation for wetland impacts in new locations. This modified permit, issued in 2010, retained the original expiration date of April 9, 2030.

The CWA also requires a Section 401 permit with allowed wetland impacts, which is a water quality certification. Section 401 is issued by the State of Florida and is covered in the existing installation-wide 404 permit where SFWMD has consulted on specific and pending actions. Mitigation for wetland impacts has not been required for the individual small impacts resulting from localized construction and maintenance projects at APAFR. If compensatory mitigation is necessary to offset the functional loss of a wetland within APAFR there are the following options:

- On-site (wetland creation or enhancement)
- Mitigation Bank credit purchase.

The following Mitigation Banks are a Service Area that includes APAFR:

Lake Livingston Conservation Bank – for Sand Skinks
Morgan Lake Wales Preserve – Sand Skink & Florida Scrub-jay
Collany Conservation Bank – out of all credits (was for Sand Skinks)
Lake Livingston Mitigation Bank – pending status since 2016
Kissimmee Ridge Mitigation Bank – Palustrine Forested credits available
Collany Wetland Mitigation Bank – Palustrine Forested credits available

Wetland monitoring is achieved by both the water and biodiversity programs during the regular duties and studies conducted as part of the respective program needs. Monitoring of wetlands includes identification of areas affected by direct and indirect impacts, observing the effects of such impacts over time, and developing datasets to track improvements or degradation. The most common impacts observed include direct disturbances by equipment/vehicles, erosion and sedimentation, wildlife effects, and the transition of wetlands from obligate to facultative due to hydrologic changes and species selection.
APAFR has not conducted any large-scale restoration activities on wetlands. With the implementation of BMPs, programmatic modifications to landscape use including vehicle restrictions, user education, feral hog removal and cattle grazing exclusions APAFR has been successful in improving many wetland areas.

Climate Change Vulnerabilities

In Florida, climate change projections assess vulnerability of these ecosystems to sea level rise, water supply and storm surge/weather (Association of State Wetland Managers, n.d.). APAFR contains numerous natural ponds, manmade ponds, marshes, springs, sloughs and other wetlands, which constitute approximately 58,000 acres of the installation. According to climate projections in this study, wetland ecosystems at APAFR will be particularly vulnerable to the increase of temperature, which could increase evaporation rates in these areas. Wetland systems are vulnerable to changes in quantity and quality of their water supply, and it is expected that climate change will have a pronounced effect on wetlands through alterations in hydrological

regimes (Erwin, 2009).

7.7 Grounds Maintenance

Applicability Statement

This section applies to AF installations that perform ground maintenance activities that could impact natural resources. This section IS applicable to this installation.

Program Overview/Current Management Practices

Ground maintenance activities are carried out under the Base Operating Services (BOS) contract. Appendix K contains the BOS grounds maintenance statement of work and standards and guidelines for grounds maintenance.

7.8 Forest Management

Applicability Statement

This section applies to AF installations that maintain forested land on AF property. This section IS applicable to this installation.

Program Overview/Current Management Practices

The principal objective of forest management on AF installations is to maintain and enhance the ecological integrity of forested landscapes while supporting the military mission (AFI 32-7064 *Integrated Natural resource Management*). Under the principles of ecosystem management, forest treatments may be used to achieve installation goals for forest enhancement and restoration, wildlife habitat improvement, wildfire protection, military training requirements, and airfield certification or safety requirements.
APAFR has added an additional practice of utilizing salvage operations after times of heavy wildfire or other natural disaster destruction. Wood production will remain an important consideration for meeting budget requirements.

APAFR has approximately 35,000 acres of forest cover (Figure 7.8.1). This includes 15,000 acres of slash pine (*Pinus elliotti*) plantations, 1000 acres of longleaf pine (*Pinus palustris*) plantations, 15,000 acres of mixed South Florida slash (*Pinus densa*) and longleaf pine, 400 acres of sand pine (*Pinus clausa*), and 5,000 acres of cypress (*Taxodium sp.*) and mixed hardwoods. Pine flatwoods are maintained by frequent fires, which help to keep oak encroachment to a level conducive for silvicultural practices while also being important for understory diversity. Forest management has primarily addressed silvicultural treatment to natural slash and/or longleaf pine and planted slash pine plantations.

North Florida slash pine plantations were established at APAFR during the 1960s and 1970s covering 22,000 acres across several different habitats. Commercial forestry has been the primary focus at APAFR for the past 30 years, sawlogs and mulchwood being primary production end states dependent on the regional timber market. Currently, the budget requirements have been reduced by more than 50% and forest management will focus more heavily on an adaptive ecological and restorative approach while still providing income to the program.

The forest management program will continue to work closely with other Environmental Flight program managers (e.g. Invasive Species, T&E Species, Hydrology, Wildland Fire). This will help to increase the amount of habitat restoration accomplished in the future as the program transitions from a solely revenue-generating program to a more restoration-focused program. Restoration and/or habitat improvement projects

throughout APAFR have been identified and will continue to be developed with input from program managers and new scientific data.

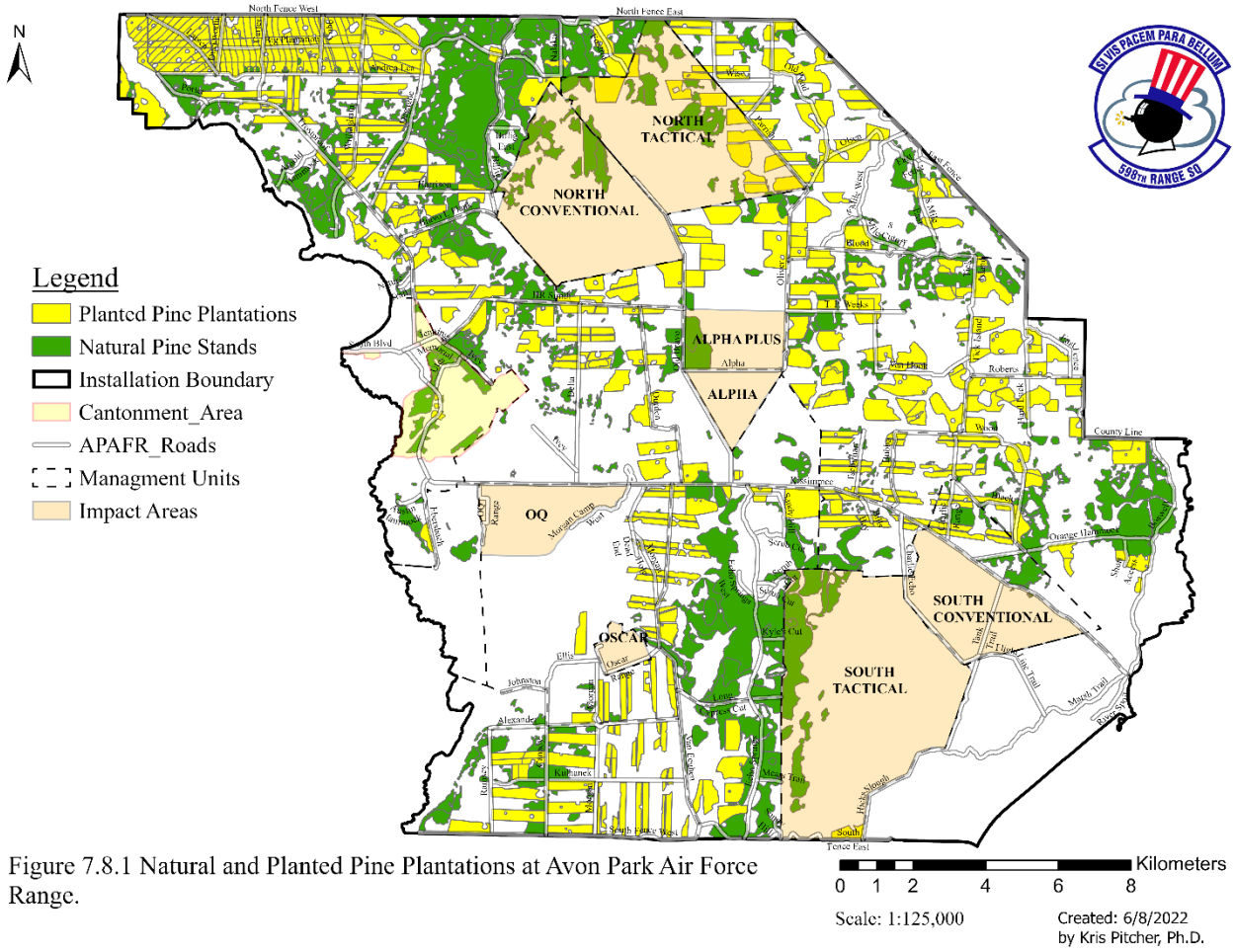

Figure 7.8.1 Natural and Planted Pine Plantations at Avon Park Air Force Range.

Timber Management

Military Mission Support

Several forest management activities have benefited the military mission either directly or indirectly. Direct mission support includes the removal of ~900 acres of pine plantations across multiple impact areas that resulted in the increase in land suitable for military training activities and missions. There have been multiple timber harvests in the immediate and surrounding areas of the airfield to meet required airfield certification and to reduce possible BASH hazards. Indirect mission support has occurred through the removal of several pine plantations for the mitigation of impacts incurred through military missions.

Forest Inventory

Forest inventory is an ongoing process with all electronic inventory data maintained on the Environmental Flight database. Timber harvesting records are also maintained on an annual basis. The current forest inventory will be updated over the next five years, focusing on pine plantations and natural pine areas not in current RCW cluster locations. RCW clusters are defined throughout this document as the area extending 0.5 miles from the center of the collection of cavity trees used by an RCW PBG.

Slash Pine Plantation Management

The Forest Management Program initiated a reforestation focus in 1999. Since then, 4,500 acres of South Florida slash pine and 1000 acres of longleaf pine have been planted in cleared plantations and are the second generation of planted pine. The primary focus of this management has been to remove all North Florida slash pine planted and its regeneration immediately adjacent to these plantations, let them sit fallow for ~2 years, site prepare through the use of mechanical treatments only if bedded, burn, and plant back containerized Avon Park seed source south Florida slash seedling. Prescribed fire will be used for site preparation in place of mechanical treatments on un-bedded sites. Prescribed fire should be applied to young plantations within 2 to 3 years after planting. Bedded pine plantations will continue to receive mechanical treatments because of an excessive level of saw palmetto, shrubs, and leftover slash that will need to be reduced for successful future plantings. Roller-chopping also benefits the hydrology of the plantations by reducing the beds about 50% from their original height. Plantations should only be burned with prescribed fire between Dec 1st and Apr 15th unless otherwise approved by the base forester.

Timber Salvage

Periodically, fires with high severity and weather events, such as hurricanes and tornados, damage planted pine plantations to the extent that a salvage harvest operation is necessary. Forest management will continue to salvage in these locations, but will try to retain snags, when possible, for use by Florida bonneted bats.

Restoration

The current restoration emphasis for the Forest Management Program is to remove planted North Florida slash pine plantations and associated pine regeneration from habitats that historically had low to no over-story, such as in dry and wet prairies, or having a very low native South Florida slash or longleaf pine basal area. Most of these stands at APAFR are located in un-bedded plantations, which allows for a higher possibility of successful restoration

Sand Pine Restoration

All commercially available sand pine has been previously harvested and occurs in insufficient quantities or basal area to allow for a successful timber sale. Currently, sand pine is being removed through mechanical treatments or prescribed fire to improve FSJ habitat.

Longleaf Pine Restoration

Longleaf pine has been replanted in several cleared plantations since 2000 totaling about 1000 acres. Cleared North Florida slash pine plantations are treated with prescribed fire, and planted back with local seed-source containerized longleaf pine. Almost all of these stands have required multiple plantings to reach the desired stocking levels. For the next 5 years starting in 2022, containerized longleaf pine seedlings will be planted in un-grazed tame pastures and designated pine plantations that may have planted slash pine over-story. These sites will be selected to improve connectivity of RCW clusters in the northeast of the installation with those directly to the south. The long term restoration goal is to eventually create a corridor to the natural stands of long leaf on the southern ridge of APAFR which is currently unoccupied by RCWs. Longleaf seedlings will be planted at least 15 feet from the base of the over-story pine. These plantings will then be treated with prescribed fire using low severity burns to allow for the release of seedlings out of the grass- stage and then treated with forestry-approved herbicide to reduce competition and treat any introduced invasive or exotic plant species.

Endangered Species Management

Forest management will continue with the removal of North Florida slash pine plantations from FSJ and FGSP habitats. Slash pine regeneration that occurs in designated cleared pine plantations in or near FSJ and FGSP habitats will be removed dependent on funding, mission constraints, and species-specific nesting seasons. The harvesting of natural pine in any RCW clusters that have been active or augmented during the past 25 years is not planned for the next 5 years. All longleaf pine in designated RCW habitat with a diameter at breast height >10 in will be protected from timber harvesting. Slash pine plantations within the current RCW clusters half mile radius may be selectively thinned if RCW cluster basal areas remain adequate according to the USFWS Species Recovery Plan (2003) and the future APAFR-specific RCW Foraging Matrix.

Pre-commercial thinning

Many natural longleaf pine stands produce dense clumps of longleaf pine regeneration. Pre-commercial thinning can create a desired result of reduced competition and increased growth of forest understories. The Forest Management Program has pre-commercially thinned many such locations of native longleaf regeneration since 1998. These improvements have increased sunlight to the understory, reduced competition between trees, provided additional necessary space for increased growth rates, and created a more open midstory canopy. These procedures will continue to be implemented across both longleaf and South Florida slash pine stands, where needed. Targeted native slash and longleaf pine trees for these treatments will have a diameter at breast height of 2 to 6 in.

Best Management Practices

APAFR follows the Silviculture BMP (FDACS 2008) publication to minimize impacts caused by forestry operations. Harvesting is typically conducted during the drier months of the year (January – June). Mechanical treatments usually occur during the early fall (September – November). Harvesting and mechanical operations will be conducted with USFWS concurrency if done during the RCW breeding season within active clusters. Additionally, timber harvesting will be shut down for short periods if excessive rain occurs and may stop for extended periods under excessively wet conditions. Implementing these measures helps to reduce heavy rutting and keeps non-asphalt installation roads in working condition. APAFR has an adequate supply of forest roads, trails, and disk lines for hauling and does not need to construct any additional roads for timber harvest.

7.9 Wildland Fire Management

Applicability Statement

This section applies to AF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section IS applicable to this installation.

Program Overview/Current Management Practices

The climate and vegetation of the APAFR region has created a landscape where very frequent lightning-ignited fires dominated the landscape for thousands of years. A reconstruction of past fire regimes from records in tree rings reveals human influences on fire. When humans were present from the late 1700s through approximately 1920, the prevailing fire regime was still climatically-based with very frequent fires (mostly 1-2 year interval) that occurred predominantly in the lightning season. People caused greater changes in fire regimes beginning in the early 1900s with turpentine operations followed by the cutting of the old growth longleaf pine and the initiation of more intensive cattle grazing. Beginning in the 1920s (and

extending through the present day), a much higher proportion of fires occurred outside of the lightning season. Since the 1930s fires have also become less frequent, shifting from occurring mostly every one to two years toward a longer three-year fire interval. Historically, lightning-ignited fires produced large landscape fires from April to mid-June, during the transition between the dry winter season and the onset of the summer-wet season in south-central Florida. The frequent lightning-ignited fires required fire management by the AF, so from 1940 until the early to mid-1960s, wildfire suppression was the primary focus of wildland fire management at APAFR. The AF depended upon State of Florida resources to control wildfires on the installation.

In the 1960s, the responsibility to suppress wildfires shifted to the AF when a Forest Management Program was instituted at APAFR. The Forest Management Program provided personnel and equipment to control wildfires and conduct prescribed burns. The goal of the prescribed burning program was fuel reduction and to provide winter season grazing for cattle owned by cattlemen who leased land on the installation. A two-year return interval was incorporated, primarily to appease the cattle lessees. In the early 1970s, APAFR adopted a cattle-grazing strategy that modified grazing practices by promoting a longer fire return interval (three years) and emphasized resting pastures after burning. Today, the program goal is to burn a five year rolling average of 28,130 acres of the installation each year within an ecosystem management context (Figure 7.9.1). All wildland fire operations are addressed in the APAFR WFMP (Appendix B) and future Fire Aviation Operations Plan.

Current wildland fire management at APAFR is conducted in coordination with the AF Wildland Fire Branch (AFWFB). The AFWFB was established at Eglin AFB as part of the AF's Civil Engineering Center (AFCEC) transformation initiative and began initial operations in July 1, 2012. It was established to capitalize on the subject matter expertise at Eglin AFB and minimize wildland fire risk on AF installations throughout the U.S. The AFWFB currently employs 5 full-time wildland fire personnel at APAFR with plans to employ 3 additional full-time wildland fire personnel by the end of FY 2022. These eight individuals will constitute the Peninsular Florida WFC Module (the Module) and assist with prescribed burning operations at MacDill AFB and Cape Canaveral Space Force Station in addition to the implementation and/or wildland fire activities at APAFR. Future plans may include adding Homestead Air Reserve Base into the Module's area of responsibility.

The unifying goal of fire management at APAFR is to reduce risk to the military mission.
The fire management goals and objectives listed on these pages are derived from and expand upon the goals and objectives enumerated in the INRMP work plan (Section 8). Achieving these objectives will achieve the related objectives in the INRMP. The natural resources objective for fire management at APAFR is to maintain or restore landscape-level natural ecological processes using prescribed fire as the primary tool, while enhancing mission sustainability through fuels reduction. Another objective is to enhance military mission capability and long-term range sustainment on APAFR through an adaptive wildland fire program that minimizes risk from wildfires, enhances ecosystem resilience through science-based application of prescribed fire and provides key fire related information to decision makers, such as range operations and civil engineering.

At APAFR, prescribed fire is a vital tool utilized to reduce wildfire risk, manage ecological communities and their associated species IAW the ESA and the Sikes Act while managing military impact areas. It is also used to aid forest management, agricultural outleases, game management, and invasive species control. Prescribed fire is the most important land management tool at APAFR by reducing fuel loads and the risk of associated wildfires. Aggressive use of prescribed fire has proven effective at reducing wildfire risk at other DoD installations (Eglin AFB, Tyndall AFB).

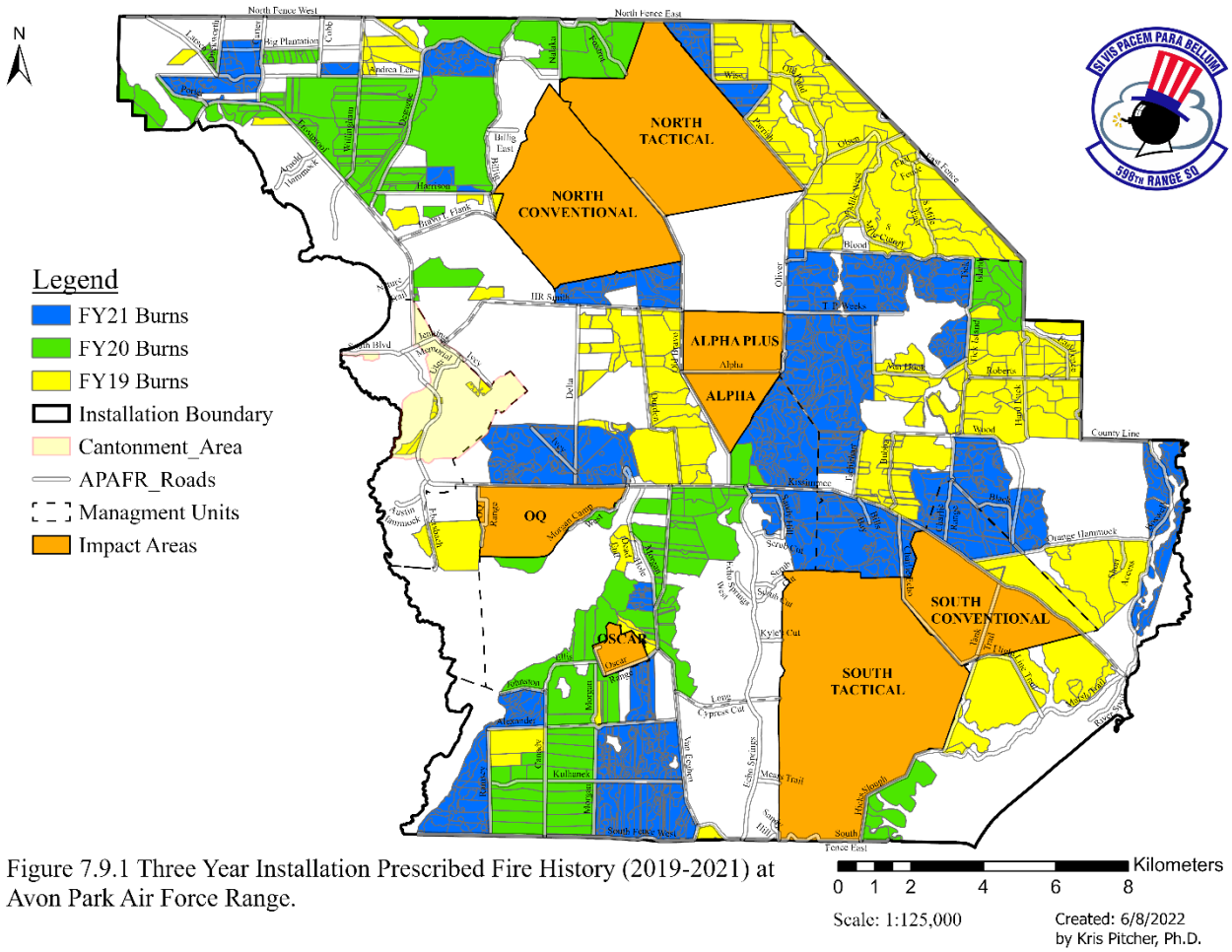

Figure 7.9.1 Three Year Installation Prescribed Fire History (2019-2021) at Avon Park Air Force Range.

Climate Change Vulnerabilities

Wildfire frequency and intensity are likely to remain approximately the same during most of the fire season at APAFR. However, decreases in summer precipitation combined with moderate increases in summer temperatures may lead to a more active summer wildfire season. At this time, our data do not support a quantification of these changes.

In this analysis, we assume that the total ignition load does not change, and that the spatial and temporal distribution of ignition sources does not change (i.e., there is no significant change to mission activities or civilian behavior). Analysis of these ignition factors is beyond the scope of this assessment. Given an ignition heat source, wildfire ignition likelihood is largely dependent on the receptivity of the fuel bed. This is in turn driven by physical characteristics of the fuels, such as surface area to volume ratio and chemical composition, and climatic factors such as temperature and relative humidity. Fire behavior is traditionally depicted as dependent on fuels, weather, and topography. Of these three factors, topography will remain constant, but fuel and weather conditions are likely to change.

Precipitation across all climate scenarios is likely to increase or stay approximately the same through the height of the current fire season, which is most pronounced in February through May. All climate scenarios project substantial increases in precipitation in May, ranging from 0.82 to 2.16 inches. These changes in precipitation, particularly in May, could be enough to offset the increases in temperature, projected to be roughly two to four °F in almost all months from January through June (the full fire season) in all climate

scenarios. There is insufficient data to make a determination however. Precipitation is projected to decrease in June through August, and by 2050 both the 4.5 and 8.5 RCP scenarios predict decreases of 12-15% on average through this period of the year.

Fire probability and fire intensity can be expected to increase in June and the fire season may expand into July. Precipitation in June decreases marginally in the 2030 projections, but decreased by 1.18 and 1.39 inches in the 4.5 and 8.5 RCP projections respectively. Maximum temperatures are expected to increase in June by 2.3 to 5.0 °F, depending on the climate scenario. These changes suggest a slightly warmer, but considerably drier June than historic norms, and therefore fire occurrence and intensity can both be expected to increase.

Decreases in precipitation in July were of greater magnitude, with the exception of the RCP 4.5 2030 scenario in which precipitation was projected to increase by 0.68 inches. In the other scenarios, however, precipitation decreased by 1.21 to 1.56 inches, as much as 20% relative to current day. Combined with July temperature increases of 1.9 to 4.9 °F, and preceded by a warmer and drier June as discussed above, it is likely that fires will become routine in July. June and July are still expected to be wetter than the heart of the current fire season in February through April, but also approximately 10 °F warmer on average. Without extensive analysis, it is not possible to say whether evapotranspiration in live fuels and/or increased drying of dead fuels will increase fire behavior to match that of the fire season, but it is very likely to increase.

Given that there is no projected change in the MC2 vegetation type, and that weather variability will produce drought years during which precipitation is well below the projections discussed previously, APAFR may face a future in which wildfires occur more frequently, across a wider portion of the year, and in which some of those fires may exceed the capacity of firefighters to contain. Current day fires occasionally strain suppression resources, but according to these projections, fires in the future may do so with more regularity. Wind is not included in this analysis, which can significantly impact fire spread and overall size.

7.10 Agricultural Outleasing

Applicability Statement

This section applies to AF installations that lease eligible AF land for agricultural purposes. This section IS applicable to this installation.

Program Overview/Current Management Practices

George H. Dacy, historian of the Florida cattle industry from its beginnings in the early sixteenth century to the mid-twentieth century, pointed to the Kissimmee River valley, as the quintessential cattlemen's paradise, a cow country embracing Okeechobee, Osceola, Orange, Hendry, Polk, Highlands, Glades, Brevard, and Indian River counties. Permanent settlement and intensive exploitation of the region was delayed until the mid-nineteenth century after the Seminole Wars. Then, between the Civil War and World War II, the region developed rapidly and with a significant degree of complexity: it became typified by overlays of state interest in development potential, agricultural use, and corporate investment as cattlemen, farmers, and corporations became involved in the extractive and exploitative uses of the region's natural resources.

The U.S. military passed through the area of present-day APAFR during the Second Seminole War in 1837 and returned in 1849 to build a fort on the Kissimmee River and another at Lake Arbuckle. They established roads, such as the one named for General David E. Twiggs that ran from the area of south Tampa Bay east to the Atlantic Ocean. The area was sufficiently pacified by the 1850s to allow the surveying of all the land within the current installation and divided into townships, ranges, and sections. While initial settlement may have begun unofficially as early as 1859, the earliest legal settlement occurred

with the filing of patents in 1883. The greatest number of filings were made by corporations such as Disston Land Company, Atlantic and Gulf Coast Canal and Okeechobee Land Company, Atlantic Land and Improvement Company, and Consolidated Land Company and its numerous affiliated corporations. The presence of both corporate and non-corporate owners created a complex pattern of land ownership at APAFR as private owners used parts of the area for subsistence farming, stock raising, and ranching, and corporations used the same area for large-scale ranching, turpentining, lumbering, and recreation. By the 1920s, corporations had become predominant, and with the end of the naval stores industry in the area by 1930, the landscape was devoted almost entirely to livestock production, which was typical of much of Florida south of the Suwannee River.

Cattle management on the open ranges of the late nineteenth century consisted of roundups that ran from about March 1 until August. Owners met at designated locations to gather and market cattle, bringing with them a horse, a pair of saddle bags, wallet, spurs, whip, and several days' rations. Some may have brought mongrel dogs to help handle the wild, quick Florida cattle, which were readily identified by their marks and brands. The unmarked calves were marked and branded, and the animals selected for market separated from the stockier cattle, which were turned back out on the range.

The history of APAFR was part of the mainstream of south Florida history until 1941, when long- time residents and owners of property on the current installation were forced to move and abandon their use of the land after it was condemned by the Federal government. It is likely that installation lands had been the location of cattle herds owned by Native Americans by at least the eighteenth century; by the mid-nineteenth century it had become crisscrossed by military roads and was on the cusp of participation in the cattle boom that gave the region called Kissimmee Island its identity as cow country par excellence. During the early twentieth century, the livestock industry coexisted with the lumbering and naval stores industries and re-emerged after 1930 as the dominant activity.

The current installation landscape includes recorded cultural sites and structures that reflect historic uses, such as railroad beds, tramlines, and company towns associated with the naval stores and timber industries, and dipping vats and cattle pens associated with the range cattle industry.

The area of APAFR never participated in the large-scale land boom of the post-World War II era that permanently changed much of the south-central Florida rural landscape. As a result, it more nearly reflects the mid-nineteenth to mid-twentieth century agricultural and industrial landscape, where clues to the history of its use and development remain in the artifacts and historic sites associated with the historic settlements, naval stores and livestock industries.
(Adapted from APAFR Phase I and Phase II Investigations on APAFR, Polk and Highlands Counties, Florida AP0022)

Outleasing of portions of the installation for domestic livestock grazing purposes has been conducted on the installation since 1957. In 2013, cattle were removed from dry prairie and sites with rare plants to help manage and conserve T&E species on the installation. The overall management strategy is a one herd multiple pastures grazing system allowing an adequate recovery or rest period that does not adversely impede the natural growth in the various native grasses livestock normally prefer to eat. Pastures near the Kissimmee River were removed in 2018 due to the difficulty in accessing these areas on a routine basis. In 2021, pastures located near the Air Field were removed due to Air Field requirements. The current leases will end their five-year cycle in July 2025 with plans for USACE to re-administer them for an additional five years.

Program Organization

The Real Estate Division of the Mobile District Army Corps of Engineers administers the agricultural outleases. Grazing Land Use Regulations are located in Appendix L. USACE is responsible for issuing the leases to the successful high bidder for a five-year term with a five-year optional extension. They process

the bills, accept payments and handle all lease management issues. The Outdoor Recreation Program at APAFR is responsible for all day to day management of the resource and direct contact with the lessees. The Outdoor Recreation Program oversees the maintenance and reconstruction of all agricultural infrastructure through contracts. The care and managing of the livestock are the sole responsibility of the lessee.

Stocking Rates

Lease Unit 2

Unit 2 consists of three native pastures totaling 1,021.17 acres of native rangeland, nine tame Bahia pastures totaling 1036.00 acres, and six pens totaling 37.10 acres (Figure 7.10.1). Two of the native rangeland pastures consist of part marsh and part flatwoods, the third is all marsh. Cattle should be moved a minimum of once every two weeks on the native pasture, and every three weeks for the Bahia pastures. A Melich-3 soil test is required by FDACs prior to fertilization to determine if there is a need to fertilize native rangeland. For Bahia pastures, a plant tissue test is also required. Fertilization, when needed will maximize the production of the improved pastures.

The leasehold has been inventoried using USDA Natural Resource Conservation Service standards and refined by University of Florida (IFAS) research (one cow unit per 4.3 acres improved bahia pasture = 240 cow units; additionally, a pasture substitute of one acre of improved bahia pasture to 3.65 native flatwoods to adjust to 4,802.57 acres equivalent native flatwoods at one cow unit per 20 acres of native flatwoods equivalent = 240 cow units). The estimated carrying capacity of the leasehold is 240 cow-units. A cow-unit on APAFR is a cow/calf pair through a production year, assuming a mature, 850-pound cow, and assuming the calf is sold within seven months of birth. One bull is equivalent to one and one quarter cow-units. Assuming a bull to cow ratio of one to twenty, and assuming 850-pound cows, the leasehold would be stocked at a maximum of 225 cows and 12 bulls (12 bulls = 15 cows). These numbers will be adjusted to match cow size and bull/cow ratio.

Lease Unit 3

Unit 3 consists of four native rangeland pastures totaling 4,735.73 acres, two improved pastures totaling 57.42 acres, and 103.23 acres of pens. The native rangeland consists of flatwoods rangeland. A Melich-3 soil test is required by FDACs prior to fertilization of native rangeland to determine if there is a need to fertilize. For Bahia pastures, a plant tissue test is also required. Fertilization, when needed, will maximize the production of the improved pastures.

The leasehold has been inventoried using USDA Natural Resource Conservation Service standards and refined by University of Florida (IFAS) research (one cow unit per 20 acres native flatwoods). The estimated carrying capacity of the leasehold is 240 cow-units. A cow-unit on APAFR is a cow/calf pair through a production year, assuming a mature, 850-pound cow, and assuming the calf is sold within seven months of birth. One bull is equivalent to one and one quarter cow-units. Assuming a bull to cow ratio of one to nineteen, and assuming 850-pound cows, the leasehold would be stocked at a maximum of 225 cows and 12 bulls (12 bulls = 15 cows). These numbers will be adjusted to match cow size and bull/cow ratio.

Grazing Fee Structure

The grazing fees are determined by competitive bid and are in effect for five years. Present annual grazing lease income is as follows:

Unit 2: $23,000
Unit 3: $30,287.76
Total annual income is $53,287.76

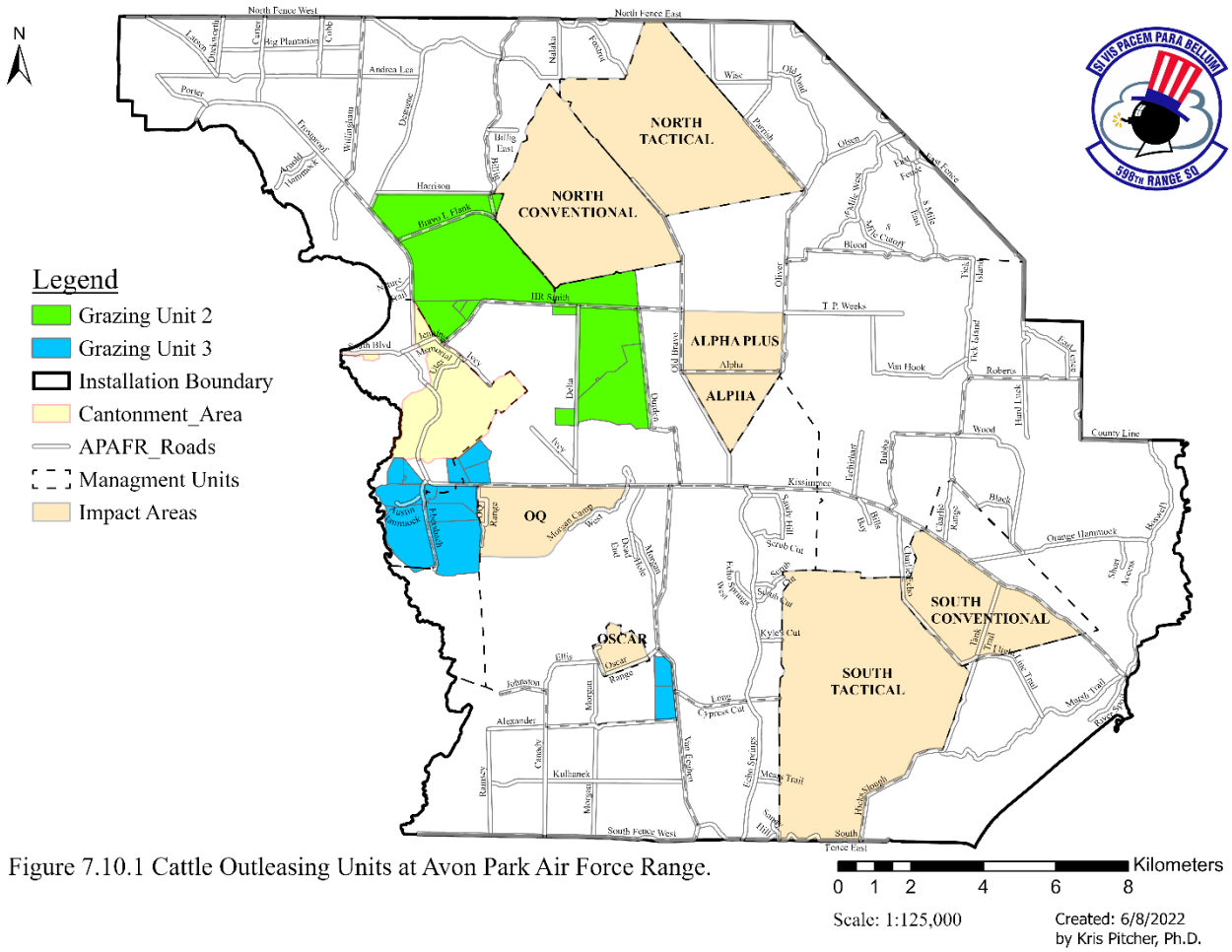

Figure 7.10.1 Cattle Outleasing Units at Avon Park Air Force Range.

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to AF installations that perform pest management activities in support of natural resources management (e.g. invasive species, forest pests). This section IS applicable to this installation.

Program Overview/Current Management Practices

There are several noxious, invasive and exotic plant species that require control by federal regulation. The Federal Noxious Weed Act requires federal agencies to control exotic species on federal lands. Invasive plants are introduced species that have few, if any, natural controls in the U.S. and can spread out of control. Invasive plant species also require control as directed by federal requirements outlined in EO 13112, 3 February 1999, Alien Invasive Species Control. These requirements include: preventing the introduction or spread, controlling and monitoring existing populations, and accompanying all actions with appropriate NEPA documentation. As further stated by this EO: “DoD moves vehicles and equipment to field sites throughout the world, where such species are picked up and transported to other countries. Vehicles, equipment and supplies are to be cleaned of all plant and animal matter, soil and caked on mud.” Exotic and invasive species that may be present at APAFR are listed in the IPMP (Appendix F).

In Florida, there are state noxious weed laws (FDACS, FAC Chapters 62C-52), aquatic weed quarantines

and plant pest quarantine regulations. The state also enforces the Federal Noxious Weed Law (USDA, 7CR-360). There are several plant species that are considered noxious and control is mandatory for those found on the Federal USDA list. The USDA and APHIS clears retrograde cargo, such as tactical equipment returning from a foreign country, prior to arriving at APAFR.

The APAFR Natural Resources Program is charged with the treatment of invasive plant and animal species within the installation but not including fence lines, cantonment area, roadsides, buildings, state- operated land, and military targets, which typically are treated by other stakeholders, including the USDA, Civil Engineering Program and cattle leasees. This program is overseen by the AF Botanist and implemented by the Invasive Species Coordinator who is employed through CSU/CEMML. The program utilizes a comprehensive and integrative approach of invasive exotic species management that includes mechanical, chemical, prescribed fire, and biocontrol treatments. The Invasive Species Coordinator and Botanist work together to identify areas of the installation that can be treated through the FWC Upland Invasive Species contract program. This program provides a valuable service to APAFR for the treatment of invasive plant species by allowing treatment of large areas within small timeframes.

The invasive plant species that are targeted include cogon grass (*Imperata cylindrica*), Old World climbing fern (*Lygodium microphyllum*), Japanese climbing fern (*Lygodium japanicum*), Brazilian pepper (*Schinus terebinthifolius*), coral ardisia (*Ardisia crenata*), air potato (*Dioscorea bulbifera*), and several other species located on the Florida Exotic Pest Plant Council (FLEPPC) list of category 1 and category 2 invasive exotic plants (FLEPPC 2015). All herbicides used are addressed within the APAFR 2016 IPMP (Appendix F).

The Invasive Species Coordinator works with the civil engineering pest management contractor to prevent stoppages of the military mission. This is accomplished by the treatment and control of invasive plant species within the impact areas and around military targets. The reduction of invasive plant species is also a focal point around and within areas of T&E species, including Florida bonneted bat roosts, RCW clusters, FSJ habitat, dry and wet prairie systems, or in the immediate vicinity of pigeon wings and wireweed on installation.

Invasive exotic animal species are addressed through a contract with the USDA Wildlife Services (WS) division. They are contracted to provide a full-time permanent technician to maintain a zero-tolerance policy for feral hogs (*Sus scrofa*) within the impact areas and ranges. This is completed using several different removal methods including baiting and trapping, spotlighting, and aerial removal. Other invasive or exotic species (reptiles) are dealt with on a case-by-case basis including calling FWC Law Enforcement to provide methods of removal. The Invasive Species Coordinator does not provide animal species removal in any capacity.

The Invasive Species Coordinator maintains working relationships with several state and regional cooperatives and partnerships within the invasive species management field. This allows the coordination of research projects and exchange of knowledge to better understand treatments of invasive species within the central Florida landscape. Information gleaned through these means, and installation knowledge, is incorporated into an adaptive management process to further the efficacy of invasive species management. The continuation of an Invasive Species Management Program is essential for the continued success of the military mission and natural resource management.

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to AF installations that maintain a BASH program to prevent and reduce wildlife-related hazards to aircraft operations. This section IS applicable to this installation.

Program Overview/Current Management Practices

A BASH program exists at APAFR's airfield and its vicinity primarily due to resident and migratory bird species and other wildlife. Due to the abundant sources of open water in the form of wetlands, large rivers, lakes and streams, and large expanses of natural areas, birds and other wildlife are attracted to the airfield and the vicinity. Daily and seasonal bird movements create various hazardous conditions. The BASH program monitors, reports and attempts to eliminate potential BASH problems at APAFR and the local flying area. The 598 RANS BASH Plan 91-212, dated 20 October 2015, provides guidance for implementing the BASH Program at APAFR (Appendix C).

The Bird Hazard Working Group (BHWG) is chaired by the 23rd Wing Vice Commander at Moody AFB and the Wing Commander is the approval authority for recommendations. The USDA WS BASH Biologist represents 598 RANS on the Working Group.

Implementation of the BASH Program at APAFR centers upon:

- Establishing procedures to identify high-hazard situations, and aid supervisors and aircrews in altering or discontinuing flying operations when conditions dictate.
- Establishing aircraft and airfield operating procedures to avoid high-hazard situations.
- Providing a means for disseminating information on wildlife hazards and avoidance procedures to all aircrews.
- Establishing guidelines to decrease airfield attractiveness to wildlife IAW AFI 32-7064.
- Providing guidelines for dispersing birds/wildlife when they are a threat on or near the airfield.

Detailed tasks and responsibilities of the BHWG members are provided in the BASH Plan (Appendix C).

Depredation Permitting Requirements

Occasionally, birds (e.g. vultures, cattle egrets, doves and killdeer) must be killed to reinforce other frightening techniques. Depredation of most species requires federal (USFWS) and state (FWC) permits obtained by USDA WS. However, non-native pigeons, starlings, and house sparrows can be killed without a permit. In as much as APAFR is a state WMA, the AF is required to obtain a trapping/depredation permit for removal of feral hogs outside of permitted hunting activities from the FWC.

Existing and Potential Hazards to Aircraft Operations Posed by Wildlife

Military aircraft are authorized to operate as low as 500' above ground in the designated Military Operating Areas and Low-level Routes, and to surface level when authorized. As stated earlier, the natural features of this area attract a variety of birds from common resident birds to Neotropical migrants, waders to upland species. In addition, three natural vulture roosts exist at APAFR and the Highlands County landfill is approximately three miles from Echo Range. Consequently, a significant bird-aircraft strike hazard exists. In addition to birds, several mammalian and reptilian species pose threats to flight operations. In particular, the grounds surrounding the airfield are covered with bahia grass that attracts white-tailed deer, wild hogs, bobcats, coyotes and other wildlife. Despite these hazards, and as a result of the work performed by the BASH Program personnel, few significant strikes occur at APAFR. For example, how refuse is handled has also decreased the hazard of bird collision, because the state prison is now required to deposit waste in drums with covers, and entrails from hunters cleaning game are now buried three feet deep instead of being dumped on the ground.

BASH managers are concerned with the strike hazard posed by a variety of birds and take action to reduce the strike risk. In particular, raptors and migratory birds are the two most hazardous types. Bird hazards and the activities the BASH manager takes to prevent strikes are found in the 598 RANS BASH Plan (Appendix C).

Natural Resources Program Support of BASH Plan Objectives

APAFR relies on Environmental Flight to ensure that the airfield and range areas are not attractive to birds or other wildlife. Natural resource managers at APAFR support and coordinate with the BASH Program in the following ways:

- Provide natural resources representative to the BASH BHWG to monitor and advise the group of environmental modification.
- Develop procedures for removal or control of species that attract birds of prey.
- Initiate surveys and write environmental impact assessments and statements as required.
- Advise BHWG of environmental conditions that increase BASH potential.
- Employ land management practices that reduce attractiveness to hogs, deer, and raptors; also remove trees and brush in waterways.
- Recommend airfield habitat modifications consistent with runway lateral and approach zone management criteria per AFI 32-1026
- Develop habitat modification to reduce BASH potential beyond the 1,000 feet distance criterion.

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to AF installations that are located along coasts and/or within coastal management zones. This section IS NOT applicable to this installation.

Program Overview/Current Management Practices

7.14 Cultural Resources Protection

Applicability Statement

This section applies to AF installations that have cultural resources that may be impacted by natural resource management activities. This section IS applicable to this installation.

Program Overview/Current Management Practices

APAFR employs a cultural resource manager that oversees all cultural resource management and any potential conflicts between natural resource management and cultural resources. Cultural resources protection is covered in the ICRMP (Appendix E).

7.15 Public Outreach

Applicability Statement

This section applies to all AF installations that maintain an INRMP. The installation IS required to implement this element.

Program Overview/Current Management Practices

There is no Public Affairs function authorized for 598 RANS. Environmental Flight personnel carry out all

public outreach activities. The program focuses on a variety of activities to inform and involve the public in the Environmental Flight at APAFR. Historical outreach and education is conducted through the Cultural Resource Manager.

The Outdoor Recreation Program maintains a web site that provides information on recreational opportunities and other Conservation Program activities. It also hosts special events to increase public awareness. These events include the annual Christmas Bird Count, a Kid's Fishing Tournament and Special Opportunities Hunts. The program also has an Outdoor Recreation Advisory Committee. This group is composed of recreational users who have volunteered their time to act as a conduit to improve public awareness and maintain an open dialogue between the AF and its recreational stakeholders. The group meets on a regular basis. Meetings focus on items of interests for recreational users.

As part of the installation ERP, a local Restoration Advisory Board (RAB), composed of interested local citizens, meets three times a year. Although the primary focus of the RAB is the ERP, the group maintains an interest in a wide variety of programs at APAFR, including the Conservation Program. AF personnel regularly provide updates on conservation subjects of interest to the RAB. APAFR personnel regularly address local citizens groups on the aspects of the Conservation Program at APAFR. Local interest remains high and this is an effective means for informing the public about APAFR programs.

7.16 Climate Change Vulnerabilities

Applicability Statement

This section applies to USAF installations that have identified climate change risks, vulnerabilities, and adaptation strategies using authoritative region-specific climate science, climate projections, and existing tools. This section IS applicable to this installation.

Program Overview/Current Management Practices

APAFR's mission as a year-round air and ground forces training area requires a diverse assemblage of vegetation communities to provide varied and realistic training opportunities. The primary threat to the military mission at APAFR due to climate change is the potential for shifts in vegetation communities due to an increase in temperature, decrease in precipitation, and an increase in wildfire frequency and/or intensity. Changing habitat due to vegetation community shifts could lead to an increased regulatory environment or loss in training realism.

Future impacts to the mission at APAFR linked to climate change could include:

- increases in temperature and wind velocity leading to unsafe environmental conditions for the launch of current and planned weapons and equipment, resulting in increased maintenance requirements, requirements for new equipment, or decreased launch capacity (DoD, 2014);
- increased dust generation effecting equipment and visibility (DoD, 2014);
- increased wind velocities damaging vital mission infrastructure (Sydeman et al., 2014); increased drought potential (Glick et al., 2011);
- potential loss of future training areas that may be needed in light of a changing geopolitical landscape and base realignment.

In addition to these direct effects, climate change has the potential to disrupt the acquisition and transportation of materials required for the maintenance, construction, and storage of the equipment required for these systems (DoD, 2014).

7.17 Geographic Information Systems (GIS)

Applicability Statement

This section applies to all AF installations that maintain an INRMP, since all geospatial information must be maintained within the AF GeoBase system. The installation IS required to implement this element.

Program Overview/Current Management Practices

Data management support with a GIS is critical to the success of this INRMP. Spatial data collected on endangered species, plants, cultural resources, roads, culverts and other important elements of the natural resource program are used to create maps that help facilitate planning activities that have the potential to impact management programs. GIS is a vital tool for assisting land managers with making decisions and monitoring results of management and mission activities, plays a critical role in planning actions for current and future years and maps out useful information for everyday work plans. GIS layers can be used to depict important management areas of concern and potential conflict with proposed military actions, and can assist natural resource managers in conflict resolution and mission enhancement and sustainment.

All portions of the Environmental Flight collect and maintain GIS data specific to their programs needs and responsibilities. This information is shared throughout the Flight and Range Operations personnel for use in natural resource management decisions. This information helps to identify and deconflict possible issues in a timely manner to allow for no net loss of military missions.

Equipment Availability

GPS equipment is available through the Environmental Flight upon request for installation activities. Equipment includes TRIMBLE Handheld GPS units. These integrated GPS receivers provide accurate positioning information when using real-time or post-processed differential correction. ESRI's Arc GIS Software can be downloaded onto individual AF computers upon request and approval.

Staffing

Implementation of GIS throughout the AF is with GeoBase, the accepted AF GIS. Every installation and range is required to have a designated Geographic Integration Office (GIO) responsible for GIS. The 23rd Civil Engineer Squadron at Moody AFB is the designated GIO for the 598 RANS. At this time, GeoBase has been implemented at APAFR. The GIS Manager has the following responsibilities:

- Supervise maintenance, quality control and quality assurance of all GIS data layers;
- Provide technical leadership and coordination within a team of GIS technical or related staff;
- Coordinate with staff relating to current GIS projects or analyses;
- Supervise the development of GIS applications, design, and roll-out within the installation
- Coordinate and supervise the training of the personnel in GIS or related skills;
- Administer contracts/grants related to GIS with other governmental or private bodies;
- Identify, analyze, develop and supervise various GIS projects that will benefit the mission process or workflow;
- Manage staff usage of survey maps, railroad maps, aerial photography, property lines, geographic features, field survey notes, and all similar materials to extract data in order to maintain and create a variety of installation maps.

8 Management Goals and Objectives

The installation establishes long term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long or medium range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year. Also, in cases where off-installation land uses may jeopardize AF missions, this section may list specific goals and objectives aimed at eliminating, reducing or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are displayed in the 'Installation Supplement' section below in a format that facilitates an integrated approach to natural resource management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

Installation Supplement –

PRINCIPAL GOAL 1 - Support military mission sustainability through ecological stewardship.

Objective 1.1: Provide natural resource management expertise to support military mission requirements through a proactive and responsive natural resource analysis and consultation process, including the coordination and review with range operations staff.

Project 1.1.1: Natural resource personnel will attend weekly range operations schedule meeting and deconflict any potential hazards between the military mission and natural resource projects.

Project 1.1.2: Implement monthly EIAP working group to foster communication and deconfliction between natural resource, civil engineering, and range operations staff.

Project 1.1.3: Incorporate ESA consultations with the USFWS during both mission and EIAP processes to ensure no net loss of military missions.

Project 1.1.4: Conduct reviews of mission training requests and projects monthly in order to provide recommendations regarding all CWA requirements.

Objective 1.2: Coordinate with BASH personnel to provide technical expertise on continued development and implementation of the BASH plan.

Project 1.2.1: Aid BASH personnel for quarterly BASH briefing to installation commander for implementation of the BASH Plan (Appendix C).

Objective 1.3: Enhance the long-term sustainability of the military mission and natural resources on APAFR through implementation of an adaptive wildland fire program that minimizes risks, while meeting ecological and land management objectives.

Project 1.3.1: Through a responsive planning process, ensure minimal interference with military mission activity by conducting prescribed burns at APAFR without interrupting mission operations

except when there is a significant safety risk to firefighters or bystanders.

Project 1.3.2: IAW Air Force Wildland Fire Branch (AFWFB) conceptual operations plan, AFWFB will staff seven full-time wildland fire positions at APAFR for prescribed fire operations and, when available, wildfire suppression.

Project 1.3.3: Maintain utilization of wildfire suppression tactics stated in the APAFR Wildland Fire Management Plan (Appendix B) that will minimize impacts to natural resources and the military mission while still controlling potential damages from all wildfire and ensuring safety of firefighters and bystanders to the maximum extent possible.

Objective 1.4: Provide monitoring and inventory activities, IAW biological opinions and recovery plans for all federally-listed T&E species, to ensure no-net loss of military missions.

Project 1.4.1: Provide annual reports to USFWS, and other regulatory agencies as needed, of all federal T&E species occurring and monitored at APAFR by September 30th to integrate with an adaptive fire management program.

Project 1.4.2: Provide geospatial data of all federal T&E species at APAFR weekly to update installation GeoBase.

Project 1.4.3: Maintain a centralized database for the storage, both physically and digitally, of wildlife monitoring occurring at APAFR.

Florida Bonneted Bat

Project 1.4.4: Conduct annual acoustic surveys to determine presence of Florida bonneted bat (*Eumops floridanus*) IAW current USFWS guidelines and site-specific recommendations. Surveys will be implemented on a three-year rotation (covering 1/3 of the approximately 60,000 acres of available Florida bonneted bat habitat annually) at a rate of 4 deployment nights per 250 acres.

Project 1.4.5: As needed, perform intensive acoustic and roost search surveys in areas identified during annual acoustic monitoring IAW current USFWS guidelines.

Project 1.4.6: Visually and acoustically monitor all known Florida bonneted bat roosts periodically throughout the year to provide long-term presence/absence and roosting activity measures

Project 1.4.7: Opportunistically monitor Florida bonneted bat movement patterns through radio telemetry to identify roost locations

Florida Grasshopper Sparrow

Project 1.4.8: Conduct annual range wide qualitative habitat assessments IAW established protocols to characterize the availability of suitable habitat for FGSP (*Ammodramus savannarum floridanus*; including fire ant surveys).

Project 1.4.9: Conduct annual point count and transect surveys to estimate FGSP population size IAW current USFWS guidelines (April through June). Special note: Significant FGSP habitat exists in HE areas within active impact areas and surveys within these areas require Explosive

Ordnance Dispersal (EOD) escorts for at least 3 days in each of three months (April, May and June).

Project 1.4.10: Find and monitor FGSP nests at an interval that allows precise quantification of clutch size, brood size and the number of fledged young.

Project 1.4.11: Map locations of all FGSP positive detections and FGSP nests and update ArcGIS Online data daily during the nesting season.

Project 1.4.12: Maintain a banded population of FGSP, including local recruits and immigrants, to try to determine survival rates and movement patterns. As needed, band FGSP nestlings between 4-5 days after hatching.

Project 1.4.13: Under the direction of the USFWS, provide biological samples from FGSP or other grassland bird species as required.

Florida Scrub-Jay

Project 1.4.14: Conduct habitat suitability assessment in all occupied habitat annually and in all unoccupied habitat on a four-year rotation.

Project 1.4.15: Conduct annual census of all FSJs in suitable habitat, IAW current USFWS guidelines, to quantify inputs and outputs. Census historically unoccupied habitat on at least a four-year rotation.

Project 1.4.16: To the extent possible, find and monitor FSJ nests ahead of military and land management activities that might affect this species. Special note: Significant FSJ habitat exists in HE areas within active impact areas and surveys within these areas require EOD escorts for at least 1 day in each of three months (April, May and June).

Project 1.4.17: Map boundaries of all FSJ territories, find active FSJ nests, and update ArcGIS Online when data are collected.

Project 1.4.18: Maintain a banded population of FSJs, including local recruits as well as immigrants, to try to determine survival rates and movement patterns, as well as information on FSJ group size and composition.

Red-cockaded Woodpecker

Project 1.4.19 Conduct habitat-suitability assessment of available foraging and roosting habitat for RCWs (*Picoides borealis*) on a 10-year interval (covering approximately 1/10 of RCW habitat annually).

Project 1.4.20: Conduct annual census IAW current USFWS guidelines of entire RCW population.

Project 1.4.21: To the extent possible, find and monitor RCW nests ahead of military and land management activities that might impact this species.

Project 1.4.22: Map locations of all active clusters and active cavity trees, with nesting status, if known, and update ArcGIS Online data monthly.

Project 1.4.23: Conduct an annual cavity tree census of managed RCW cavity trees.

Pigeon Wings and Wireweed

Project 1.4.24: Survey all possible habitat locations of pigeon wings (*Clitoria fragrans*) and wireweed (*Polygonella basiramia*) within four months post-burning annually.

Project 1.4.25: GPS all locations of new wireweed populations annually per APAFR-specific monitoring protocol (Appendix P).

Project 1.4.26: GPS all locations of new pigeon wings populations annually per APAFR-specific monitoring protocol (Appendix P).

Project 1.4.27: Continue to update APAFR plant list annually.

Northern Crested Caracara

Project 1.4.28: Conduct annual northern crested caracara (*Caracara cheriway*) surveys IAW current USFWS guidelines and site-specific recommendations to identify nesting sites and territories installation-wide

Project 1.4.29: Map locations of all positive northern crested caracara detections, nesting sites and gathering areas and update ArcGIS Online data daily during the survey season.

Project 1.4.30: Opportunistically monitor northern crested caracara movement patterns through satellite telemetry and provide USFWS data to better understand effects of military mission.

Wood Stork

Project 1.4.31: Conduct annual wood stork (*Mycteria americana*) surveys IAW current USFWS guidelines to identify and map potential roosting/nesting sites and important foraging areas installation- wide. Update ArcGIS Online as data are collected.

Florida Panther

Project 1.4.32: Conduct an annual camera trap survey to confirm the presence and location of the Florida panther (*Puma concolor*) at APAFR

Project 1.4.33: Annually maintain a database of all verified Florida panther (*Puma concolor coryi*) sightings.

Everglade Snail Kite

Project 1.4.34: Conduct annual Everglade snail kite (*Rostrhamus sociabilis plumbeus*) surveys IAW current USFWS guidelines to identify nesting and/or roosting sites within suitable habitat.

Project 1.4.35: Map locations of all positive detections, nesting sites and roosting areas of Everglades snail kites and update ArcGIS Online data daily during the survey season.

Eastern Indigo Snake/Gopher Tortoise

Project 1.4.36: Determine the need for eastern indigo snake (*Drymarchon couperi*)/gopher tortoise (*Gopherus olyphemus*) surveys during EIAP process for all proposed actions occurring at APAFR.

Project 1.4.37: Conduct EIS/gopher tortoise surveys, when warranted through EIAP analysis or CCA, IAW current USFWS/CCA guidelines and literature.

Project 1.4.38: Conduct a camera trap survey to identify the presence and location of eastern indigo snakes at APAFR. If possible, design a capture-mark-recapture study to be used in conjunction with the camera trap study to assess health of the indigo snake population.

Project 1.4.39: Map locations of all positive indigo snake detections and mark all potential refugia within proposed action area IAW current USFWS guidelines. Update ArcGIS Online as data are collected.

Bald Eagle

Project 1.4.40: Annually survey and monitor historical and existing bald eagle (*Haliaeetus leucocephalus*) nests while implementing National Bald Eagle Management Guidelines (May 2007). Update annual nest status to ArcGIS Online as collected.

Eastern Black Rail

Project 1.4.41: Design and implement a passive (and possibly active) acoustic monitoring survey to identify the presence and location of the eastern black rail (*Laterallus jamaicensis*) at APAFR. Update ArcGIS Online as data are collected.

Bluetailed Mole Skink/Sand Skink

Project 1.4.42: Conduct a camera trap survey to identify the presence and location of the bluetailed mole skink and sand skink at APAFR. Update ArcGIS Online as data are collected. This survey will also identify the presence and location of the eastern indigo snake.

Objective 1.5: Implement and provide an adaptive invasive exotic species monitoring/control program contributing to a realistic and sustainable military training landscape.

Project 1.5.1: Survey ≥ 10% of burned acreage on installation for invasive and exotic plant species found on the FLEPPC Category 1 and 2 list but excluding HE areas. Update GeoBase as needed.

Project 1.5.2: Monitor and identify, monthly, through reports given to USDA technician, areas outside of impact ranges containing feral hog (*Sus scrofa*) disturbance and close these areas to Outdoor Recreation for 3 weeks from identification date for removal of feral hogs.

Project 1.5.3: Utilize a zero-tolerance application of hog control within previously identified locations, including impact areas, with monthly reports given to natural resources staff.

Project 1.5.4: Chemically treat any burned sites for invasive exotic plant species in pigeon wings (Clitoria fragrans) or wireweed (Polygonella basiramia) locations or surrounding habitat. Update Geobase as needed.

Project 1.5.5: Chemically-treat ≥ 30 acres of cogon grass (*Imperata cylindrica*) annually within all accessible RCW clusters, FSJ territories and FGSP nesting territories IAW BMP and guidance from USFWS/AF liaison or AF Wildlife Biologist.

Project 1.5.6: Use chemical, mechanical and biocontrol treatment methods identified in the APAFR IPMP to treat ~2,000 gross acreage of the overall installation for invasive plant species. Update GeoBase as needed.

Project 1.5.7: As needed, utilize the FWC Upland Invasive Species program and FWC Herbicide Bank to help supplement invasive plant species treatments at APAFR.

Project 1.5.8: Survey areas of ground-disturbance military activities and treat populations of invasive species occurring within those areas annually as military missions allow.

Project 1.5.9: Upload new invasive exotic species locations to EDDMaps website at least once a year for contribution to the regional-scale of invasive exotic plant species infestations.

Project 1.5.10: Biennially monitor the four road fill piles for invasives and chemically treat as needed to prevent the spread of exotic and introduction of new invasive exotics.

Objective 1.6: Follow DoD, AF and USFWS guidelines to implement an adaptive and proactive approach to changes in natural resource management as it pertains to climate change and impacts to the military mission.

Project 1.6.1: Coordinate on an annual basis with the Patrick AFB ISS and other regional partners (e.g. USFWS, FWC) to incorporate new climate change initiatives or directives.

Project 1.6.2: Communicate with SFWMD and USACE at least quarterly in regards to climate-driven modifications to the Kissimmee River and Lakes Istokpoga and Okeechobee regulation schedules to provide guidance to the AF on potential impacts to training areas and exercises.

PRINCIPAL GOAL 2 - Conserve native biodiversity by restoring and maintaining ecological processes.

Objective 2.1: Continue to utilize an adaptive and proactive prescribed fire program as described in the APAFR Wildland Fire Plan to mimic the natural and historic fire regimes of APAFR.

Project 2.1.1: Annually implement fire cycle rotations, species-specific conservation measures, and prescribed fire standards as described in APAFR WFMP (Appendix B) and/or approved Prescribed Fire Burn Plan for all applicable prescribed fire operations.

Project 2.1.2: Continue to utilize prescribed fire techniques to annually burn a five-year rolling average of 28,130 acres while being consistent with the APAFR WFMP (Appendix B).

Project 2.1.3: Annually implement prescribed burns so that at least 50% of acres are burned between March and June to achieve optimal seasonality while being consistent with the APAFR WFMP (Appendix B).

Project 2.1.4: Utilize prescribed fire IAW the APAFR WFMP (Appendix B) and current USFWS species-specific guidelines to maintain or improve the total acreage of dry prairie, scrub community and pine flatwoods habitat described as species-specific 'optimal' annually.

Project 2.1.5: Minimize ground disturbance from disking by using current BMP and utilizing non-disking methods for firebreak maintenance by reporting mileage of fire lines disked on an annual basis.

Project 2.1.6: Annually report geospatial wildland fire data including acres burned, miles disked, acreage mowed, wildfire acres, and other wildland fire-related activities.

Project 2.1.7: Implement a fire effects assessment to determine long-term changes in dry prairie species composition and structure, particularly as it relates to the federally endangered Florida grasshopper sparrow.

Objective 2.2: Restore or maintain ecological processes to native communities damaged or otherwise impacted by human activities or exotic species.

Florida Bonneted Bat

Project 2.2.1: Retain snags within known Florida bonneted bat roosting habitat that are not likely to cross a known firebreak

Florida Grasshopper Sparrow

Project 2.2.2: Maintain and improve habitat quality (as established within Project 1.4.8) within and between FGSP aggregates to support an intrinsic rate of increase equal to or greater than 0, sustained as a 2-year running average over at least 6 years

Project 2.2.3: Remove all trees and shrubs greater than two meters tall in occupied core FGSP habitat.

Project 2.2.4: Install predator deflection fences (as recommended by FGSP Captive Breeding BO) around FGSP nests.

Florida Scrub-Jay

Project 2.2.5: Maintain and improve habitat quality within and between FSJ aggregates to support an intrinsic rate of increase equal to or greater than 0, sustained as a 3-year running average over at least 10 years with an overall population goal of 168 groups.

Project 2.2.6: Annually identify and utilize mechanical treatment, in conjunction with prescribed fire, to establish optimal habitat conditions (as identified in Project 1.4.14) in at least 70% of occupied and potential FSJ habitat, and provide adequate dispersal corridors (0-30 trees per acre geographically distributed such that scrub patches are linked by open corridors at least 100 meters wide).

Red-Cockaded Woodpecker

Project 2.2.7: Maintain and improve habitat quality within and between RCW aggregates to

continue to increase the population beyond 40 PBGs and to move toward an overall goal of 68 PBGs.

Project 2.2.8: Replace all cavity inserts that are breached or show signs of negatively affecting RCW demography.

Project 2.2.9: Conduct inter and intra-population translocations as needed to increase genetic heterozygosity, increase population size, match unpaired birds within APAFR, and meet recovery goals.

Invasive/Exotic Species

Project 2.2.10: Chemically treat cogon grass (Imperata cylindrica) along HR Smith Rd after prescribed fire to reduce adverse effects on pine scrub bluestem (Schizachyrium niveum) until control is achieved.

Project 2.2.11: Communicate annually with biological control researchers to procure biological control agents for FLEPPC Category I invasive exotic plant species on the installation.

Project 2.2.12: Implement prescribed or recommended BMP along Echo Springs and Sandy Hill trails to alleviate erosion issues, and monitor quarterly Nalaka, Foxtrot North and abandoned fire/disk lines for prioritization in future erosion control projects beginning in FY22

Project 2.2.13: Hand cut pines and oaks from at least four sites annually where woody encroachment has become a detriment to native biodiversity and/or listed species. The AF wildlife biologist and AF botanist must approve site selection.

Project 2.2.14: Chemically treat water hyacinth (*Eichhornia crassipes*) and West Indian marsh grass (*Hymenachne amplexicaulis*) along the 3 miles water control structure in the 60ft wide lateral ditch within Arbuckle Marsh at least twice a year.

Objective 2.3: Monitor populations of state and/or globally-imperiled species and develop management strategies as needed to maintain long-term viability

Project 2.3.1: Provide project report, survey data and GIS shapefiles to USFWS, FWC and CCA SharePoint after gopher tortoise surveys.

Project 2.3.2: Re-census gopher tortoise burrows in previously-identified intensive monitoring sites during 5-year CCA monitoring efforts.

Project 2.3.3: Conduct an annual meeting with FWC officials to try to coordinate monitoring for state-listed species at APAFR.

Project 2.3.4: Provide bioacoustics summary data to the USGS-developed NABat monitoring program at least annually and archive bioacoustics data for all incidental bat species found during acoustic monitoring for future use.

Project 2.3.5: Work with regional and state conservation partners to utilize APAFR for surveying and monitoring of state and regionally-imperiled species.

Project 2.3.6: Maintain a database with observations of species of conservation concern to

provide to state and regional partners on at least an annual basis.

Objective 2.4: Protect, monitor, and report findings to improve water quality, flow regimes and impaired waterways on installation.

Project 2.4.1: Provide annual training to all APAFR staff regarding implementation of water quality BMP found in APAFR BMP Guidance manual.

Project 2.4.2: Maintain and rebuild segments of secondary roads, as needed and as suggested by APAFR staff.

Project 2.4.3: Continue to assist the FDEP Stream and Pond Assessment section to access those locations at APAFR that could be sampled for additional water quality data.

Project 2.4.4: Upon receiving AFCEC guidance, coordinate with FDEP concerning TMDL cycle updates, BMAP requirements, and water quality data collection on a quarterly basis, at a minimum.

Project 2.4.5: Coordinate with USACE and SFWMD regarding the Kissimmee River Restoration Projects and potential impacts to APAFR on a quarterly basis, at a minimum.

Objective 2.5: Foster on-going botanical/ecological inventories, research and monitoring to ensure long-term ecological integrity, provide for ecosystem restoration and support adaptive management implementation.

Project 2.5.1: Annually monitor state and FNAI-listed rare plant species, referred to in Appendix M, occurring on APAFR post-burn to improve and/or update locality and population trends on installation.

Project 2.5.2: Annually collect genetic, morphological, and phenological data, on species referred to in Appendix N, to help describe possible species new to science, contribute to integrative species delimitation, and contribute to future land-management guidelines.

Project 2.5.3: When possible, publish one scientific paper biennially pertinent to flora communities at APAFR or research that contributes to the ecological forces shaping those communities.

Project 2.5.4: Conduct vegetation surveys on jurisdictional wetlands semi-annually at a minimum of 25 locations to monitor habitat quality and potential exotic aquatic plant invasion.

Objective 2.6: Provide conservation law enforcement for the protection of natural resources within installation boundaries through cooperation with federal/state conservation agencies.

Project 2.6.1: Through cooperation with FWC or USFWS, provide CLEO at APAFR.

Objective 2.7: Support the DoD Partners in Flight Program and the Memorandum of Understanding (MOU) for conservation of migratory birds by monitoring the overall health of the avian communities at APAFR.

Project 2.7.1: Monitor avian population trends to assess ecosystem health via indicator species.

Project 2.7.2: Coordinate an annual Christmas Bird Count through the Audubon Society for the continued monitoring of avian species at APAFR on an annual basis.

PRINCIPAL GOAL 3 - Promote conservation goals regionally to minimize encroachment threats to the installation and identify cooperative partner-leveraged conservation opportunities.

Objective 3.1: Pursue opportunities with adjacent and/or regional landowners and working groups that would further the goals of (1) protecting and enhancing habitat for threatened, endangered, and proposed plant/animal species, (2) preventing encroachment by development through the REPI, Sentinel Landscape partnerships, and other regional cooperatives, and (3) restoring wetland and/or water resources.

Project 3.1.1: Work with range operations and support staff to provide requested natural resource information/recommendations to help Department of the Interior and USDA identify off-installation properties available for conservation mitigation purchase through Sentinel Landscape funding.

Project 3.1.2: Work with range operations and support staff to provide requested natural resource information/recommendations to help identify properties for purchase of REPI easements with the main objective of reducing encroachment on the installation buffer area.

Objective 3.2: Continue to use and promote APAFR as a training ground, within the constraints of the military mission, for natural resource and wildland fire management professionals while hosting community events as requested.

Project 3.2.1: Utilize experience and resources from the AF Wildland Fire Center Peninsular Florida Module to implement fire annual refresher/arduous pack test and other NWCG trainings as needed for installation personnel and partners.

Project 3.2.2: Annually host at least one prescribed fire training opportunity through interagency cooperation.

PRINCIPAL GOAL 4 - Provide for the sustainable multi-purpose use of natural resources and dispersed recreational opportunities.

Objective 4.1: Continue to implement silvicultural practices within the constraints of the military mission while using an adaptive management approach to address restoration objectives and new information that also adheres to established BMP.

Project 4.1.1: Harvest up to 20,000 tons of pine annually IAW with installation-specific BMPs.

Project 4.1.2: Thin up to 1,500 acres combined total of both natural and planted pine annually.

Project 4.1.3: Cooperate with the FDACS to collect South Florida slash (*Pinus densa*) and longleaf pine (*Pinus palustris*) cones annually for seed harvest when cone crops are above 150 bushels.

Project 4.1.4: Annually clear-cut up to 500 acres of planted pine plantations.

Project 4.1.5: Annually inventory 10% of pine plantations at APAFR.

Project 4.1.6: When resources are available, annually restore ≥ 100 acres of longleaf pine (*Pinus palustris*) over the next five years in areas that will promote expansion of red cockaded woodpecker habitat.

Objective 4.2: Provide non-consumptive recreation opportunities consistent with the AF mission and sustainable ecosystem management.

Project 4.2.1: Provide hiking opportunities with at least one special opportunity hiking or nature watch event annually.

Project 4.2.2: Conduct at least one special youth activity per year consistent with non-consumptive recreation.

Project 4.2.3: Annually maintain recreational facilities IAW current standards.

Objective 4.3: Provide hunting and fishing opportunities consistent with the AF mission and sustainable ecosystem management.

Project 4.3.1: Prescribe annual quality harvest guidelines of whitetail deer (*Odocoileus virginianus*), northern bobwhite (*Colinus virginianus*), wild turkey (*Meleagris gallopavo* var *osceola*), and American alligator (*Alligator mississippiensis*) for a maximum sustained yield.

Project 4.3.2: Annually provide physiological and demographic monitoring of managed species to ascertain population health and evaluate management decisions.

Project 4.3.3: Provide a quality public hunting experience as defined by a maximum hunter density of approximately 1 hunter per 110 available acres when open to the public.

Project 4.3.4: Annually provide at least one public youth hunt in which ethical American alligator harvest (*Alligator mississippiensis*) is taught through hands-on experience.

Project 4.3.5: Provide fish stocking for recreational fishing as needed.

Project 4.3.6: Annually conduct at least one special hunt for disabled hunters.

Objective 4.4: Provide information and educational hunting and fishing opportunities to the public describing the sustainable multi-purpose use of dispersed recreational opportunities at APAFR.

Project 4.4.1: When possible, provide environmental education opportunities to permit holders by sponsoring special events that incorporate training in the ethical use of the outdoors.

Project 4.4.2: Implement a schedule of seasonal road closures where flooding and/or high water table conditions present vehicular access and safety concern based on annual precipitation and climatic events.

Objective 4.5: Continue to offer cattle grazing at APAFR within existing pastures as long as it remains compatible with the military mission and regulatory requirements.

Project 4.5.1: Remove approximately 25 miles of wire from previously identified 5-wire barbed fencing from removed pastures as possible.

Project 4.5.2: Annually review and implement the State of Florida adopted Cow/Calf operations BMP plan on existing and future leases IAW the FDACS NOI, effective August 2016.

9 INRMP implementation, update, and revision process

9.1 Natural Resources Management Staffing and Implementation

Staffing

Avon Park AFR

Natural Resources Management Staffing

APAFR's goals and objectives (see the Management Goals and Objectives section) are primarily carried out as duties and responsibilities of the Environmental Flight Chief, as relayed to the natural recourses staff. When possible, other organizations, contractors, and volunteers are utilized to supplement natural resources staff efforts. Efforts beyond the capabilities of the installation are carried forward as projects to the AF Civil Engineer Center (AFCEC) for inclusion in the five-year budget review. Current program staffing is provided in Table: Current staff of the 598 RANS/RMFI at APAFR.

Current Staff of the 598 RANS/RMFI Natural Resource Section at APAFR

Grade Scale (GS)	Job Title	
Government Positions		
GS-13	Environmental Flight Chief	
GS-12	Wildlife Biologist	
GS-12	Botanist/Ecologist	
GS-11	Wildland Fire Manager/ Ecologist	
GS-11	Forester	
WG-10	Equipment Operator	
Contract Support		
Non-appropriated Funds	Full Time/Perm	Park Ranger (1)
Non-appropriated Funds	Part Time/Seasonal	Park Ranger (2)
CSU/CEMML	Contract Dependent	Recreation, Invasive Species, Forestry, Fire Support
Archbold Biological Station (ABS)	Cooperative Agreement Dependent	T&E Monitoring
USFWS	Full Time	T&E Biologist
USFWS	Full Time	T&E Monitoring
USFWS	Full Time	Fire
FWC	Contract Dependent	CLEO
Arctic Slope Federal Field Services (BOS Contractor)	Contract Dependent	NEPA Support
Tetra Tech	Contract Dependent	Water Resources/Permitting
Volunteers	Seasonal	Outdoor Recreation

598 RANS/RMFI = 598 Range Squadron, Environmental Flight, Natural Resources; AFR = Air Force Range; GS = Grade Scale; USFWS = U.S. Fish and Wildlife Service; CLEO= Conservation Law Enforcement Officer; BOS= Base Operating Services

*Reclassification of previous Forestry Technician (Fire), based on support from APAFR Wildland Fire Center (AFCEC)

To fully implement the Goals and Objectives of this INRMP, additional resources beyond the capabilities of the current staff are required. Requests are dependent on the availability of base resources, AFCEC resources/expertise, funding, and civilian volunteers.

Implementation

The Commander, 23rd Wing, Moody AFB, Georgia, is responsible for ensuring that adequate professional personnel are available to carry out the conservation programs described in this INRMP to the extent resources are available. Management authority, including natural resources, has been delegated to GSU Squadron Commander per Range Operating Authority (ROA) and AF MAN 13-212. The 23rd Wing at Moody maintains a separate INRMP, and Environmental Quality funds are distributed through separate AFCEC Installation Support Sections.

Actual implementation of the INRMP is carried out by APAFR natural resource staff, volunteers, and contractors. INRMP implementation, under the authority of the Environmental Flight Chief, requires management expertise of individuals in the following programs: compliance, hydrology, fish and wildlife biology, T&E species management, outdoor recreation, grazing, forestry, fire management, biodiversity conservation, environmental planning (NEPA), cultural resources, botany, and GIS technology.

The following AF organizations or persons provide oversight and guidance for the preparation and implementation of the INRMP:

- The Assistant Secretary of the AF for Installations, Environment, and Logistics (SAF/IE)
- Secretary of the Air Force, General Counsel of the Air Force (SAF/GC) through the Deputy General Counsel, Installations, Energy and Environment (SAF/GCN)
- Headquarters, US Air Force, Deputy Chief of Staff for Logistics, Installations, & Mission Support, Director of Civil Engineers (AF/A4C)
- AF Civil Engineer Center (AFCEC)
- AF Legal Operations Agency, Environmental Law Field Support Center (AFLOA/JACE-FSC)
- Air Force Safety Center Bird/Wildlife Aircraft Strike Hazard (BASH) Team
- The Installation Support Team (IST) and Regional Support Team (RST)
- Air Combat Command (ACC), which is APAFR's Major Command (MAJCOM)
- APAFR Commander
- APAFR Natural Resources Chief

9.2 Monitoring INRMP Implementation

Monitoring, evaluating, and implementing new information are the heart of adaptive management and act as a check for implementation of the INRMP. Although this version of the INRMP establishes direction for the Environmental Flight and natural resource staff over the next five years, it may take much longer to address some of the goals and desired future conditions. Monitoring determines whether:

- Projects are implemented in compliance with INRMP, federal regulation, AFI, and DoD requirements
- Standards and guidelines are followed
- Standards and guidelines are effective
- Goals and objectives are met
- Natural resource assumptions, relationships, and decisions are valid considering new information or changing conditions.

Two types of monitoring are pertinent to this INRMP: implementation and effectiveness. Implementation monitoring answers the question: Did we do what we said we would do? It is the most basic level of monitoring. This monitoring determines if projects and activities are designed and conducted in compliance with the INRMP. Implementation work plans and environmental assessment documents will track whether these projects comply with the INRMP and have been completed. The second type of monitoring, effectiveness monitoring, answers the question: Did we accomplish our goals and objectives and are we moving toward our desired future conditions? Once projects have been completed, effectiveness monitoring and data collection tell us if we're on the path to achieving our stated goals. Every goal, objective and project must have some level of monitoring and data collection associated with it. Relevancy to issues, compliance with legal and agency policy, administrative feasibility, budget considerations, and personnel workloads all influence monitoring activities and abilities.

Because of the dynamic nature of natural resources and the military mission, there are expected variations in needs during the course of a normal year. Some projects may be moved to a higher priority status than originally planned, some will be removed as systems, work, or funding priorities change. The INRMP implementation and monitoring effort will collect all these and other changes, ensure they are reviewed and documented, and alter INRMP planning, if necessary, to fit current ecosystem, regulatory, and military mission needs.

During the annual review, the Environmental Flight Chief, in cooperation with representatives from the USFWS and FWC, will review all the accomplishments outlined in the previous year's approved work plan. The Environmental Flight Chief and other natural resources staff will verify the results of INRMP implementation, analyze the results, and prepare specific reports regarding what has and has not been accomplished pertinent to specific projects previously identified in the annual work plan. The Environmental Flight Chief will then work with the various program managers on the upcoming annual work plan submittal to ensure all appropriate needs are addressed in the future year's work plan.

9.3 Annual INRMP Review and Update Requirements

The INRMP requires annual review IAW DoDI 4715.03, *Natural Resources Conservation Program,* and AFI 32-7064, to ensure the achievement of mission goals, verify the implementation of projects, and establish any necessary new management requirements. This process involves installation natural resources personnel and external agencies (USFWS, FWC) working in coordination to review the INRMP. If the installation mission or any of its natural resources management issues change significantly after the creation of the original INRMP, a major revision to the INRMP is required. The need to accomplish a major revision is normally determined during the annual review with USFWS and FWC. The NRM documents the findings of the annual review in an Annual INRMP Review Summary and obtains signatures from the coordinating agencies on review findings. By signing the Annual INRMP Review Summary, the collaborating agency representatives assert concurrence with the findings. If any agency declines to participate in an on-site annual review, the NRM submits the INRMP for review along with the Annual INRMP Review Summary document to the agency via official correspondence and requests return correspondence with comments/concurrence.

The USFWS, FWC, and the NRM conduct an Annual INRMP Review Meeting. This meeting takes place in person with respective representatives for each agency. Individuals may telephone or video call if they cannot attend in person. During this meeting the NRM updates the external stakeholders/parties with the end of the year execution report and coordinates future work plans and any necessary changes to management methods. All parties review the INRMP and begin preliminary collaborative work on updating the INRMP (e.g. new policies, procedures, impacts, mitigations), as applicable. Necessary references and appendices are updates as needed.

10 Annual Work Plans

The INRMP Annual Work Plans are included in this section. These projects are listed by fiscal year, including the current year and four succeeding years. For each project and activity, a specific timeframe for implementation is provided (as applicable), as well as the appropriate funding source, and priority for implementation. The work plans provide all the necessary information for building a budget within theAF framework. Priorities are defined as follows:

- High: The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the Air Force is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a "Benefit of the Species" determination necessary for ESA Sec 4(a) (3) (B) (i) critical habitat exemption.
- Medium: Project supports a specific INRMP goal and objective, and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112 on Invasive Species. However, the INRMP signatories would not contend that the INRMP is not be implemented if not accomplished within programmed year due to other priorities.
- Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or support long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Table 10.0 List of annual work plans currently approved at APAFR. Table shows individual projects that have been funded (Annual Work Plans) and which fiscal year those projects are funded (FY), as well as the funding source (OPR), funding driver (Funding Driver: Endangered Species Act [ESA], Biological Opinion [BO], Clean Water Act [CWA]), Priority Level (Priority Level: Low, Medium, High), and INRMP objectives associated with each project (Objectives Associated).

Annual Work Plans	OPR	Funding Driver	Objectives Associated	FY	Priority Level
MGT, Habitat	ASPRA53227118 ASPRA53237118 ASPRA53247118 ASPRA53257118 ASPRA53267118	ESA, BO	1.1, 1.3, 1.4, 1.5, 2.1, 2.2, 2.4, 2.5, 3.1, 4.1, 4.2, 4.3, 4.4, 4.5	2022 2023 2024 2025 2026	High
MGT, Species	ASPRA53227119 ASPRA53237119 ASPRA53247119 ASPRA53257119 ASPRA53267119	ESA, BO	1.1, 1.4, 1.5, 2.1, 2.2, 2.4, 2.5, 2.7, 3.1, 4.1	2022 2023 2024 2025 2026	High
MGT, Invasive Species	ASPRA53227120A SPRA53237120 ASPRA53247120 ASPRA53257120 ASPRA53267120	ESA, BO	1.3, 1.5, 2.1, 2.2, 2.4, 3.1, 4.1	2022 2023 2024 2025 2026	High

Annual Work Plans	OPR	Funding Driver	Objectives Associated	FY	Priority Level
MGT, Wetlands / Floodplain	ASPRA5322915 ASPRA5323915 ASPRA5324915 ASPRA5325915 ASPRA5326915	CWA, BO	1.1, 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 2.4, 3.1, 4.1, 4.5	2022 2023 2024 2025 2026	Medium
MGT, Nuisance Wildlife	ASPRA53227122 ASPRA53237122 ASPRA53247122 ASPRA53257122 ASPRA53267122	ESA, BO	1.1, 1.2, 1.5, 2.2, 4.3, 4.4	2022 2023 2024 2025 2026	Medium
MGT, Species, Migratory Birds	ASPRA53226120 ASPRA53236120 ASPRA53246120 ASPRA53256120 ASPRA53266120	BO	2.7, 3.1	2022 2023 2024 2025 2026	Low

11 References

Standard References (Applicable to all AF installations)

- AFI 32-7064, *Integrated Natural Resources Management*
- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook – a Internal AF reference available at https://cs1.eis.af.mil/sites/ceportal/CEPlaybooks/NRM2/Pages/

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Acronyms

Standard Acronyms (Applicable to all AF installations)

- eDASH Acronym Library
- Natural Resources Playbook – Acronym Section
- U.S. EPA Terms & Acronyms

Installation Acronyms

- 598th Range Squadron (598 RANS)

- Air Combat Command (ACC)
- Air Force (AF)
- Air Force Base (AFB)
- Air Force Civil Engineer Center (AFCEC)
- Air Force Instruction (AFI)
- Air Force Policy Directive (AFPD)
- Air Installation Compatible Use Zone (AICUZ)
- Archaeological Resources Protection Act (ARPA)
- Areas of Concern (AOC)
- Avon Park Air Force Range (APAFR)
- Avon Park Correction Institution (AVPCI)
- Basin Management Action Plans (BMAP)
- Base Operating Services (BOS)
- Best management practices (BMP)
- Biological Opinion (BO)
- Bird Hazard Working Group (BHWG)
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Bomb Dummy Unit (BDU)
- Candidate Conservation Agreement (CCA)
- Civil Engineering Transformation (CET)
- Clean Water Act (CWA)
- Code of Federal Regulations (CFR)
- Colorado State University/Center for Environmental Management of Military Lands (CSU/CEMML)
- Concept of operations (CONOPS)
- Conservation Law Enforcement Officer (CLEO)
- Control and Reporting Post (CRP)
- Critical Infrastructure Program (CIP)
- Department of Defense (DoD)
- Department of Defense Instruction (DoDI)
- Deployed Unit Complex (DUC)
- El Nino-Southern Oscillation (ENSO)
- Endangered Species Act (ESA)
- Environmental Impact Analysis Process (EIAP)
- Environmental Management Plan (EMP)
- Environmental Restoration Program (ERP)
- Executive Order (EO)
- Explosive Ordnance Disposal (EOD)
- Final Governing Standards (FGS)
- Fire Management Officer (FMO)
- Fiscal Year (FY)
- Florida Army National Guard (FLARNG)
- Florida Department of Agriculture and Consumer Services (FDAC)
- Florida Department of Environmental Protection (FDEP)
- Florida Exotic Pest Plant Council (FLEPPC)
- Florida Fish and Wildlife Conservation Commission (FWC)
- Florida Grasshopper Sparrow (FGSP)
- Florida Natural Areas Inventory (FNAI)
- Florida scrub-jay (FSJ)

- Geographic Integration Office (GIO)
- Geographic Information System (GIS)
- Global Positioning System (GPS)
- Grade Scale (GS)
- Hazardous Solid Waste Amendment (HSWA)
- Hazardous Waste Management Plan (HWMP)
- High explosives (HE)
- In accordance with (IAW)
- Installation Support Team (IST)
- Integrated Cultural Resources Management Plan (ICRMP)
- Integrated Natural Resources Management Plan (INRMP)
- Integrated Pest Management Plan (IPMP) – right now it is IPM
- Integrated Solid Waste Management Plan (ISWMP)
- International Union for Conservation of Nature (IUCN)
- Joint Integrated Fires Exercises (JIFE)
- Kissimmee Island Cattle Company (KICCO)
- Kissimmee Prairie Preserve State Park (KPPSP)
- Land Use Control (LUC)
- Major Command (MAJCOM)
- Memorandum of Understanding (MOU)
- Military Recreation Area (MRA)
- Mitigation Bank (MB)
- Morgan Hole Creek (MHC)
- Multiple Launch Rocket System (MLRS)
- Munition Burial Site (MBS)
- National Environmental Policy Act (NEPA)
- National Historical Preservation Act (NHPA)
- National Marine Fisheries Service (NMFS)
- National Oceanic and Atmospheric Administration (NOAA)
- National Pollution Elimination Discharge System (NPDES)
- National Wildfire Coordinating Group (NWCG)
- Natural Resources Manager (NRM; NRM/POC)
- No Further Action (NFA)
- Notice of Intent (NOI)
- Operating Instructions (OI)
- Potential breeding group (PBG)
- Public Recreation Area (PRA)
- (RMFI)
- Readiness and Encroachment Protection Initiative (REPI)
- Red-cockaded woodpecker (RCW)
- Remotely Piloted Aircraft (RPA)
- Resource Conservation and Recovery Act (RCRA)
- Restoration Advisory Board (RAB)
- Assistant Secretary of the AF for Installations, Environment and Logistics (SAF/IE)
- Satellite Accumulation Point (SAP)
- Solid Waste Management Units (SMWU)
- South Florida Water Management District (SFWMD)
- The Nature Conservancy (TNC)

- Threatened and endangered (T&E)
- Three Lakes Wildlife Management Area (TLWMA)
- Total maximum daily load (TMDL)
- Unexploded Ordnance (UXO)
- Uninhabited Combat Aerial Vehicles (UCAV or UAV)
- United States (US)
- United States Army Corps of Engineers (USACE)
- United States Department of Agriculture (USDA)
- United States Fish and Wildlife Service (USFWS)
- United States Code (USC)
- Wastewater treatment plant (WWTP)
- Wildland Fire Center (WFC)
- Wildland Fire Management Plan (WFMP)
- Wildlife Management Area (WMA)
- Wildlife Services (WS)

Definitions

Standard Definitions (Applicable to all AF installations)

- Natural Resources Playbook – Definitions Section

Installation Definitions

- Add unique state, local and installation-specific definitions

Appendices (See T-EMP Version)