Laughlin Air Force Base

Integrated Natural Resources Management Plan

2017

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

LAUGHLIN AIR FORCE BASE

Laughlin Air Force Base, Texas

47th Civil Engineer Squadron

In accordance with Public Law 105-85, the Sikes Act Improvement Act of 1997.

This Plan was prepared in coordination with the U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department.

2017

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Laughlin Air Force Base

APPROVING OFFICIAL:

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4 Oct 2017

MICHELLE L. PRYOR, Colonel, USAF
Vice Commander

Date

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Laughlin Air Force Base, Texas

Annual Review and Coordination

Laughlin Air Force Base (AFB) is required to establish and maintain regular communication with appropriate federal, state, and installation organizations to address issues concerning implementation of the Integrated Natural Resources Management Plan (INRMP). At a minimum, this shall include an annual review of the INRMP by the installation in coordination with U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD). The annual review will be certified by the 47 Flight Training Wing (FTW) Commander. Documentation of previous reviews are located in **Appendix D**.

The annual review will verify that:

- All "must fund" projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP if the goals and objectives remain unchanged.
- All required coordination with USFWS and TPWD has occurred.
- Any significant changes to the installation's mission requirements or its natural resources have been identified.

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LIST OF TABLES

Note: All tables and/or data were obtained from Laughlin AFB unless otherwise annotated.

LIST OF ACRONYMS	
Accident Potential Zone	APZ
Air Education and Training Command	AETC
Air Force Base	AFB
Air Force Base Instruction	AFBI
Air Force Instruction	AFI
Air Installation Compatibility Use Zone	AICUZ
Alluvium	Qal
Appropriated Funds	APF
Acuna silty clay	AcB
Best Management Practice	BMP
Bird-Aircraft Strike Hazard	BASH
Buda Limestone	Kbu
Civil Engineer Squadron	CES
Clean Water Act	CWA
Clear Zone	CZ
Code of Federal Regulations	CFR
Cross-Functional Team	CFT
Decibels	dB
Defense Logistics Agency	DLA
Dichlorodiphenyltrichloroethane	DDT
Del Rio Clay	Kdr
Department of Defense	DoD
Endangered Species Act	ESA
Environmental Impact Analysis Process	EIAP
Environmental Protection Agency	EPA
Environmental Restoration Program	ERP
Environmental, Safety, and Occupational Health Council	ESOHC
Executive Order	EO
Fahrenheit	˚F
Federal Emergency Management Agency	FEMA
Flying Training Wing	FTW
Force Support Squadron	FSS
Geographic Information System	GIS
Integrated Cultural Resources Management Plan	ICRMP
Integrated Natural Resources Management Plan	INRMP
Pest Management Plan	IPMP
International Boundary and Water Commission	IBWC
Military Family Housing	MFH
Mission Support Group	MSG
Multi-Sector General Plan	MSGP
National Environmental Policy Act	NEPA
National Oceanic and Atmospheric Administration	NOAA
National Park Service	NPS
National Pollutant Discharge Elimination System	NPDES
National Wetlands Inventory	NWI
Natural Resources Conservation Service	NRCS
Next Generation Radar	NEXRAD

LIST OF ACRONYMS	
Notice of Intent	NOI
Off-Road Vehicle	ORV
Security Forces Squadron	SFS
Solid Waste Agency of Northern Cook County	SWANCC
Spot Tailed Earless Lizard	STEL
Storm Water Pollution Prevention Plan	SWPPP
Strategic Reconnaissance Wing	SRW
Sustainable Landscape Development Plan	SLDP
Texas A&M Institute of Renewable Natural Resources	TAMU-IRNR
Texas Commission on Environmental Quality	TCEQ
Texas Natural Diversity Database	TNDD
Texas Parks and Wildlife Department	TPWD
The Nature Conservancy	TNC
Threatened and Endangered Species	TES
U.S. Air Force	USAF
U.S. Army Corps of Engineers	USACE
U.S. Department of Agriculture	USDA
U.S. Fish and Wildlife Service	USFWS
United States Code	USC
Uvalde Gravel	T-Qu
World Geodetic System	WGS
Zapata-Vinegarroon	ZaC

Chapter 1 – Executive Summary

This Integrated Natural Resources Management Plan (INRMP) provides guidance for management activities and long-range planning for lands currently managed by Laughlin AFB. The emphasis of the INRMP is to sustain military readiness while maintaining ecosystem integrity at Laughlin AFB. Planning decisions are made while considering the interrelationships among the natural resources on and around Laughlin AFB lands, and between these resources and the military mission. The overarching goal of the INRMP is to develop an ecosystem management plan and integrate management activities in a way that sustains and restores the health and integrity of ecosystems on Laughlin AFB lands.

The INRMP combines natural resource management policies for and data from Laughlin AFB to produce a guidance document that recognizes the objectives of Laughlin AFB's mission. The INRMP provides guidance to assist managers in making day-to-day decisions that facilitate the protection of natural resources. The military mission takes precedence over the guidance provided by the INRMP. The INRMP focuses on natural resource management on Laughlin AFB, but also includes the Laughlin Auxiliary Airfield, the recreation area at Lake Amistad (Southwinds Marina), the Instrument Landing System Site and the Next Generation Radar (NEXRAD) Site.

Purpose of the INRMP

This INRMP sets forth a single, unified management philosophy, strategy, and framework for the protection, conservation, use, and management of natural resources at Laughlin AFB. In general, the INRMP includes overviews and general information. The INRMP is a Component Plan of the Base Comprehensive Plan, and identifies natural resources that should be incorporated into that plan along with the Installation Development Plan, Element Plans, and other component plans. Component Plans are located within this document as appendices. Component Plans contain detailed management procedures, management objectives, and component-specific information. This document is intended to fulfill the requirements of Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management*.

Goals of the INRMP

A primary goal of the INRMP is to maintain ecosystem integrity and dynamics on Laughlin AFB without compromising the military mission. Maintaining ecosystem integrity promotes good stewardship by protecting existing biodiversity, ensuring lasting use of the installation, and minimizing management costs and efforts. Ecosystem management on Laughlin AFB is a goal-driven program that supports present and future military mission requirements while managing natural and cultural resources and preserving ecosystem integrity. General natural resources management goals for Laughlin AFB include:

- Assist the installation commander with the conservation and rehabilitation of natural resources consistent with the use of the installation to ensure the readiness of the Armed Forces.
- Develop natural resources management guidelines that are consistent with the military mission and ensure no net loss in the capability of installation lands to support the military mission.
- Provide for the optimum use of land and water areas and access for military purposes while maintaining ecological integrity.

The INRMP describes or contains the following:

- Natural resource objectives, policies and procedures;
- The history, climate, and geography of Laughlin AFB;
- Mission impacts on the environment;
- Descriptions of the general physical environment;
- An overview of the general biotic environment;
- Presentation of management issues and concerns; and
- Management goals and objectives.

Component Plans and analysis, completed or requiring completion, and referenced by this INRMP include:

- Pest Management Plan PMP);
- Bird-Aircraft Strike Hazard (BASH) Plan;
- Integrated Cultural Resources Management Plan (ICRMP);
- Air Installation Compatibility Use Zone (AICUZ) Study;
- 5-year Plan Checklist;
- Laughlin AFBI 32-7064, *Base Hunting*;
- Sustainable Landscape Development Plan (SLDP); and
- Rare, Threatened, and Endangered Species Management.

Management Goals and Objectives

This INRMP includes specific goals and objectives for future natural resources management on Laughlin AFB. Goals are the primary focal points for the implementation of the INRMP. A goal reflects the values of Laughlin AFB by expressing a vision of a desired condition for the installation's natural resources in the foreseeable future. A goal is supported by objectives which indicate a management initiative or strategy that will be used to achieve that stated goal. An objective specifically states what will be done and how it will be done. Current goals are listed below and Chapter 8 defines the goals and objectives for Laughlin AFB in more detail.

1. Collect, enhance, update, and maintain natural resources GIS data.
2. Manage fish and wildlife, based on an ecosystem-management approach.
3. Maintain partnerships with agencies and groups involved in fish and wildlife management.
4. Manage and protect sensitive species and priority habitats while protecting operational functionality of Laughlin AFB mission.
5. Remain in compliance with the Endangered Species Act (ESA) and continue to cooperatively support state protection goals.
6. Improve effectiveness of grounds maintenance to the overall ecosystem.
7. Make maximum use of regionally native plant species and avoid introductions of invasive and exotic species in re-vegetation and landscaping activities.
8. Protect life and property and accomplish resource management objectives.
9. Decrease the potential for uncontrolled wildland fires at Laughlin AFB.
10. Prevent short- and long-term damage to natural resources by implementing coordinated pest and noxious species control.
11. Provide quality outdoor recreation experiences in the natural environment while sustaining ecosystem integrity.

Chapter 2 – General Information

2.1 Overview

The INRMP will serve as a practical management guideline for the natural resources on Laughlin AFB. Laughlin AFB, located in central Val Verde County, Texas, is a United States Air Force (USAF) Air Education and Training Command (AETC) facility with the primary mission of specialized undergraduate pilot training with T-6, T-38, and T-1A aircraft. The base is situated approximately six miles east of Del Rio, Texas near the United States and Mexico border. The main facility covers 4092.73 acres of land which is owned or leased by the USAF, see **Figure 2-1**. In addition to the main facility, Laughlin AFB has non-contiguous facilities that include: 402 acres at the Laughlin Auxiliary Airfield near Spofford, Texas, the 101-acre Southwinds Marina at Lake Amistad, seven acres near the main facility for the Instrument Landing System, and two acres for the NEXRAD site outside Brackettville, Texas. The main facility of Laughlin AFB is the focus of this plan, with ancillary references to the other facilities. Management of natural resources at the other facilities is currently outside of the scope of this plan; they may be included in later revisions of the INRMP.

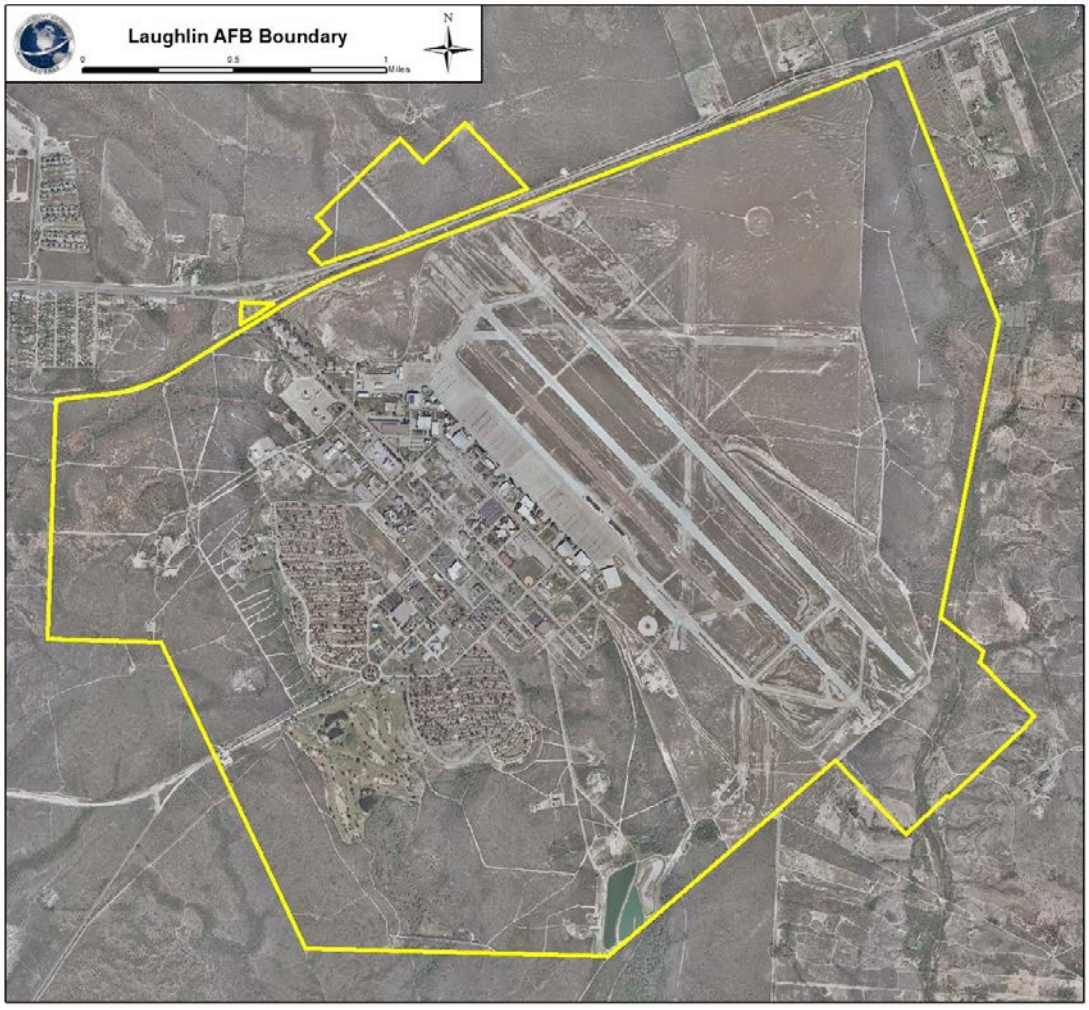


Figure 2-1
Overview Aerial Map of Main Laughlin AFB Facility, Texas

The INRMP incorporates natural resource management policies, integrates available regulatory guidance documents, and utilizes current natural resource data for Laughlin AFB to produce a practical guidance document. The INRMP recognizes and respects the goals and objectives of Laughlin AFB's mission while providing simple natural resource management guidance to assist the user in making decisions that allow for protection and conservation of natural resources. The military mission takes precedence over the guidance provided by the INRMP.

The INRMP development and implementation will be integrated with the development and implementation of the Installation Development Plan for Laughlin AFB, the ICRMP, and the BASH Plan. The INRMP is an integrated plan because it:

- brings together USAF mission requirements and natural resource management goals within a single document;
- is integrated with other installation plans;
- is multidisciplinary and utilizes multiple scientific disciplines;
- employs an integrated ecosystem approach to environmental management; and
- incorporates environmental data and current information to sustain and restore the health and integrity of ecosystems on Laughlin AFB lands.

A significant amount of time and effort has been dedicated to document the various environmental resources at Laughlin AFB. Even with this level of effort, gaps in data have been identified and should be filled in order to properly manage the natural resources and still support Laughlin AFB's mission. The INRMP will accomplish the following for Laughlin AFB:

- Review past natural resource studies that are pertinent to management decisions;
- Identify data gaps;
- Recommend and prioritize tasks to fill those gaps; and
- Provide practical guidelines to assist managers in making decisions to support mission operations.

In summary, the INRMP document will incorporate the knowledge of past and current studies to develop management guidelines.

2.2 Purpose

The primary purposes for the INRMP, according to AFI 32-7064, are to:

- Assist the installation commander with conservation and rehabilitation of natural resources consistent with the use of the installation to facilitate the readiness of the Armed Forces.
- Define natural resources management goals and objectives that are consistent with the military mission and ensure no net loss in the capability of installation lands to support the military mission.
- Implement ecosystem management by setting goals for attaining desired land conditions.
- Outline the staffing requirements to provide professionally trained natural resources management personnel who can develop, implement, and enforce the INRMP.

The primary function of the INRMP is to sustain military readiness while maintaining ecosystem integrity and dynamics on Laughlin AFB.

2.3 Authority

The INRMP is prepared under authority of AFI 32-7064 (*INRMP*) as implemented by USAF Policy Directive 32-70 (*Environmental Quality*) and Department of Defense (DoD) Instruction 4715.3 (*Environmental Conservation Program*). The authority to establish natural resources management programs at DoD installations is provided by 16 United States Code (USC) 670 or Sikes Act (Conservation Programs on Military Installations). Additional governing laws include the ESA, Clean Water Act (CWA), Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

This plan follows the outline in Attachment 2 of AFI 32-7064.

2.4 Responsibilities

The 47th Flying Training Wing (FTW) Commander is ultimately responsible for natural resource management at Laughlin AFB. The Natural Resources Manager (NRM) position is part of the 47 Civil Engineer Squadron's (CES) Environmental Element (47 CES/CEIE) which is part of the Installation Management Flight. From the squadron level, the reporting chain-of-command consists of the 47 CES Commander reporting to the 47th Mission Support Group (MSG) Commander who in turn reports to the Wing Commander via annual review and coordination report to certify that natural resources within the boundaries of the Laughlin AFB are managed properly. State and federal agencies are involved only when Laughlin AFB activities impact state or federal regulations, and coordination with those agencies is required.

2.5 Management Philosophy

In accordance with USAF and DoD policy, this INRMP is based on a philosophy that emphasizes ecosystem management over single-species management or agricultural commodity production (Lillie and Ripley, 1998). This approach is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts. The DoD definition of ecosystem management is:

> "*A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural process; is cognizant of nature's timeframes; recognizes social and economic viability within functioning ecosystems; is adaptable to complex changing requirements; and is realized through effective partnerships among private, local, state, tribal, and Federal interests*" (DoD 1996).

The overall philosophy behind the INRMP is to provide natural resource management guidance within the context of ecosystems management concept. The goal in managing Laughlin AFB's natural resources is to support the military mission and readiness through conservation and enhancement of ecosystem integrity. According to AFI 32-7064, the USAF principles for ecosystem management include the following:

- Maintenance or restoration of native ecosystem types across their natural range where practical and consistent with the military mission;
- Maintenance or restoration of ecological processes such as fire and other disturbance

regimes where practical and consistent with the military mission;
- Maintenance and restoration of the hydrological processes in streams, floodplains, and wetlands when feasible;
- Use of regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other state, federal, and local agencies and adjoining property owners; and
- Provide for outdoor recreation and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the USAF mission.

Monitoring programs are a key component to the management of natural resources and should be developed to define and prioritize the measurable parameters of natural resources. This allows for proper evaluation of the effectiveness of management measures. Plant and animal populations may experience dramatic changes over years through interactions with each other and responses to changes in the physical components of their habitats. Because natural resources are continually changing, their response to disturbances, which can be quantified utilizing monitoring activities, influence management actions.

2.5.1 Policies

This plan sets forth a program for the protection, use, and development of natural resources to be implemented according to the following DoD policies:

- All installation personnel, both civilian and military, will act responsibly in the public interest in managing the land and resources that are an integral part of the installation. There shall be a conscious and active concern for the inherent value of natural resources in all installation plans, decisions, actions, and programs.
- Natural resources under the control of the installation will be managed to support the military mission while practicing the principles of multiple-use and sustained-yield, using scientific methods. The conservation of natural resources and the military mission need not and shall not be mutually exclusive.
- An INRMP that incorporates the provisions of AFI 32-7064 shall be maintained for the installation. This plan shall guide planners and implementers of mission activities as well as NRMs. All installation decision makers will be kept informed of the conditions of natural resources, the objectives of natural resources management, and potential or actual conflicts between mission activities and management plans as part of the annual review and coordination report.
- All current and planned installation activities (e.g. master planning, construction requests, site approval requests, and training exercise plans) shall be planned and conducted involving effective and timely coordination with installation natural resources management personnel.

2.5.2 Procedures

- The installation NRM will coordinate this plan with appropriate federal, state, and local government officials and other public groups with interest or jurisdiction; and, with planners of installation activities that affect natural resources as required.
- This plan will be reviewed annually by the CES to ensure that it: (1) implements the overall

installation goals for natural resources management; (2) is compatible with other installation management plans; and (3) is current and appropriate for the coming year. The CES will inform the Base Commander of the results of its review by submitting the annual review and coordination report to the Environmental, Safety and Occupational Health Council (ESOHC) through the Cross-Functional Team (CFT), or other effective means as processes change.

- Any planned actions that would substantially affect natural resources or that would require changes to this plan will be reviewed by the CES. Such actions will proceed only when complied with this plan or after the plan has been appropriately changed.
- Proponents of actions that would affect installation natural resources will coordinate with the installation NRM throughout planning and implementation.
- The installation NRM will routinely review work requests that affect natural resources to ensure they are compatible with the INRMP.
- Other offices with natural resource activities will coordinate with the installation NRM.

2.6 Conditions for Implementation and Revision

This INRMP will be reviewed by 47 FTW personnel and signed by the Wing Commander. Upon approval from the Wing Commander, subsequent reviews will be performed by others including the USFWS and the TPWD. The INRMP will be coordinated with the USFWS and the TPWD and will engage the public when the situation deems it necessary. The Regional Director from the USFWS and the Executive Director of the TPWD are signatories to the INRMP. The 47 FTW Commander is the approving official.

Revision of this plan will be accomplished as major programs are initiated, redirected, or discontinued. As identified in AFI 32-7064 Section 3.6 INRMP Update and Revision, the INRMP must be updated no less than every five years. The 47 CES/CEIE will annually review the plan for revision and approve changes to the plan.

Chapter 3 – Installation Overview

3.1 Location and Area

Laughlin AFB is located in central Val Verde County, Texas. The base is situated approximately six miles east of Del Rio, Texas, near the United States and Mexico border, see **Figure 3-1**, and the main facility covers 4,3553.43 with appurtenant acreage listed in **Table 3-1 (**Laughlin AFB 2011). The natural resources on permitted and USAF owned land are managed alike. Aside from the main facility, the USAF owns or is permitted to use land on the Laughlin Auxiliary Airfield near Spofford, Texas, the Southwinds Marina at Lake Amistad, an Instrument Landing System site, and a NEXRAD site outside Brackettville, Texas.

Table 3-1
Property Managed, through Ownership, Lease, Easement, or Right-of-Way by Laughlin AFB

Property Area	Acres Owned	Acres Permitted (lease, easement, or right- of-way)
Main Facility—Laughlin AFB	4,355.43	337
Laughlin Auxiliary Airfield—near Spofford	402	321
Southwinds Marina—at Lake Amistad	0	101
Instrument Landing System—near Main Facility	3	4
NEXRAD—near Brackettville	1	1
Sub-Totals:	4,761.43	764
Total Acreage:	**5,525.43**	

In2017/2018, the population of Val Verde County was49,205. The majority of this population, approximately35,591, lives in the city of Del Rio, and approximately 4,058 people reside at Laughlin AFB (U.S. Census Bureau).

3.2. Installation History

Since the beginning of operations in 1942, the training of USAF pilots has been the principal mission for Laughlin AFB. Laughlin AFB was originally named Laughlin Army Air Field, after Jack T. Laughlin, a B-17 Flying Fortress navigator who became Del Rio's first casualty of World War II. During World War II, the installation provided training for personnel manning the Martin B-26 Bomber. The base closed after World War II, reopening in 1952 to provide new pilots with basic bombing and gunnery combat skills during the Korean War.

During the 1950s and 1960s, Laughlin AFB served as home to several high altitude reconnaissance aircraft from the 408th Strategic Reconnaissance Wing (SRW). The 408th SRW were among the first pilots to provide photographic evidence of Soviet missile installations in Cuba. Reconnaissance aircraft provided distinguished service to the USAF prior to their relocation to Davis-Monthan AFB in Arizona in the late 1960s. Since then, Laughlin AFB's primary military mission has been flight training.

In July 1993, the 47 FTW realigned under the newly designated AETC, headquartered out of Randolph AFB in San Antonio, Texas. With this transition came the implementation of the Specialized Undergraduate Pilot Training (SUPT) program, which for the first time addressed both

primary flying training and specific advanced track training to better prepare students for their future roles in the USAF. In addition to flight training operations, more than 500 hours of classroom time and 60 hours of simulator time are required to complete the intense 52-week SUPT program.

Today, aircraft flown at Laughlin AFB include the T-6, the T-38, and T-1A. Fifteen classes of approximately 20-25 pilots each graduate every year. The 47 FTW commands a flying operation which exceeds 84,446 flying hours and 56,255 sorties per year. It is composed of more than 1,419 military personnel, 1,353 civilian employees, and 1,193 active duty family members for a total base community exceeding 4,058 people (Laughlin AFB 2013). The 47 FTW's total annual economic impact for 2014 was estimated at $214,486,501 (Laughlin AFB 2013).

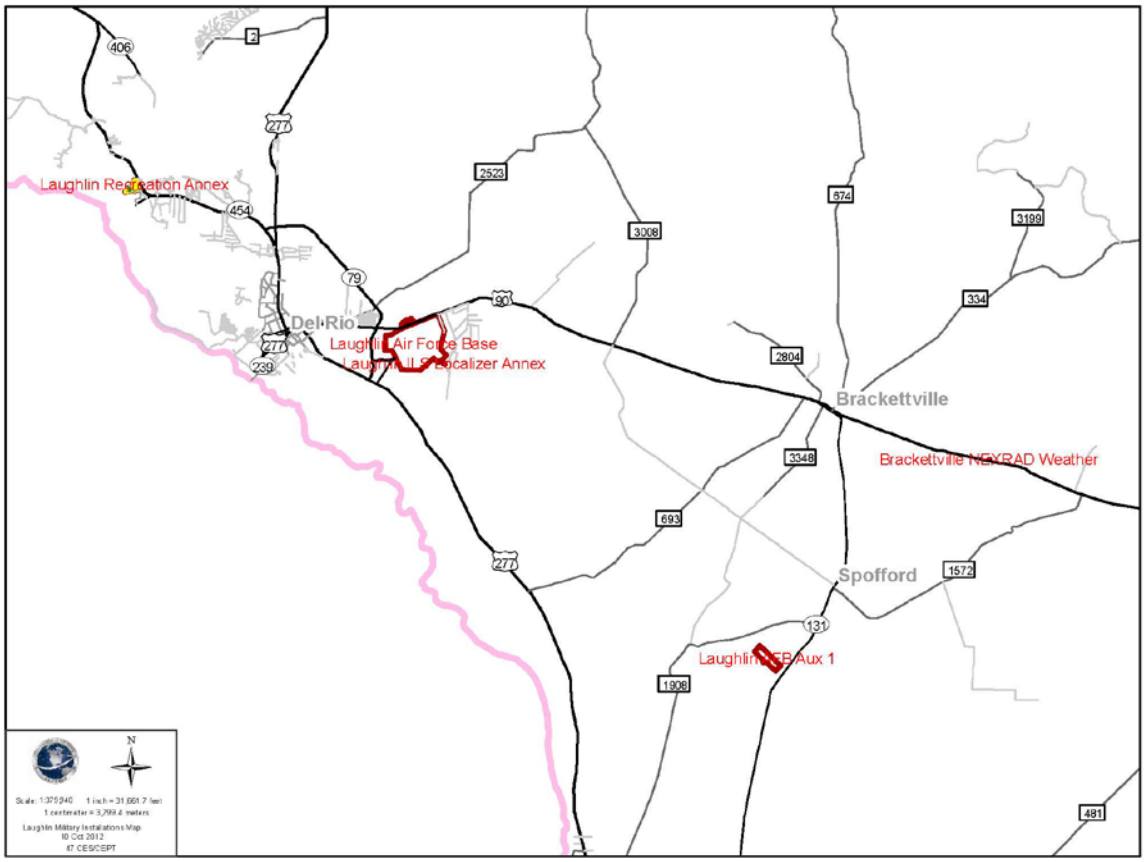


Figure 3-1
Site Location for Laughlin AFB and the Surrounding Area

3.3. Military Mission

The primary mission performed at Laughlin AFB is that of the base's host command, the 47 FTW, a subordinate unit to AETC which is headquartered in San Antonio, Texas. The AETC mission is to provide basic military training, initial and advanced technical training, flight training, and professional military and degree-granting professional education. The mission of the 47 FTW is to conduct specialized undergraduate pilot training for the USAF, Air Force Reserve, Air National Guard and allied nation air forces. The training mission includes the use of 29 state-of-the-art flight simulators and over 216 aircraft that are permanently stationed at Laughlin AFB (Laughlin AFB Economic Impact Statement 2014). To conduct this mission, a variety of subordinate wing units operate the many and varied facilities on base, including: police, fire, library, shopping center, and housing area.

Several tenant organizations are assigned to Laughlin AFB. These include:

- Air Force Office of Special Investigation - Provides criminal counterintelligence, internal security, and special investigative services;
- Army and Air Force Exchange Service - Provides base populations with and base exchange and Shoppette gas station;
- Defense Commissary Agency - Provides military personnel with grocery services;
- Defense Logistics Agency Disposition Services - Provides base with items that can be reused or reclaimed or recycled;
- Defense Logistics Agency Energy - Provides the fuel energy required for flight training; and
- Department of Homeland Security - Conducts, directs, and controls security investigations, and performs all other investigative functions as directed.

3.4. Surrounding Communities and Regional Land Use

The City of Del Rio is the closest community to Laughlin AFB. Del Rio is the county seat of Val Verde County and hosts a population of 35,591 in 2017. Since 2010, the population of Del Rio has grown by 0.4 percent (U.S. Census Bureau 2014). Development sprawling from Del Rio, specifically the suburb of Val Verde Park, has encroached on the northwest boundary of Laughlin AFB (City of Del Rio 2009). However, as of 2010, Val Verde Park's population has decreased by 1.39 percent since 2000 to 1,920 people. At this time no conflicts between the military training mission and the surrounding communities have been reported.

According to the U.S. Census Bureau, the median household income is $39,101 and 21.5 percent of families live below poverty level. At the end of fiscal year 2008-2009, Del Rio's unemployment rate was 8.8 percent with an employed labor force of 15,320 (City of Del Rio 2009). The top employers are the federal agencies with 1,978 employees (City of Del Rio 2009), Laughlin AFB with 1,586 military personnel and 1,056 civilian employees (Laughlin AFB 2010), and San Felipe Del Rio Independent School District with 1,420 employees (City of Del Rio 2009).

The local economy is historically based on agriculture, and Val Verde County is a national leader in wool and mohair production. The arid climate, rocky terrain, and shallow soils of the county make much of the land unsuitable for crop production. Although there are limited areas of arable land along the Rio Grande, ranching of sheep and goats is the leading agricultural activity in the county.

Outside of Laughlin AFB and Del Rio the region is sparsely populated. Other communities which are located near Laughlin AFB include:

- Brackettville, located 30 miles east of Del Rio along U.S. Highway 90, population 1,645 (U.S. Census Bureau 2014).
- Eagle Pass, located 54 miles south of Del Rio along U.S. Highway 277, population 28,329 (U.S. Census Bureau 2014).
- Uvalde, located approximately 60 miles east of Del Rio along U.S. Highway 90, population 16,412 (U.S. Census Bureau 2014).
- San Antonio is the closest major metropolitan area to Del Rio and Laughlin AFB and is located approximately 150 miles east of Del Rio. San Antonio has a population of 1,436,697 (U.S. Census Bureau 2014).

3.5. Local and Regional Natural Areas

There is little public land in Val Verde County. The majority of landholdings are in large, private ranching operations, mostly sheep and goat production. There are several state and federal natural areas in the immediate vicinity of Laughlin AFB. These natural areas include the Amistad Reservoir and National Recreational Area, Seminole Canyon State Park, and Devils River State Natural Area.

The most prominent natural area in Val Verde County is the Amistad Reservoir. Located approximately 20 miles northwest of Laughlin AFB, this reservoir was completed in 1969 as a joint project between the United States and Mexico. The reservoir is located within the Rio Grande Channel, downstream from the confluence of the Rio Grande and Pecos Rivers. The international border between the United States and Mexico runs through the reservoir, which is jointly owned, operated, and managed under agreements between the two countries. Created by an earthen and concrete dam structure, the reservoir has a surface area of approximately 64,900 acres.

Amistad Reservoir is located within the Amistad National Recreation Area, managed by the National Park Service (NPS), Department of Interior. The NPS maintains several campgrounds and boat ramps at various locations across the National Recreation Area. The dam is operated by the International Boundary and Water Commission (IBWC), who utilize the dam and impoundment for flood control, irrigation, and hydroelectric power generation.

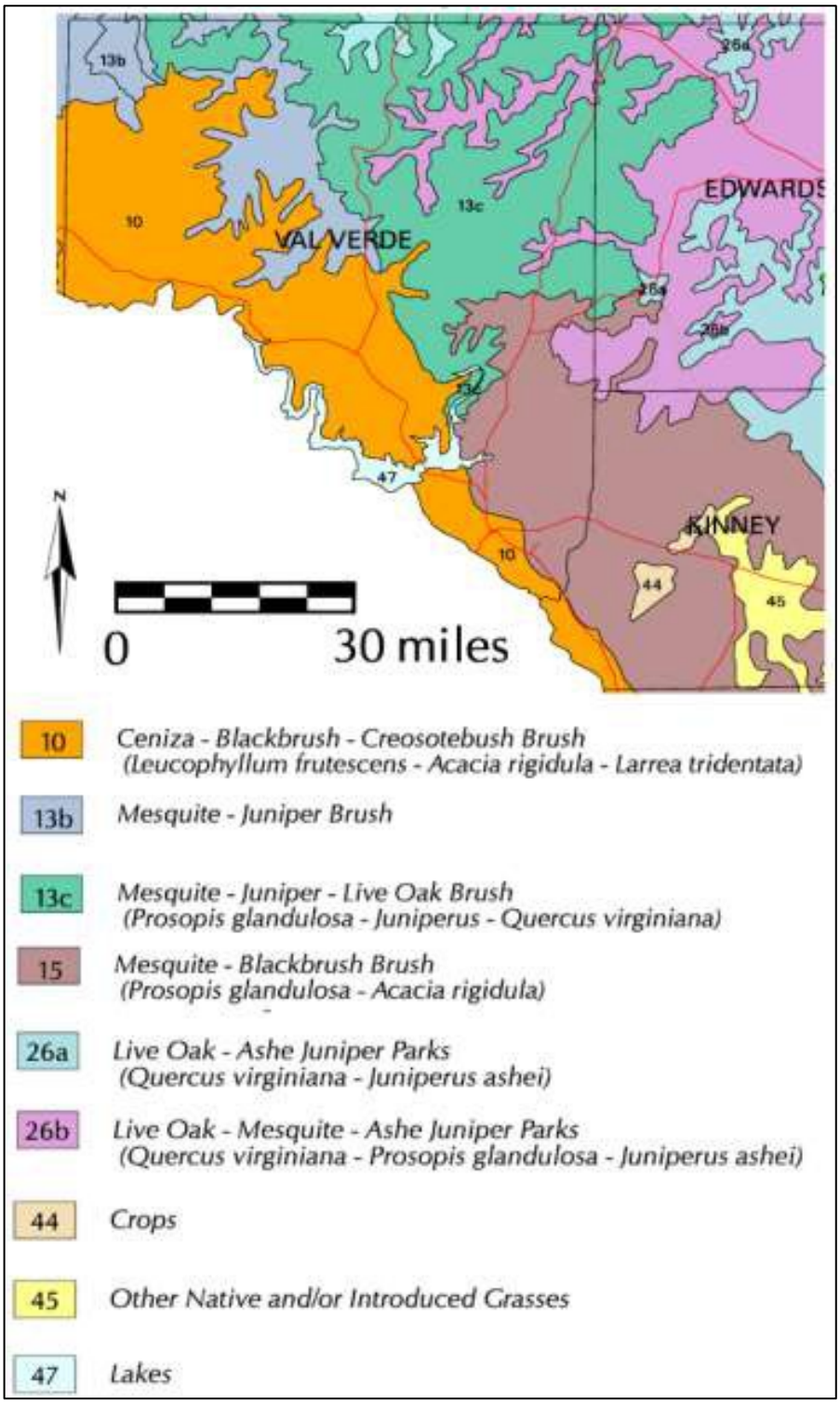
Amistad National Recreation Area supports a diverse and unique flora and fauna community. The biodiversity is a result of the park's location in a transition zone between three major plant communities: Ceniza – Blackbrush – Creosotebush Brush, Mesquite – Juniper – Live Oak Brush, and Mesquite – Blackbrush Brush, see **Figure 3-2**. The entire Amistad National Recreation Area is underlain by 100 million year-old Cretaceous limestone. Dissolution features, such as sinkholes and caves, are common in the area. Contributing spring water and a lack of surrounding soil promote high water quality in Amistad Reservoir, which also formed the sinkholes and caves.

Another natural area in Val Verde County is Seminole Canyon State Historical Park. Located approximately 60 miles west of Del Rio along U.S. Highway 90, near the banks of the Rio Grande, Seminole Canyon is a prehistoric Texas Native American site containing some of the best examples of prehistoric pictographs in Texas. Seminole Canyon is managed by the TPWD.

Devils River State Natural Area, in Val Verde County, approximately 45 miles north of Del Rio, was officially acquired by the TPWD in May, 1988. The original area comprises 19,988 acres with

447 acres held in trust. Additionally, in January 2011, 18,000 acres approximately 13 miles downstream from the existing area were added. The site possesses high biological diversity, and the scenic river corridor offers a rugged river experience. The park's large size and remoteness supports day hiking, primitive camping, mountain biking, and canyon tours. Access to the river is by hiking, biking, or park tour only. No vehicle access is permitted.

A series of springs provide up to 80% of Devils River's volume. Three stream conditions characterize the river: long, deep pools; wide shallow areas; and relatively deep, turbulent rapids. The river is free of impoundments, generally inaccessible, essentially primitive and unpolluted. Ecologically, the area combines elements of the Edwards Plateau to the east, the Trans-Pecos to the west, and South Texas brush to the south. Large, dense stands of Live Oak and Pecan trees are adjacent to the river with semi-desert grassland vegetation on the ridges that slope away from the river. Numerous springs and seeps with mosses, ferns, various herbs, and vines also exist.



Source: TPWD. 1984 The Vegetation Types of Texas

Figure 3-2
Texas Parks and Wildlife Department's Major Vegetation Types for Val Verde County and Surrounding Area.

Chapter 4 – Physical Environment

4.1 Climate

Laughlin AFB is located near the Rio Grande River, on the western tip of the Balcones Escarpment (Texas Historical Association 2011), in southwest Texas. Elevation is near 1,000 feet and varies little regionally. The climate of the area is semi-arid continental. Over 80 percent of the average annual precipitation occurs from April through October. During this period, precipitation is primarily in the form of showers and thunderstorms, often as heavy downpours resulting in flash flooding. The small amount of precipitation from November through March usually falls as steady light rain. Average yearly rainfall is near 19 inches. Rainfall extremes vary from 4.34 inches in 1956 to 37.75 inches in 1914. Between the years of 1906 and 2010, average precipitation was observed to be greatest in May and September and lowest in January and December as shown in **Figure 4-1** (National Oceanic and Atmospheric Administration [NOAA] 2011c).

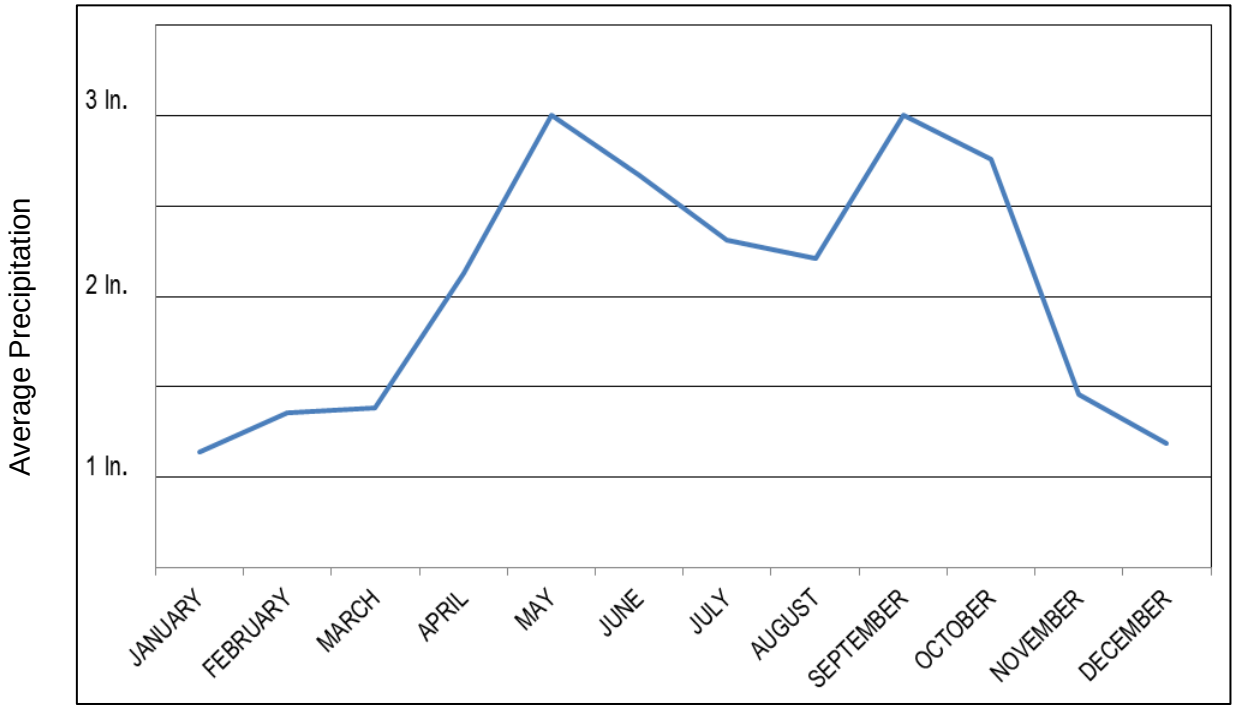


Figure 4-1
Average Precipitation by Month between 1906 and 2010, Del Rio, Texas

Although rare, tornadoes have occurred in the area and are most often associated with dissipating tropical storms that have moved inland from the Gulf of Mexico. Hail usually occurs once per year in the area. Sleet or snow has been observed in some winters, but typically melts as it falls.

Temperature averages indicate mild winters and hot summers. Average monthly temperatures vary from the 50s in the winter to the 80s in the summer with an overall average annual temperature of 70 degrees as seen in **Figure 4-2**. Cold weather periods usually do not last more than a week. Typically the coldest temperature occurs in December, while the last freeze generally occurs in late February. Hot weather is persistent from May to mid-September, with

most days above 90 degrees Fahrenheit (°F). Temperatures of 100°F have been observed as early as March and as late as October. During June, July, and August, afternoon highs exceed 90°F over 80 percent of the time. The highest temperature recorded was 112°F on 9 June 1988 (NOAA 2011b).

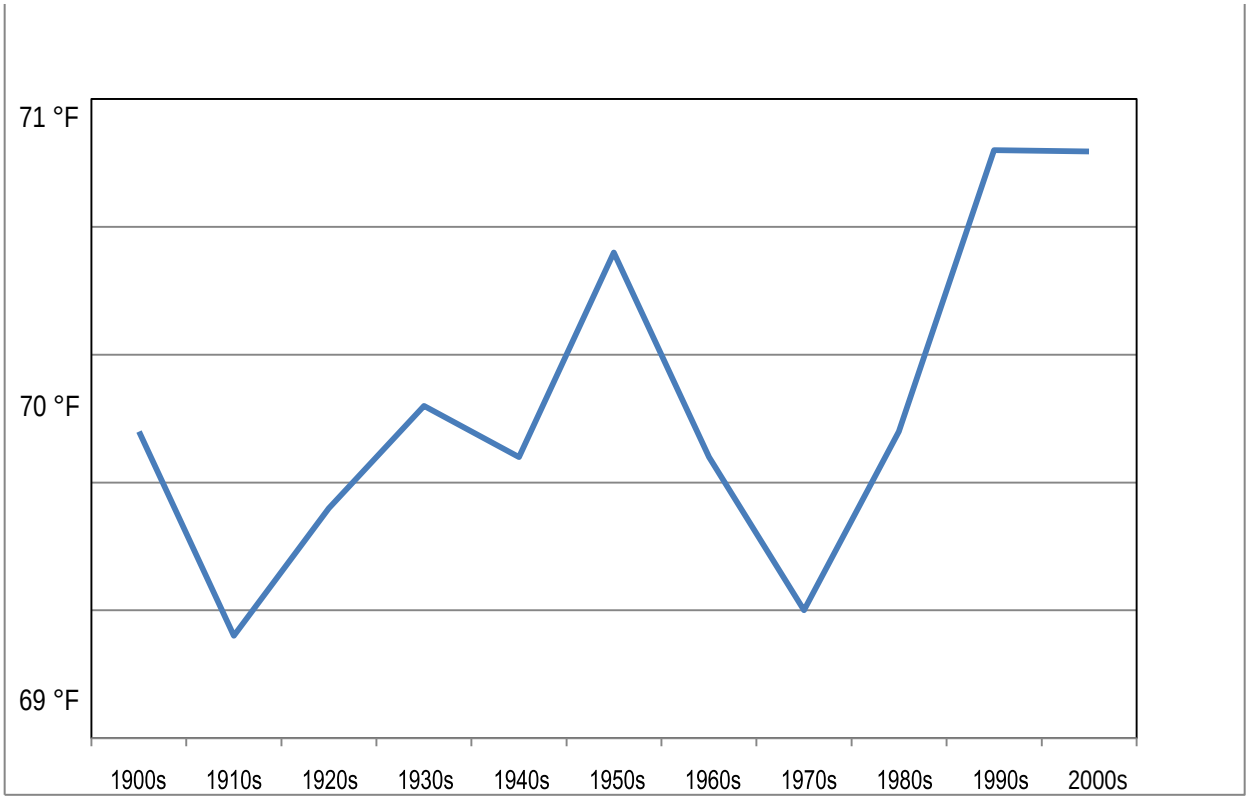


Figure 4-2
Average Temperature by Decade 1900 through 2008, Del Rio, Texas

Prevailing winds are southeasterly from April through October. Between November and March, a northerly wind prevails during winter with the passage of more cold fronts. The average wind speed between 1979 and 2002 in Del Rio is 9.7 miles per hour with the greatest speed occurring during the spring and summer months and lowest during the fall months, see **Figure 4-3** (NOAA 2011a).

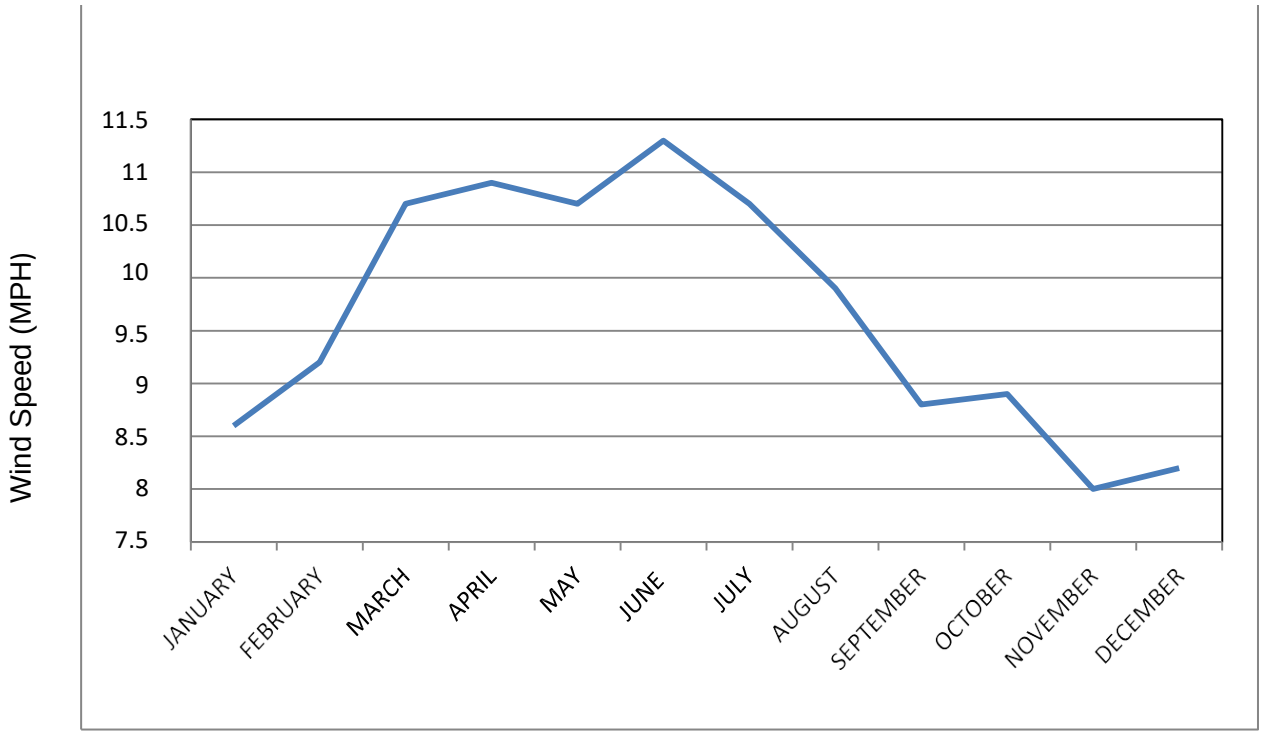


Figure 4-3
Average Wind Speed by Month between 1979 and 2002, Del Rio

4.2 Landforms

Laughlin AFB lies on the western edge of the Balcones Escarpment within the Edwards Plateau physiographic province (BEG 1996). The Balcones Escarpment bounds the eastern and southern Edwards Plateau, see **Figure 4-4**. This curved band is composed of major normal faults. Stream erosion along the fault escarpment sculpts the Hill Country from Waco to Del Rio, Texas. The Edwards Plateau is capped by hard Cretaceous limestone. Springs provide flowing water to some streams.

The general terrain of Laughlin AFB is moderately undulating to flat. The highest elevation on the base is 1,142 feet above mean sea level and the lowest elevation is 1,058 feet above mean sea level. The general direction of slope is to the east towards Sacatosa Creek. Highest elevations occur along the west and southwest boundary of the base and the lowest elevations occur along the east and southeast boundary of the base.

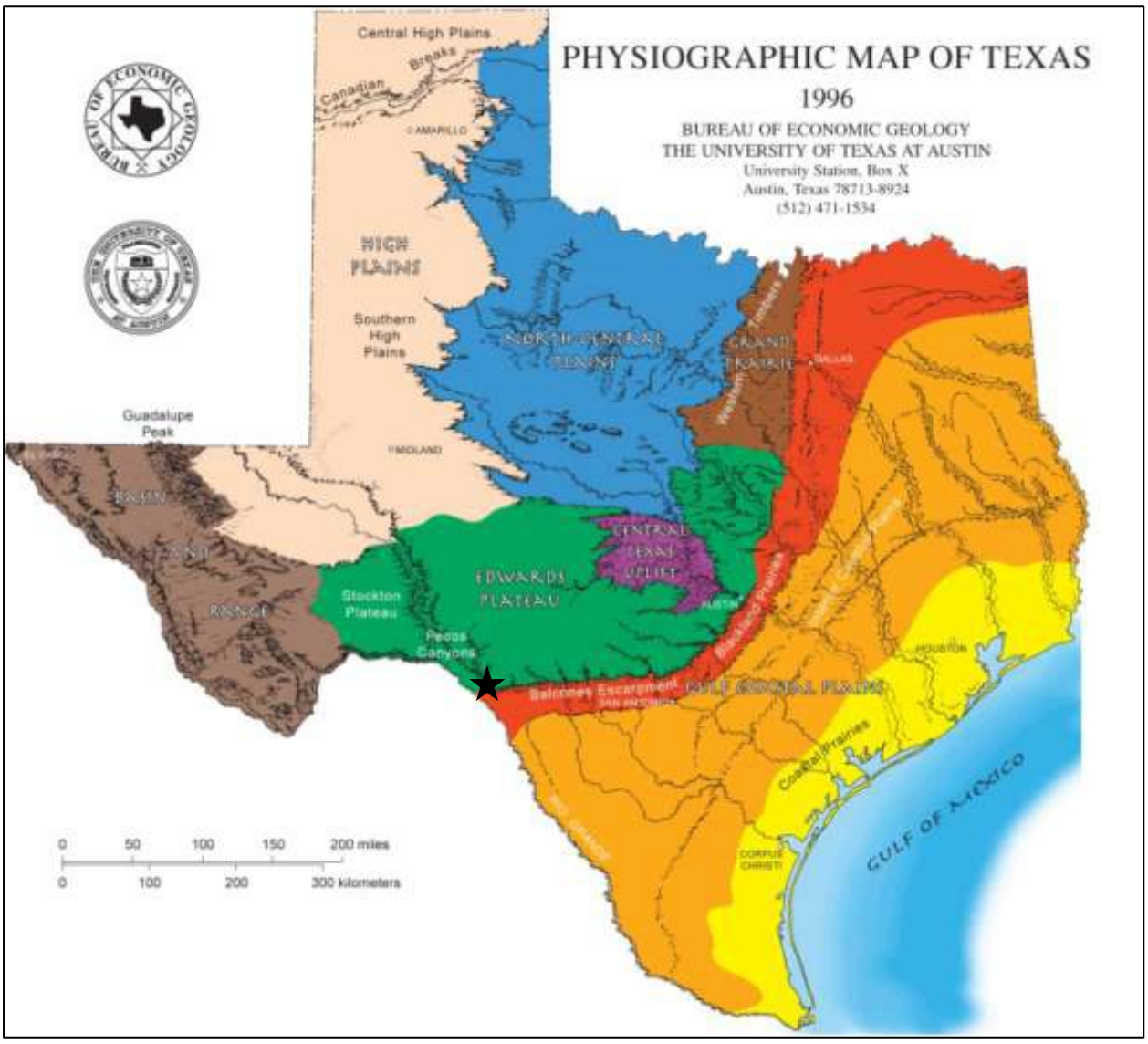


Figure 4-4
General Physiographic Map of Texas

4.3 Geology and Soils

Geology

Del Rio and Laughlin AFB lie at the junction of two major physiographic regions of Texas: the Edwards Plateau and the Gulf Coastal Plains as shown in **Figure 4-4** (BEG 1996). The Edwards Plateau region is locally characterized by high dry limestone ridges, scrub brush, and poor surface soils. The Gulf Coastal Plains generally have gently rolling plains and deeper richer soils. According to the University of Texas, Bureau of Economic Geology, Geologic Atlas of Texas, Del Rio Sheet, Laughlin AFB is underlain by the Uvalde Gravel (T-Qu), Del Rio Clay (Kdr), Buda Limestone (Kbu), and Alluvium (Qal), **Figure 4-5** (BEG 1977).

The geologic formations are as follows:

Uvalde Gravel (T-Qu) of Pliocene or Pleistocene -

> *Caliche-cemented gravel, some boulders up to one foot in diameter, well-rounded cobbles of cherts and some cobbles of quartz, limestone, and igneous rocks; occupies topographically high areas not associated with present drainage; thickness ranges from several feet to gravel lag to ±30 feet.*

Del Rio Clay (Kdr) of the Upper Cretaceous -

> *Calcareous and gypsiferous becoming less calcareous and more gypsiferous upward, pyrite common, blocky, medium-gray, weathers light-gray to yellowish-gray; some thin lenticular beds of highly calcareous siltstone; marine megafossils include abundant Exogyra arietina and other pelecypods; thickness up to 200 feet, feathers out northwestward.*

Buda Limestone (Kbu) of the Upper Cretaceous -

> *Fine-grained, bioclastic, commonly glauconitic, pyritiferous, hard, massive, poorly bedded to nodular, thinner bedded and argillaceous near upper contact, light-gray to pale-orange; weathers dark-gray to brown; burrows filled with chalky marl, abundant pelecypods; thickness 45-100 feet, thickens eastward.*

Alluvium (Qal) -

> *Floodplain deposits, includes low terrace deposits near floodplain level and bedrock locally in stream channels; gravel, sand, clay, silt, and organic material; along the Rio Grande includes a wide variety of igneous and sedimentary rocks from Trans-Pecos Texas, Mexico, and New Mexico. (BEG 1977)*

Minerals with significant deposits in Val Verde County include oil, natural gas, and manganese. The oil in the area is asphaltic and is generally not economical to drill. There are some small natural gas deposits being drilled in the northwest part of the county. Manganese was mined near Shumla during World War I, but the quality of the ore was not sufficient to allow economical operation of mines after the war ended (Roberts and Nash 1918). No active pits, quarries, mines, or oil and gas wells are known to exist at Laughlin AFB.

Sand and gravel deposits of commercial value are found adjacent to the major rivers that flow across Texas. Sand and gravel deposits are mined primarily as a source of construction materials. Val Verde is one of several counties in Texas that produce sand and gravel.

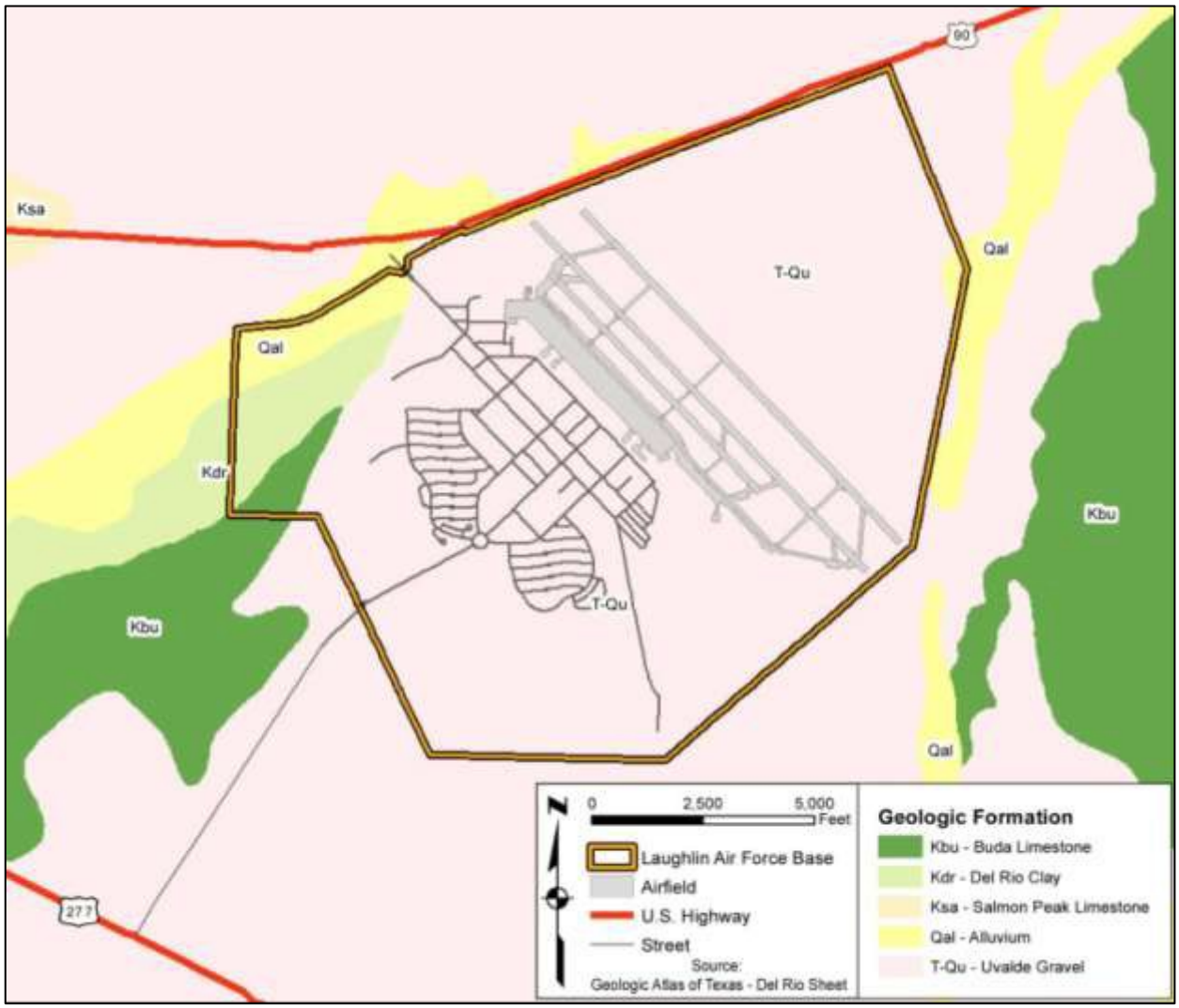


Figure 4-5
Surface Geologic Formations Underlying Laughlin AFB, Texas

Soils

The predominant soil type on the base is the Zapata-Vinegarroon (ZaC) complex, see **Figure 4-6**. This soil is characterized by very shallow gently sloping soils on upland areas. These soils formed in mild outwash sediment over thick beds of caliche. As much as 20 percent of the surface is covered by limestone and caliche fragments. These soils are well drained. Surface runoff is medium. Permeability is moderate, and available water capacity is very low. There are lesser areas of Acuña silty clay (AcB). This soil type is found in stream terraces and streambeds (BEG 1977).

More detailed information including limitations for specific activities on various soil types located throughout the base is located on Laughlin AFB's eDASH website.

Figure 4-6
Soil Types on Laughlin AFB, Texas

4.4 Hydrology

Surface waters on Laughlin AFB are limited due to low annual precipitation. Sacatosa Creek originates approximately 7.5 miles to the north-northeast of Laughlin AFB and is spring fed and flows year round. Zorro Creek is located on the western portion of the base and originates 200 yards north-northwest of Laughlin AFB. Both creeks discharge into the Rio Grande River (USGS 1985). Mission activities are not expected to impact these creeks. However, activities associated with the mission may impact ephemeral streams, which are located throughout Laughlin AFB. These streams are only periodically inundated by stormwater. Most of the

ephemeral streams found on Laughlin AFB are connected to the Rio Grande River. The Rio Grande River is a listed navigable water of the U.S. If work is planned that involves construction in and around these streams, a jurisdictional determination by the U.S. Army Corps of Engineers (USACE) would be required. Activities potentially impacting jurisdictional streams include road construction, pipeline and utility installation, and construction of buildings or other facilities. Similar mission activities may impact floodplains, but those impacts can be minimized if proper procedures are used.

4.4.1 Watersheds and Drainage Patterns

A watershed is an area of land where all the drainage goes into the same place. Watersheds generally include lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape. NRMs should determine how to plan and work toward an economically healthy and environmentally sound watershed.

Storm water drainage exits the base by way of one of four drainage channels. A full map of the drainage areas is provided in **Appendix A**. Although some water crosses the base boundary as sheet flow before entering a defined drainage channel, these sheet flow areas ultimately enter one of the four drainage channels shortly after leaving base property.

The Zorro Creek drainage basin is located in the northwestern portion of the base. This drainage area drains approximately 3,300 acres north of the Base across U.S. Highway 90 before crossing the extreme northwest corner of the base. Approximately 425 acres of base property discharge into Zorro Creek. Zorro Creek continues flowing south-southwest after leaving the base and flows into the Rio Grande approximately 12 creek-miles downstream of the base.

An unnamed tributary of the Rio Grande receives runoff from the southwestern portion of Laughlin AFB. The headwaters of this drainage originates on base from the area west of the north housing area, slightly northwest of the golf course. This tributary drains approximately 910 acres of base property, including the two housing areas, the golf course, and the area along the southwest boundary of the base. This drainage flows into the Rio Grande approximately 11 creek-miles downstream of the base.

An unnamed tributary of Sacatosa Creek originates on the base. The headwaters of this tributary are located near the northern terminus of the man-made drainage channel running parallel to and just southwest of Second Street. This drainage area extends from U.S. Highway 90 to the south base boundary and contains approximately 1,400 acres. Included in this drainage area is a portion of the airfield that is drained by the subsurface storm water drainage system. Other facilities within this drainage basin include most administrative, support, industrial areas of the base, and the wastewater treatment plant and lagoons. This drainage flows into Sacatosa Creek approximately five creek miles downstream of the southern base boundary.

Sacatosa Creek flows along the eastern boundary of the base, and remaining portions of the base drain to this waterway. Sacatosa Creek drains a large area of approximately 10,000 acres north of Highway 90. This drainage does not enter the base, but is immediately adjacent to the most eastern boundary of the base. Approximately 1,500 acres of the base drain to Sacatosa Creek. The majority of the drainage leaves the base as sheet flow along the eastern boundary and along the area southeast of the airfield. The remaining drainage is from the airfield subsurface drainage system that discharges into a defined channel prior to entering into Sacatosa Creek.

4.4.3 Impoundments

Several impoundments are located across the base including two small pond and a swale on the golf course. Both of these impoundments lie within the drainage basin of the unnamed tributary of the Rio Grande, and are man-made impoundments along the natural drainage way. Each pond has a surface area of approximately 2.5 acres. Water in these ponds consists of runoff originating on-base, from the housing and undeveloped areas within the drainage.

Further downstream of the golf course ponds is a low lying area along the drainage path of the unnamed tributary of the Rio Grande that is impounded by a man-made earthen dam. The dam is located within 200 feet inside of the southern base boundary line. This impoundment is in a remote portion of the base and surrounded by tree and brush growth. The impoundment area is generally dry during extended periods of drought.

In addition to the above-described ponds and impoundments, the base utilizes a pond system for treatment of domestic wastewater. The treatment system consists of a bar screen, two wastewater sewage grinders and parshall flume at the headworks to remove large objects and monitor the influent flow. Two biological facultative ponds, with solar powered mixer pumps, and an overflow impoundment pond, with a combined surface area of approximately 25 acres, operate in a series to treat the wastewater. The ponds are connected to each other with subsurface piping, and the wastewater flows along the hydraulic gradient of the pond system by gravity. Effluent flow from the pond system is measured at a flume and samples are sent off for testing in accordance with Laughlin AFB Wastewater Permit requirements before being discharged to the unnamed tributary of Sacatosa Creek.

4.4.3 Floodplains

A floodplain is the area a river may occupy when it is at flood stage and commonly encompasses an area much larger than the river channel itself. The Federal Emergency Management Agency (FEMA) has developed maps under the National Flood Insurance Program that show the locations of floodplains. The floodplain maps can be used to develop ways to manage floods. It is important to note that floodplain delineation will change over time due to construction within the floodplain from both on and off-base activities, and natural processes.

Three floodplain areas are located on the installation. These floodplains exist along the eastern base boundary adjoining Sacatosa Creek, at the northwest corner of the base along Zorro Creek, and at the southern base boundary along an unnamed tributary to the Rio Grande River, see **Figure 4-7**. No permanent structures are located within flood plain areas.

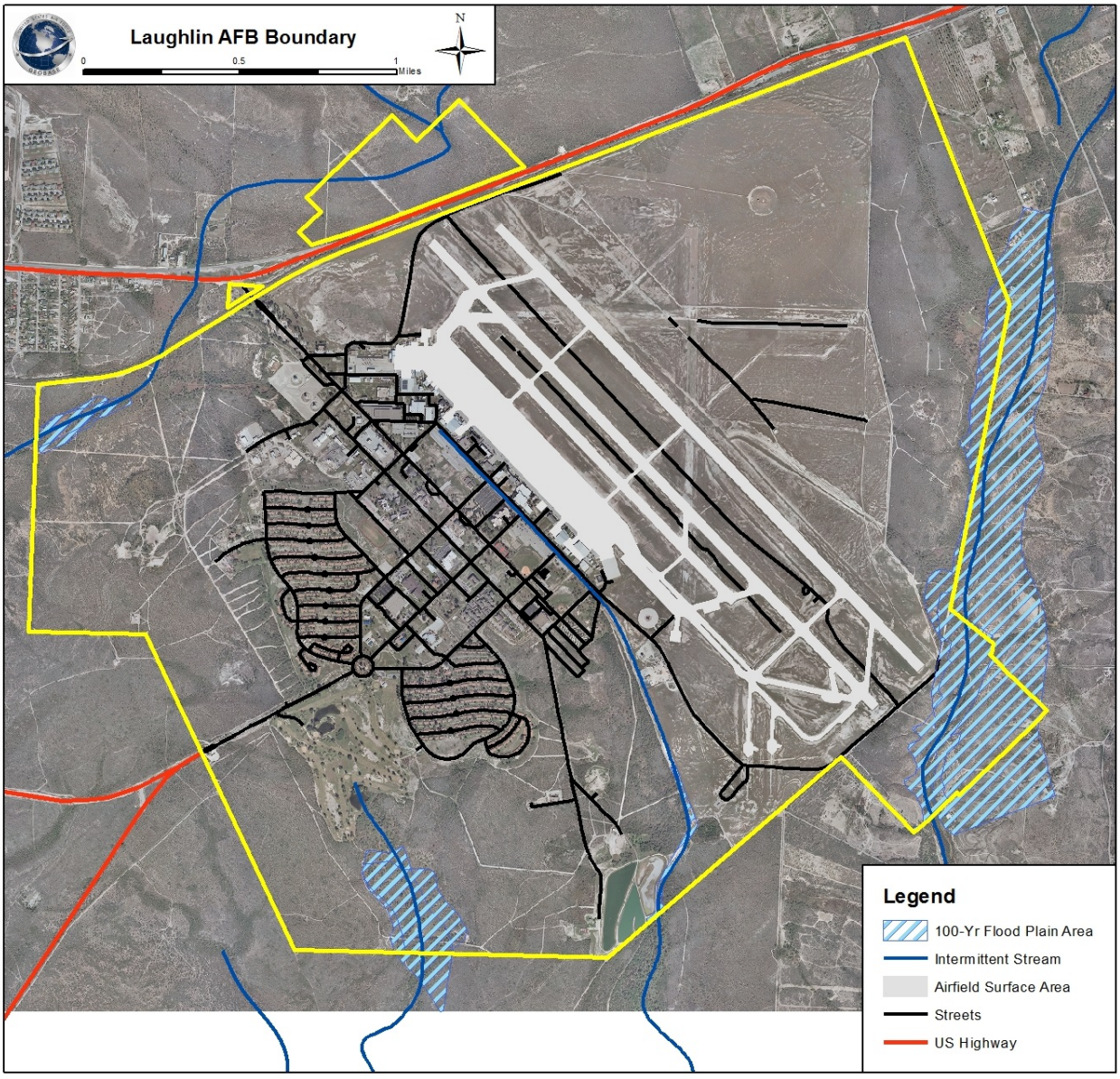


Figure 4-7
FEMA Delineated Floodplains on and Adjacent to Laughlin AFB, Texas

Chapter 5 – Ecosystems and the Biotic Environment

5.1 Ecosystem Classification

According to the National Hierarchical Framework of Ecological Units (ECOMAP 1993), Laughlin AFB lies within the following ecological unit:

Domain:	Dry
Division:	Tropical/subtropical Desert
Province:	Chihuahuan Semi-Desert
Section:	Plateau
Ecoregion (Level III):	Southern Texas
Plains Ecoregion (Level IV):	Semiarid Edwards Bajada

The Semiarid Edwards Bajada ecoregion is composed primarily of alluvial fan and slope wash deposits below the escarpment of the Edwards Plateau. Although not composed of karstic Edwards Limestone, this ecoregion contains springs and streams that show some similarities to those of the Edwards Plateau because they flow over a chalky substrate and likely originate from cool water aquifers beneath the Edwards Plateau. The very presence of perennial streams in such an arid region is distinctive. Elevations are lower and the climate is warmer than on the Edwards Plateau, and the vegetation is more typical of the rest of the Southern Texas Plains (ECOMAP 1993).

5.2 Vegetation

5.2.1 Historic Vegetation

The area surrounding Laughlin AFB is described as a rolling to moderately dissected plain and was once covered with grassland and savanna vegetation that varied during wet and dry cycles (United States Environmental Protection Agency [EPA] 2010). The Cane Bluestem-False Rhodesgrass Series was likely the dominant community. These lands were likely overgrazed leading to the extirpation of these grasses on the rocky and shallow soil types. Subsequent erosion and fire suppression have encouraged invasion by shrubby species, such as Cenizo (*Leucophyllum frutescens*), Guajillo (*Acacia berlandieri*), and Honey Mesquite (*Prosopis glandulosa*), which now represent the predominant vegetation type.

5.2.3 Current Vegetation

The TPWD, in conjunction with TNC of Texas, conducted inventories of plant species at Laughlin AFB in 1993, 1994, and 1997. The results were published in two documents titled *Biological Survey of Laughlin Air Force Base* (TPWD 1995) and *Survey of Rare, Threatened, and Endangered Plant and Animals at Laughlin Air Force Base, Del Rio, Texas* (TNC 1999). The following portions of this subsection summarize both reports. Complete copies of the reports can be reviewed in the 47 CES/CEIE office at Laughlin AFB.

Four vegetation communities were identified in a base-wide biological survey that occurred between 1993 and 1994: Cenizo Series-Guajillo series Mosaic, Cane Bluestem-False Rhodesgrass series, the Sugarberry-Elm series, and the Big Sacaton series. These plant communities are based on the descriptions in *Plant Communities of Texas* (Diamond 1993).
Most of the 424 vascular plant taxa currently known to exist on the installation are characteristic of the flora of the South Texas Plains. One omission to the plant community at Laughlin AFB is

Blackbrush (*Acacia rigidula*), a common component of thorn scrub communities. A few species of typical Trans- Pecos plant communities were observed on Laughlin AFB. Tarbush (*Flourensia cernua*), is locally common in shrublands on deep silty clays and clay loams in the northeast corner of Laughlin AFB. It is doubtful that this species ranges much further east than Laughlin AFB. Several forbs might also be considered to have a greater affinity to the vegetation of the Trans-Pecos than to that of the South Texas Plains, including *Castilleja lanata* and the Cryptantha *species*. The absence of Lechuguilla (*Agave lechuguilla*) and Ocotillo (*Fouquieria splendens*), two characteristic species of Chihuahuan Desert portions of the Trans-Pecos, is notable since both are fairly common on semi-arid Cretaceous limestone elsewhere in Val Verde County.

Cenizo Series-Guajillo Series Upland Shrublands

The Cenizo Series-Guajillo series mosaic occupies level hill tops and gentle slopes. Percent cover is variable, depending on topography, geology, soils, and past land use history. Cover varies from a low of 5 percent on the relatively level upland south of Zorro Creek pond to 75 percent on the hilltops. Aside from Cenizo and Guajillo, numerous other woody species are common in this vegetation type. A list of plant species observed in this community type is presented in **Table 5-1**.

This series covers the gravelly hills that occupy the western half, the eastern edge, and the Clear Zones (CZ). The location of CZ is identified in the AICUZ, prepared by 47 CEN/CEP. Cenizo and Guajillo are extremely common on these hills, and although small patches may be dominated exclusively by one species or the other, overall the species are too intermixed to identify separate sites for each. These hills may at one time have supported more of a grassland community such as the Cane Bluestem-False Rhodesgrass Series.

Although the site-specific land use history for Laughlin AFB is unknown, the area was likely subject to years of heavy grazing by sheep, goats, and cattle. In addition, fire, both natural and human-caused, has been suppressed. These actions encourage the proliferation of woody, less palatable species which form the community present at the site today.

Table 5-1
Plant Species Observed in Cenizo Series-Guajillo Series at Laughlin AFB

Woody Plants	
Acacia berlandieri	*Forestiera angustifolia*
Acacia neovernicosa	*Guaiacum angustifolium*
Acacia roemeriana	*Gymnosperma glutinosum*
Aloysia gratissima	*Heliotropium torreyi*
Berberis trifoliolata	*Koeberlinia spinosa*
Calliandra conferta	*Krameria ramosissima*
Castel texana	*Leucophyllum frutescens*
Celtis pallida	*Mimosa borealis*
Chrysactinia mexicana	*Nolina texana*
Clematis drummondii	*Opuntia atrispina*
Colubrina texensis	*Opuntia leptocaulis*
Condalia spathulata	*Opuntia engelmannii* var. *lindheimeri*
Dalea formosa	*Parkinsonia texana* var. *texana*
Dalea frutescens	*Prosopis glandulosa*
Dalea greggii	*Rhus microphylla*
Diospyros texana	*Yucca constricta*
Ephedra antisyphilitica	*Yucca thompsoniana*
Eysenhardtia texana	*Yucca treculeana*
Flourensia cernua	*Ziziphus obtusifolia*
Grass / Sedges	
Aristida purpurea	*Erioneuron pulchellum*
Bouteloua curtipendula	*Hilaria belangeri*
Erioneuron pilosum	*Pappophorum* spp.
Forbs	
Acalypha monostachya	*Machaeranthera pinnatifida*
Artemisia ludoviciana	*Melampodium cinereum*
Calylophus hartwegii ssp. *hartwegii*	*Polygala macradenia*
Cevallia sinuata	*Senna durangensis*
Croton dioicus	*Simsia calva*
Conoclunium greggi	*Tiquilia canescens*
Hedeoma drummondii	*Thymophylla acerosa*
Hoffmannseggia glauca	*Wedelia acapulcensis* var. *hispida*

Cane Bluestem-False Rhodesgrass Series

The relatively level uplands on the east side of the base, as well as some other scattered patches, support degraded remnants of the Cane Bluestem-false Rhodesgrass series. These grasslands were observed to be in a highly degraded state. Although past land use history is not known, overgrazing by domestic animals probably removed the more palatable grasses. Shrub invasion has not occurred in these grasslands because of an intensive mowing regime. Without such mowing, these sites would likely become shrub-invaded like the surrounding hills.

Although the Cane Bluestem-false Rhodesgrass grasslands have been heavily invaded by non-native grass species such as Bermuda grass (*Cynodon dactylon*), King Ranch Bluestem (*Bothriochloa ischaemum*), and St. Augustine grass (*Stenotaphrum secundatum*), patches of

native grasses such as Cane Bluestem (*Bothriochloa barbinodis*), Sideoats Grama (*Bouteloua curtipendula*), and Purple Threeawn (*Aristida purpurea*) still remain. Throughout the year, primarily in the spring, numerous wildflower species can be found in these grasslands. A list of plant species observed in this community type is presented in **Table 5-2**.

Table 5-2
Plant Species Observed in Cane Bluestem-False Rhodesgrass Series Upland Grasslands at Laughlin AFB

Woody Plants	
Acacia angustissima var. *hirta*	*Mimosa borealis*
Acacia farnesiana	*Parkinsonia aculeata*
Aloysia gratissima	*Prosopis glandulosa*
Celtis pallida	*Salvia ballotiflora*
Clematis drummondii	*Yucca constricta*
Condalia spathulata	*Yucca thompsoniana*
Guaiacum angustifolium	*Yucca treculeana*
Leucophyllum frutescens	*Ziziphus obtusifolia*
Grasses/Sedges	
Aristida purpurea	*Cynodon dactylon*
Bothriochloa ischaemum var. *songarica*	*Erioneuron pilosum*
Bothriochloa barbinodis var. *barbinodis*	*Erioneuron pulchellum*
Bouteloua curtipendula	*Hilaria belangeri*
Bouteloua eriopoda	*Pappophorum* spp.
Bouteloua hirsute	*Schizachyrium scoparium*
Bouteloua rigidiseta	*Sorghum halepense*
Bromus catharticus	*Stenotaphrum secundatum*
Buchloe dactyloides	*Nassella leucotricha*
Chloris cucullata	*Tridens albescens*
Chloris verticillata	
Forbs	
Acalypha monostachya	*Oxalis dichondrifolia*
Ambrosia psilostachya	*Parthenium hysterophorus*
Boerhavia spp.	*Plantago* spp.
Calylophus hartwegii ssp. *hartwegii*	*Polygala lindheimeri* var. *lindheimeri*
Calyptocarpus vialis	*Pyrrhopappus pauciflorus*
Chamaesaracha coniodes	*Quincula lobata*
Gaillardia pulchella	*Siphonoglossa pilosella*
Oenothera calcicola	*Solanum elaeagnifolium*
Gutierrezia spp.	*Solanum rostratum*
Hedeoma drummondii	*Tetraclea coulteri*
Hoffmannseggia glauca	*Teucrium* spp.
Lepidium virginicum	*Thelesperma* spp.
Machaeranthera pinnatifida	*Thymophylla acerosa*
Marrubium vulgare	*Glandularia bipinnatifida*
Melampodium cinereum	*Verbena officinalis* var. *halei*

Note: Based on field surveys conducted in 1993 (TPWD), 1994 (TPWD), 1997 (TNC), and 2011 (Baer Engineering).

Sugarberry-Elm Series Floodplain Woodlands

The Sugarberry-Elm series occupies relatively level to gently sloping terrain, and often marks a transition from the more mesic Big Sacaton series wetland grasses to the Xeric Cenizo series-Guajillo series Mosaic upland shrublands. The overstory is dominated by trees such as Sugarberry (*Celtis laevigata*), Cedar Elm (*Ulmus crassifolia*), Netleaf Hackberry (*Celtis reticulate),* Black Willow (*Salix nigra*), and Berlandier Ash (*Fraxinus berlandieri*). There is no woody understory, and the herbaceous ground cover consists of various grasses and forbs. Canopy percent cover varies from 25 to 90 percent as the tree cover is somewhat patchy, probably due to past clearing for maneuvers, road building, maintenance, and drainage impoundments and improvements. A list of plant species observed in this community type is presented in **Table 5-3**. The floodplain of Sacatosa Creek (on the east side of the base) and the drainages in the vicinity of the impoundment south of the golf course are dominated by a disturbed representation of the Sugarberry-Elm series. Along Sacatosa Creek the woodland has been dissected by roads and cleared for training exercises. Near the impoundment the original ephemeral drainage probably supported the Sugarberry-Elm series. However, major movements of soil for building the impoundment and the road have created additional low lying habitat to the west suitable for the Sugarberry-Elm series, increasing the woodland. This community has also invaded the edge of the impoundment, and is maintained as a narrow strip of woodland along the original drainage. At one time this community may have occurred in a transition zone between the Zorro Creek marsh and the surrounding upland Shrublands, but the impoundment of Zorro Creek has altered the natural vegetation and only remnant patches of woodland remain.

Table 5-3
Plant Species Observed in Sugarberry-Elm Series Floodplain Woodlands at Laughlin AFB

Woody Plants	
Acacia farnesiana	*Parkinsonia aculeata*
Sideroxylon lanuginosum	*Prosopis glandulosa*
Celtis laevigata	*Salix nigra*
Celtis reticulata	*Sapindus saponaria* var.*drummondii*
Clematis drummondii	*Smilax bona-nox*
Fraxinus berlandieriana	*Tamarix* spp.
Morus spp.	*Ulmus crassifolia*
Grasses/Sedges	
Bothriochloa ischaemum var. songarica	*Sorghum halepense*
Cynodon dactylon	*Nassella leucotricha*
Setaria leucopila	
Forbs	
Acourtia runcinata	*Parietaria pennsylvanica*
Ambrosia psilostachya	*Parthenium hysterophorus*
Artemisia ludoviciana	*Phacelia congesta*
Cissus trifoiliata	*Rivina humilis*
Cocculus carolinus	*Justicia pilosella*
Cucurbita foetidissima	*Solanum elaeagnifolium*

Forbs (Continued)	
Cynanchum spp.	*Teucrium* spp.
Conoclunium greggii	*Torilis arvensis*
Marrubium vulgare	*Xanthium strumarium*

Note: Based on field surveys conducted in 1993 (TPWD), 1994 (TPWD), 1997 (TNC), and 2011 (Baer Engineering).

Big Sacaton Series Wetland Grasslands

The Big Sacaton series occupies relatively level, seasonally wet bottomlands adjacent to Sacatosa Creek. Ground cover is 100 percent with several layers, beginning with Spikesedge (*Eleocharis* spp) and Aparejo Muhly (*Muhlenbergia utilis*) covered by a thin layer of Stalkflower Heimia, and then overtopped with scattered individuals of Lindheimer's Muhly, Big Alkali Sacaton, and Switchgrass. A list of plants species observed in this community type is presented in **Table 5-4**.

Along Sacatosa Creek on the east side of the base as well as in the south CZ, a marshy zone dominated by grasses and sedges is representative of the Big Sacaton series. Although this low-lying area does not hold permanent standing water except in the creek itself and in a pool backed up by the road, the water table is just below the surface as indicated by the vegetation. In the south CZ, these grasslands have been severely overgrazed, and the creek channel is cutting down and widening due to erosion. At this site, tall grass species such as Big Alkali Sacaton (*Sporobolus wrightii*), Lindheimer's Muhly (*Muhlenbergia lindheimeri*), Switchgrass (*Panicum virgatum*), and Bush Bluestem (*Andropogon glomeratus*) have been extirpated. However, on the base property, the marshy grasslands are still fairly intact. The most imminent threat is the invasion of weedy species such as Bermuda Grass (*Cynodon dactylon*), Johnson Grass (*Sorghum halepense*), and Roosevelt Weed (*Baccharis neglecta*). In the south CZ and the eastern margin of the base, a rare plant, Longstalk Heimia (*Nesaea longipes*), sprawls over the tops of the low grasses and sedges. The Big Sacaton series may have also occupied the former marshy area of Zorro Creek. However, the impoundment of Zorro Creek has altered the marsh beyond recognition.

Table 5-4
Plant Species Observed in Big Sacaton Series Wetland Grasslands at Laughlin AFB

Woody Plants	
Baccharis neglecta	*Salix nigra*
Cephalanthus occidentalis	*Tamarix* spp.
Chlorocantha spinosa	
Grasses/Sedges	
Andropogon glomeratus	*Muhlenbergia utilis*
Cynodon dactylon	*Panicum virgatum*
Cyperus spp.	*Paspalum urvillei*
Eleocharis spp.	*Polypogon monspeliensis*
Juncus spp.	*Sorghum halepense*
Muhlenbergia lindheimeri	

Forbs	
Bacopa monnieri	*Nesaea longipes*
Conyza canadensis	*Phyla* spp.
Helianthus annuus	*Pluchea* spp.
Heliotropium curassavicum	*Samolus ebracteatus var. cuneatus*
Lythrum spp.	*Typha domingensis*

Note: Based on field surveys conducted in 1993 (TPWD), 1994 (TPWD), 1997 (TNC), and 2011 (Baer Engineering).

5.2.3 Turf and Landscaped Areas

Approximately 3,357 acres of Laughlin AFB are improved or semi-improved grounds, which require some periodic maintenance such as: mowing, irrigation, and xeriscaping. Predominant varieties of turf grasses observed within the developed areas of Laughlin AFB include (reference SLDP):

- Bermuda;
- St. Augustine;
- Lehmann Lovegrass; and
- King Ranch Bluestem.

Laughlin AFB completed an extensive Urban Forestry survey in 2001. Fifty-four genera and seventy-seven species of trees are represented on Laughlin AFB. The following seven species comprise 70 percent of the tree population on the installation:

- Arizona Ash (*Fraxinus velutina*);
- Live Oak (*Quercus virginiana*);
- Red Oak (*Quercus shumardii*);
- Mesquite (*Prosopis glandulosa*);
- Crape Myrtle (*Lagerstroemia indica*);
- Cedar Elm (*Ulmus crassifolia*); and
- Afghan Pine (*Pinus brutia* var. *eldarica*).

Ten percent of the trees surveyed were fully mature trees greater than 24 inches in diameter and thirty-three percent of the trees were labeled as maturing, with a diameter between 6-24 inches. Young trees, having trunks that are less than six inches in diameter, represented 57 percent of the population. In the intervening years, Laughlin AFB has experienced a drought and severe weather events, many young trees have been planted as part of continuing landscaping efforts. The general proportions of young and mature trees has since changed; the proportion of mature trees has decreased. The age distribution of trees on Laughlin AFB is still favorable. In the future, as fully mature trees naturally die, Laughlin AFB will not experience loss of natural cooling by trees and their associated aesthetic values. Laughlin AFB is committed to water conservation, therefore irrigation of tree and shrubs is limited to the xeriscape areas. For more information see the SLDP.

5.3 Fish and Wildlife

Laughlin AFB natural resources include a diversity of wildlife species. Two goals of wildlife management on Laughlin AFB are (1) to conserve functioning ecosystems that maintain viable native habitat resources, and (2) to encourage or enhance wildlife species in disturbed habitats.

Developing baseline species information, as well as conserving and enhancing the existing habitat, are effective management goals for maintaining biodiversity.

Records concerning vertebrate species occurring on Laughlin AFB were documented in previous studies commissioned by the 47 CES/CEIE, by the TPWD (1995), TNC (1999), and Baer Engineering and Environmental Consulting, Inc. (Baer Engineering) (2011). The TNC and Texas A&M University Institute of Renewable Natural Resources (TAMU-IRNR) conducted multiple reptile surveys from 2013-2017. These studies identified a variety of habitats located at Laughlin AFB, numerous mammal, avian, and reptilian species occurring on base. An all encompassing detailed list of the various fauna observed on the base is listed in **Table 5-5**.

Due to the general lack of suitable aquatic habitat, Laughlin AFB does not have any natural fish populations and amphibians are rare. Representatives of all other vertebrate classes are present.

Game species at Laughlin AFB include: White-tailed Deer (*Odocoileus virginianus*), Wild Turkey (*Meleagris gallopavo*), Collared Peccary (*Tayassu tajacu*), Northern Bobwhite (*Colinus virginianus*), Scaled Quail (*Callipepla squamata*), and Eastern Cottontail Rabbit (*Sylvilagus floridanus*). Laughlin AFB has an on-base hunting program which identifies suitable hunting areas and procedures for obtaining the proper permit(s).

Table 5-5
Animal Species Observed on Laughlin AFB During Several Survey Visits in 1993, 1994, 1997, 2011, 2013, 2014, 2015, 2016 and 2017

Scientific Name	Common Name
Birds	
Accipiter cooperii	Cooper's Hawk
Accipiter striatus	Sharp-shinned Hawk
Actitis macularius	Spotted Sandpiper
Agelaius phoeniceus	Red-winged Blackbird
Peucaea cassinii	Cassin's Sparrow
Aimophila ruficeps	Rufous-crowned Sparrow
Ammodramus leconteii	Le Conte's Sparrow
Ammodramus savannarum	Grasshopper Sparrow
Amphispiza bilineata	Black-throated Sparrow
Mereca americana	American Widgeon
Anas clypeata	Northern Shoveler
Anas crecca	Green-winged Teal
Spatula discors	Blue-winged Teal
Anas fulvigula	Mottled Duck
Anas platyrhynchos	Mallard
Anas strepera	Gadwall
Anthus rubescens	American Pipit
Anthus spragueii	Sprague's Pipit
Archilochus alexandri	Black-chinned Hummingbird
Ardea herodias	Great Blue Heron
Arremonops rufivirgatus	Olive Sparrow
Auriparus flaviceps	Verdin
Aythya americana	Redhead
Baeolophus atricristatus	Black-crested Titmouse

Scientific Name	Common Name
Birds (Continued)	
Bubo virginianus	Great Horned Owl
Bubulcus ibis	Cattle Egret
Buteo jamaicensis	Red-tailed Hawk
Buteo swainsoni	Swainson's Hawk
Butorides virescens	Green Heron
Calamospiza melanocorys	Lark Bunting
Calidris alba	Sanderling
Calidris himantopus	Stilt Sandpiper
Calidris mauri	Western Sandpiper
Calidris minutilla	Least Sandpiper
Campylorhynchus brunneicapillus	Cactus Wren
Caracara cheriway	Crested Caracara
Cardinalis cardinalis	Northern Cardinal
Cardinalis sinuatus	Pyrrhuloxia
Spinus psaltria	Lesser Goldfinch
Carpodacus mexicanus	House Finch
Ardea alba	Great Egret
Cathartes aura	Turkey Vulture
Chaetura pelagica	Chimney Swift
Charadrius vociferus	Killdeer
Chondestes grammacus	Lark Sparrow
Chordeiles acutipennis	Lesser Nighthawk
Chordeiles minor	Common Nighthawk
Circus cyaneus	Northern Harrier
Cistothorus palustris	Marsh Wren
Coccyzus americanus	Yellow-billed Cuckoo
Colaptes auratus	Northern Flicker
Colinus virginianus	Northern Bobwhite
Columba livia	Rock Pigeon
Columbina inca	Inca Dove
Columbina passerina	Common Ground-dove
Coragyps atratus	Black Vulture
Corvus brachyrhynchos	American Crow
Corvus cryptoleucus	Chihuahuan Raven
Crotophaga sulcirostris	Grooved-billed Ani
Dendrocygna autumnalis	Black-bellied Whistling Duck
Dendroica coronata	Yellow-rumped Warbler
Setophaga petechia	Yellow Warbler
Egretta caerula	Little Blue Heron
Egretta thula	Snowy Egret
Euphagus cyanocephalus	Brewer's Blackbird
Falco sparverius	American Kestrel
Fulica americana	American Coot
Gallinago gallinago	Common Snipe
Geococcyx californianus	Greater Roadrunner
Geothlypis trichas	Common Yellowthroat
Passerina caerulea	Blue Grosbeak

Scientific Name	Common Name
Birds (Continued)	
Himantopus mexicanus	Black-necked Stilt
Hirundo rustica	Barn Swallow
Icteria virens	Yellow-breasted Chat
Icterus bullockii	Bullock's Oriole
Icterus cucullatus cucullatus	Mexican Hooded Oriole
Icterus spurius	Orchard Oriole
Lanius ludovicianus	Loggerhead Shrike
Limnodromus scolopaceus	Long-billed Dowitcher
Megaceryle alcyon	Belted Kingfisher
Melanerpes aurifrons	Golden-fronted Woodpecker
Melanerpes carolinus	Red-bellied Woodpecker
Meleagris gallopavo	Wild Turkey
Melospiza georgiana	Swamp Sparrow
Melospiza lincolnii	Lincoln's Sparrow
Melospiza melodia	Song Sparrow
Mimus polyglottos	Northern Mockingbird
Molothrus aeneus	Bronzed Cowbird
Molothrus ater	Brown-headed Cowbird
Myiarchus cinerascens	Ash-throated Flycatcher
Myiarchus tyrannulus	Brown-crested Flycatcher
Nycticorax nycticorax	Black-crowned Night Heron
Oporornis tolmiei	MacGillivray's Warbler
Oxyura jamaicensis	Ruddy Duck
Setophaga americana	Northern Parula
Passer domesticus	House Sparrow
Passerculus sandwichensis	Savannah Sparrow
Passerina ciris	Painted Bunting
Passerina versicolor	Varied Bunting
Petrochelidon pyrrhonota	Cliff Swallow
Phalacrocorax auritus	Double-crested Cormorant
Phalaenoptilus nuttallii	Common Poorwill
Phalaropus tricolor	Wilson's Phalarope
Dryobates scalaris	Ladder-backed Woodpecker
Pipilo chlorurus	Green-tailed Towhee
Meozone fuscus	Canyon Towhee
Pipilo maculatus	Spotted Towhee
Piranga rubra	Summer Tanager
Pitangus sulphuratus	Great Kiskadee
Plegadis chihi	White-faced Ibis
Podilymbus podiceps	Pied-billed Grebe
Poecile carolinensis	Carolina Chickadee
Polioptila caerulea	Blue-gray Gnatcatcher
Polioptila melanura	Black-tailed Gnatcatcher
Pooecetes gramineus	Vesper Sparrow
Pipilo erythrophthalmus	Eastern Towhee
Progne subis	Purple Martin
Pyrocephalus rubinus	Vermilion Flycatcher

Scientific Name	Common Name
Birds (Continued)	
Quiscalus mexicanus	Great-tailed Grackle
Regulus calendula	Ruby-crowned Kinglet
Sayornis phoebe	Eastern Phoebe
Spinus tristis	American Goldfinch
Spizella pallida	Clay-colored Sparrow
Spizella passerina	Chipping Sparrow
Spizella pusilla	Field Sparrow
Sturnella magna	Eastern Meadowlark
Sturnus vulgaris	European Starling
Tachybaptus dominicus	Least Grebe
Thryomanes bewickii	Bewick's Wren
Thryothorus ludovicianus	Carolina Wren
Toxostoma curvirostre	Curved-billed Thrasher
Toxostoma longirostre	Long-billed Thrasher
Tringa flavipes	Lesser Yellowlegs
Tringa melanoleuca	Greater Yellowlegs
Tringa solitaria	Solitary Sandpiper
Troglodytes aedon	House Wren
Tyrannus couchii	Couch's Kingbird
Tyrannus forficatus	Scissor-tailed Flycatcher
Tyrannus verticalis	Western Kingbird
Vireo atricapilla	Black-capped Vireo
Vireo bellii	Bell's Vireo
Vireo griseus	White-eyed Vireo
Vireo huttoni	Hutton's Vireo
Cardellina pusilla	Wilson's Warbler
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Zenaida asiatica	White-winged Dove
Zenaida macroura	Mourning Dove
Zonotrichia albicollis	White-throated Sparrow
Zonotrichia leucophrys	White-crowned Sparrow
Mammals	
Antrozous pallidus	Pallid Bat
Corynorhinus townsendii	Townsend’s Big-eared Bat
Dasupus novemcinctus	Nine-banded Armadillo
Didelphis virginiana	Virginia Opossum
Eptesicus fuscus	Big Brown Bat
Eumops perotis	Western Mastiff Bat
Felis silvestris catus	House Cat
Lasionycteris noctivagans	Silver haired Bat
Lasiurus borealis	Eastern Red Bat
Lasiurus cinereus	Hoary Bat
Lepus californicus	Black-tailed Jackrabbit
Mephitis mephitis	Striped Skunk
Myocastor coypus	Nutria
Myotis velifer	Cave Myotis
Myotis yumanensis	Yuma Myotis

Neotoma floridana	Eastern Woodrat
Odocoileus virginianus	White-tailed Deer
Parastrellus hesperus	Canyon Bat
Perimyotis subflavus	Tri-colored Bat
Sciurus niger	Eastern Fox Squirrel
Sigmodon hispidus	Hispid Cotton Rat
Ictidomys mexicanus	Mexican Ground Squirrel
Sylvilagus audubonii	Desert Cottontail
Sylvilagus floridanus	Eastern Cottontail
Reptiles	
Scientific Name	**Common Name**
Reptiles (Continued)	
Acris blanchardi	Blanchard's Cricket Frog
Anaxyrus deilis	Green Toad
Apalone spiniferus emoryi	Texas Spiny Softshell
Aspidoscelis gularis gularis	Texas Spotted Whiptail
Aspidoscelis sexlineata	Six-lined Racerunner
Coleonyx brevis	Texas Banded Gecko
Cophosaurus texanus	Texas Earless Lizard
Crotalus atrox	Western Diamondback Rattlesnake
Drymarchon melanurus	Texas Indigo Snake
Gastrophryne olivacea	Great Plains Narrowmouth Toad
Gopherus berlandieri	Texas Tortoise
Holbrookia lacerate	Spot-tailed Earless Lizard
Hypsiglena jani	Chihuahuan Night Snake
Incilius nebulifer	Gulf Coast Toad
Kinosternon flavescens flavescens	Yellow Mud Turtle
Lithobates berlandieri	Rio Grande Leopard Frog
Masticophis flagellum testaceus	Western Coachwhip
Masticophis schotti	Schott's Whipsnake
Nerodia rhombifer rhombifer	Diamondback Water Snake
Phrynosoma cornutum	Texas Horned Lizard
Pituophis catenifer	Gopher Snake
Pseudemys gorzugi	Rio Grande Cooter
Rena dulcis	Texas Blind Snake
Rhinocheilus lecontei	Long-Nosed Snake
Salvadoa grahamiae	Eastern Patch-Nosed Snake
Sceloporus olivaceus	Texas spiny lizard
Scincella lateralis	Little Brown Skink
Sonora semiannulata	Ground Snake
Tantilla nigriceps	Plains Black-headed Snake
Thamnophis marcianus	Checkered Garter Snake
Thamnophis proximus rubrilineatus	Redstriped Ribbon Snake
Trachemys scripta elegans	Red-eared Slider

Note: Based on field surveys conducted in 1993 (TPWD), 1994 (TPWD), 1997 (TNC), and 2011 (Baer Engineering). TNC & TAMU conducted Spot Tailed Earless Lizard and reptile surveys in 2013, 2014, 2015, 2016, & 2017. TAMU conducted Black Capped Vireo Survey 2014.

5.4 Threatened and Endangered Species

The ESA, Title 16 USC, Sections 1531-1544, requires protection and conservation of federal listed threatened and endangered species (TES) and their habitats. ESA was established to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved. The ESA requires that all federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities to further the purpose of the ESA.

According to AFI 32-7064, installations known to sustain federal listed TES or their habitats must address how these species and their habitats will be conserved in the INRMP. The INRMP goals and objectives must provide an overall ecosystem management strategy for the protection and recovery of TES. When practical, provide similar protection to plants and animals that are federal listed candidate species.

Although not required by the ESA, the INRMP provides similar conservation measures for species protected by state law when such protection is not in direct conflict with military mission. When conflicts occur, consultation with the TPWD to determine the appropriate conservation measures to mitigate impacts is required. Texas state law prohibits any take (incidental or otherwise) of state listed species. Laws and regulations pertaining to state listed endangered or threatened animals are contained in Chapters 67 and 68 of the TPWD Code. Laws pertaining to threatened or endangered plants are contained in Chapter 88.

Currently, the USFWS has the following statistics for species in Texas:

- 44 endangered and 109 threatened animal species; and
- 24 endangered and six threatened plant species.

The TPWD's *Federal and State Listed Species in Texas* provides a federal list of TES in Texas. The TPWD's *Rare, Threatened, and Endangered Species of Texas by County Database* contains county-level information for species of special concern in the state. Brief information about the habitat of a species and regulatory listing status is included. The database is structured to allow the user to query a county and obtain a federal and state listed TES for a particular county. A list was generated from the TPWD's database for TES in Val Verde County, Texas, **Table 5-6**. Whenever practicable within the constraints of the military mission, impacts to the species listed in **Table 5-6** will be avoided and minimized and their habitats will be managed.

Table 5-6
Federal and State listed Threatened and Endangered Species for Val Verde County, Texas

Species Common Name (Scientific name)	Species Scientific Name	Federally Listed	State Listed	Observed on Laughlin AFB
Peregrine Falcon	*(Falco peregrinus)*	Delisted	Endangered	

Common Black-hawk	*(Buteogallus anthracinus)*		Threatened	
Interior Least Tern	*(Sterna antillarum athalassos)*	Endangered	Endangered	
Brown Pelican	*Pelecanus occidentalis)*	Recovery		
Zone-tailed Hawk	*(Buteo albonotatus)*		Threatened	
Blotched Gambusia	*(Gambusia senilis)*		Threatened	
Blue Sucker	*(Cycleptus elongates)*		Threatened	
Conchos Pupfish	*(Cyprinodon eximius)*		Threatened	
Devils River Minnow	*(Dionda diaboli)*	Threatened	Threatened	
Pecos Pupfish	*(Cyprinodon pecosensis)*		Threatened	
Proserpine Shiner	*(Cyprinella proserpina)*		Threatened	
Rio Grande Darter	*(Etheostoma grahami)*		Threatened	
Rio Grande Silvery Minnow	*(Hybognathus amarus)*	Endangered	Endangered	
San Felipe Gambusia	*(Gambusia clarkhubbsi)*		Threatened	
Black Bear[1]	*(Ursus americanus)*		Threatened	
Gray Wolf	*(Canis lupus)*	Endangered	Endangered	
Ocelot	*(Leopardus pardalis)*	Endangered	Endangered	
White-nosed Coati	*(Nasua narica)*		Threatened	
Mexican Fawnsfoot Mussel	*(Truncilla cognata)*		Threatened	
Salina Mucket	*(Potamilus metnecktayi)*		Threatened	
Texas Hornshell	*(Popenaias popeii)*	Endangered	Endangered	
Reticulated Collared Lizard	*(Crotaphytus reticulatus)*		Threatened	
Species Common Name (Scientific name)	**Species Scientific Name**	**Federally Listed**	**State Listed**	**Observed on Laughlin AFB**
Texas Horned Lizard	*(Phrynosoma cornutum)*		Threatened	X
Texas Indigo Snake	*(Drymarchon melanurus erebennus)*		Threatened	X
Texas Tortoise	*(Gopherus berlandieri)*		Threatened	X

Trans-pecos Black-headed Snake	*(Tantilla cucullata)*		Threatened	
Texas Snowbells	*(Styrax platanifolius texanus)*	Endangered	Endangered	
Tobusch Fishhook Cactus	*(Sclerocactus brevihamatus ssp*	Threatened	Endangered	

Notes: 1. Similar Appearance – Status due to Black Bear appearing similar to the Louisiana Black Bear which is threatened.
Source: TPWD, Wildlife Division, Diversity and Habitat Assessment Programs. County Lists of Texas' Special Species. Val Verde County, Revised 2/28/2011.Frequent updates are made to the County lists. Please refer to the TPWD web site for the most current list at: *http://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/listed-species/*

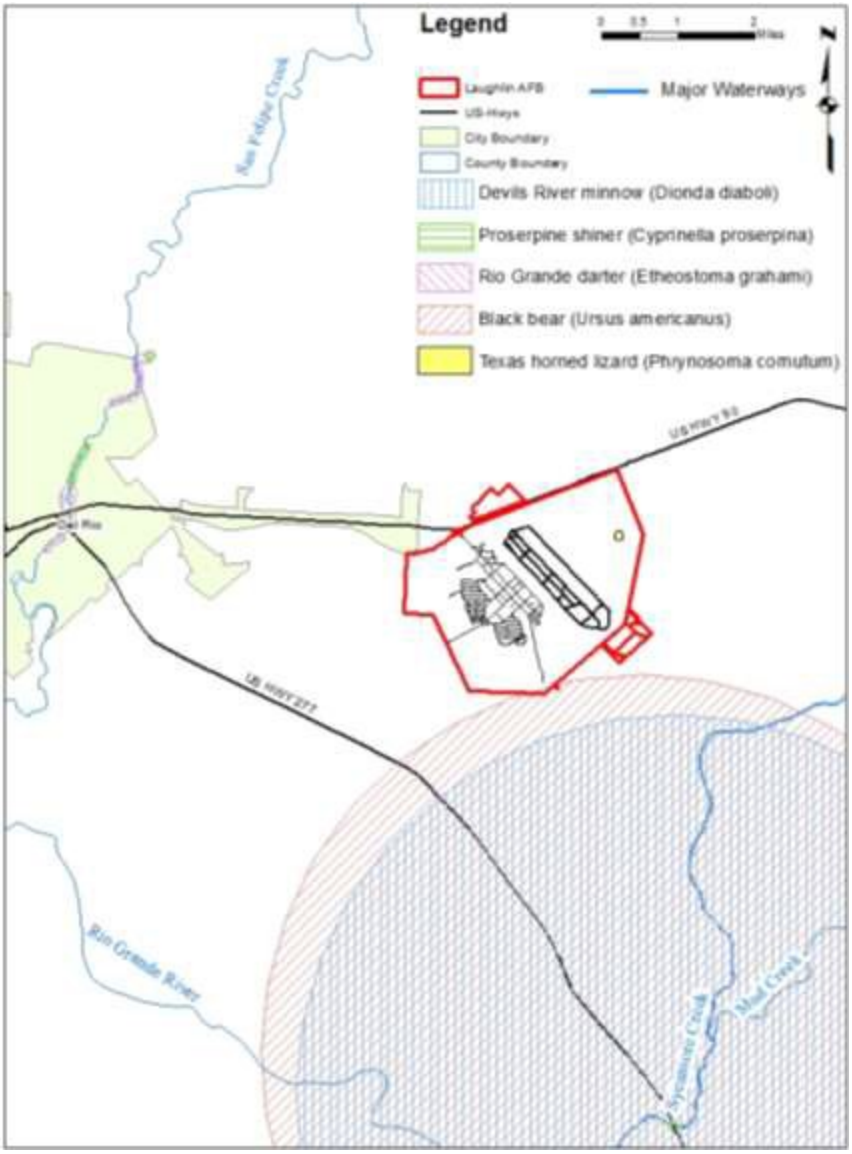
TPWD maintains a second database which tracks occurrence records for federal and state listed TES. This database, named the *Texas Natural Diversity Database* (TNDD), was searched for records documenting TES occurrences in Val Verde County. The TXNDD contains records for TES on or within six miles of Laughlin AFB, **Table 5-7**. TXNDD can be updated continuously by contacting TexasNatural.DiveristyDatabase@tpwd.texas.gov. Most of the occurrence records occur within the San Felipe and Sycamore Creek areas as shown in **Figure 5-1**.

Table 5-7

Summary of Occurrence Records for Threatened and Endangered Species on or within Six Miles of Laughlin AFB

Species	General Notes on Observation	Proximity to Laughlin AFB	Date Last Observed at this location
Devils River Minnow	Area was mapped as critical habitat in 1978	5.2 miles west in San Felipe Creek on Lowe Ranch	1989
Devils River Minnow	Specimen collected in 1989 but absent in 2002	5.8 miles south in Sycamore Creek at U.S. Highway 277 crossing	1989
Proserpine Shiner	Approximately 200 fish of this species seined here in 1979	5.2 miles west in San Felipe Creek on Lowe Ranch	1979
Proserpine Shiner	Seven specimens collected	5.8 miles south in Sycamore Creek at U.S. Highway 277 crossing	1990
Proserpine Shiner	Two specimens collected	4.6 miles west in Hinds Spring, a tributary to San Felipe Creek	1990
Rio Grande Darter	Ten specimens collected in 1990	5.2 miles west in San Felipe Creek on Lowe Ranch	1990
Texas Horned Lizard	1 Specimen captured and released	Northwest sector of Laughlin AFB, on natural trail near cultural sites.	2018
Black Bear	Specimen trapped in the City of Del Rio and relocated	4.5 miles south Laughlin AFB	2011

Source: TPWD's TNDD.



Source: TPWD's NDD

Figure 5-1
Approximate Locations for Threatened and Endangered Species Occurrences

5.4.1 Migratory Bird and Raptor Species

According to the USFWS and the TPWD, four listed avian species have potential to reside in Val Verde County. One specie, the Interior Least Tern, is federal listed as endangered. Three species, Peregrine Falcon, Common Black-hawk, and Zone-tailed Hawk are state listed as threatened. The following are general habitat associations and life-history accounts for these species, an assessment of the likely occurrence of this species on Laughlin AFB, and current management needs.

Interior Least Tern

Interior Least Terns (*Sterna antillarum athalassos*) are the smallest North American terns. Adults average eight to ten inches in length, with a 20 inch wingspan. Breeding adults have a black cap

and coral stripe that contrasts with the white forehead. Remainder of upper parts is gray and under parts is white. The outer two primaries are black and the yellow to orange bill has a striking dark tip.

This species nests on relatively open beaches and islands kept free of vegetation by natural scouring from tidal or river action. The bird prefers open habitat, and tends to avoid thick vegetation and narrow beaches. Sand and gravel bars within a wide unobstructed river channel or open flats along shorelines of lakes and reservoirs, provide favorable nesting habitat. For feeding, this species needs shallow water like lakes, ponds, and rivers preferably close to nesting areas and with an abundance of small fish (Thompson et al. 1997). Although widespread and common in places, its favored nesting habitat is prized for human recreation, residential development, and alteration by water diversions. These activities interfere with successful nesting in many areas.

The Interior Least Tern breeds inland along the Missouri, Mississippi, Colorado, Arkansas, Red, and Rio Grande River systems. In Texas, this species breeds on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, along the Red River into Arkansas, and at three reservoirs (including Amistad Reservoir) along the Rio Grande River (Sidle et al 1988).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. A breeding population does exist within the Amistad Reservoir, 12 miles west. The mission objectives for Laughlin AFB should not affect this population.

Peregrine Falcon

A medium to large falcon, Peregrine Falcons are 14.2 to 22.8 inches long, have a wingspan of 39 to 42 inches; and, females are slightly larger than males (Campbell 2003). Adult Peregrines are bluish–gray above with a black crown and nape; with a variable-width black facial stripe extending from the crown down below the eye. The throat and under parts are white to shades of buff, with a variable amount of black barring. Barred pale gray and black appear under both the wing and tail. The ends of the tail feathers are tipped in light yellow-brown. The beak is slate blue, the legs and feet are yellow, and the talons are blue-black.

Immature birds have a dark brown head and neck with sandy streaking. The upper parts are dark brown with light amber-brown feather edging. They are white to sandy underneath and heavily marked with dark brown vertical streaks. The legs and feet are bluish-gray to greenish-yellow.

Peregrine Falcons prefer hunting in meadows, river bottoms, croplands, marshes, and lakes. They capture a wide variety of prey including blackbirds, jays, swifts, doves, shorebirds, and songbirds (White et al. 2002). Peregrine Falcons nest on cliffs, and when breeding the pair will hunt together, with one bird flushing prey for the other to capture. A clutch of three to four eggs is typically laid in April and incubation lasts between 29 and 32 days. Hatched young are fed and cared for by both adults for 35 to 42 days, and upon fledging, the offspring are continually cared for by the adults for several weeks (Ehrlich et al. 1988). The average life expectancy is four years, although maximum life spans of 13 to 17 years have been recorded (White et al. 2002).

In Texas, this species is primarily found in the Trans-Pecos region, including Big Bend National Park, and Chisos, Davis, and Guadalupe mountain ranges. Although most populations in the

U.S. now appear to be producing chicks at a healthy rate, falcons in west Texas are still reproducing at a relatively low level. There is a concern that high pesticide levels continue to affect Peregrine Falcon reproduction in west Texas. This species is not expected to nest in Val Verde County, but may winter along the Rio Grande and migrate through the county each spring and fall (Campbell 2003). The winter range for this species is extremely variable and may occupy open-relief habitat devoid of cliffs, coastal or wetland areas, and major river valleys and lake shores, such as the Rio Grande River and Lake Amistad.

This species, along with other birds of prey and some marine birds, was greatly harmed by the widespread use of persistent chemicals that lowered reproduction and survival rates. The decline of this species started in the 1940's, coinciding with the introduction of the synthetic pesticide dichlorodiphenyltrichloroethane (DDT) in 1947. By 1970, the species was federally protected in the U.S. and DDT was virtually banned in North America by 1972 (White et al. 2002). Since then Peregrines have made a strong recovery, aided in part by restorative management.

Needs and Assessment

No breeding habitat exists on Laughlin AFB for this species. This species may winter south of the base and migrate through the area during spring and fall. Laughlin AFB should conduct avian surveys in all seasons to determine which species utilize the base throughout the year. Data collected during these surveys will help determine resident, breeding, and migratory populations.

Common Black-hawk

Adult Common Black-hawks (*Buteogallus anthracinus*) measure between 16.9 and 22 inches in length. Adult plumage is described as black with grayish bloom. Wings are broad with the inner webs of primaries and secondaries usually mottled gray to buffy brown. Tail is black with an unmistakable median band 1-3 inches wide.

An obligate riparian nester in southwestern U.S., the Common Black-hawk favors remote, mature gallery forest corridors along perennial streams with deep riffles, low perches, and low branches. In Texas, a small remnant population in Jeff Davis County comprises only regular nesters. Summer visitors are present in the Lower Rio Grande Valley, Texas (Schnell 1994). A nesting attempt was recorded in Val Verde County by Lasley and Sexton in 1988.

Currently, the greatest threat posed to the Common Black-hawk is the clearing or alteration of riparian habitat, water diversion for irrigation and storage, diking and damming for flood control, lowering of water table by pumping, and livestock grazing. These activities eliminate the regenerative seedlings required for a stable riparian habitat (Schnell 1994).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. This species may summer along the Rio Grande River. Laughlin AFB should continue to monitor bird populations, especially large raptor species near the airfield, as directed in the BASH plan, and throughout the base.

Zone-tailed Hawk

Zone-tailed Hawk (*Buteo albonotatus*) adults range in length between 17.7 and 22 inches. The overall bird coloring is slate black with a faint brownish cast. The under-wing area is two-toned with black wing-linings and pale flight feathers that are light gray with fine, dusky banding and a broad, dark trailing edge. The tail has two or three light tail-bands and the legs are bright yellow.

Habitat preferences for this species are poorly understood. This species is documented to breed in a variety of habitats from wet forests to dry, open scrub and deciduous forests, and mountainous terrain to coastal plains (Johnson et al. 2000). In Texas, this species is documented to breed from the Big Bend region north to Davis Mountains (Matteson and Riley 1981, Rappole and Blacklock 1994) and east to Real and Kerr counties (Snyder and Glinski 1988). Little information is known about the migratory patterns and winter range of this species.

Negative impacts on this population include direct shooting in rural southwest U.S. (Palmer 1988) and degradation of suitable nesting habitat by agricultural and development activities (Dobyns 1981). Currently, this species is listed as threatened by TPWD. The species is not federal listed which may change considering how few breed within the U.S. This species is considered a sensitive species in the U.S. due to its use of riparian habitats for nesting and foraging (Johnson et al. 1987).

Needs and Assessment

Several records for Zone-tailed Hawk in Val Verde County exist. The majority of the sightings are along Devils River. Since little is known about preferred habitat for this rare species, Laughlin AFB monitors airfield bird populations during regular United States Department of Agriculture (USDA) biologist patrols of the airfield, especially large raptor species, as directed in the BASH plan, and throughout the base.

5.4.2 Fish Species

According to the USFWS and the TPWD, nine listed fish species have potential to reside in Val Verde County. One species, the Rio Grande Silvery Minnow, (*Hybognathus amarus*) is federal and state listed as endangered. Two species, Devils River Minnow (*Dionda diaboli*) and San Felipe Gambusia (*Gambusia clarkhubbsi*) are federal and state listed as threatened. The remaining six species, Blotched Gambusia, (*Gambusia senilis*) Blue Sucker (*Cycleptus elongates*), Conchos Pupfish (*Cyprinodon eximius*), Pecos Pupfish (*Cyprinodon pecosensis*), Proserpine Shiner, (*Cyprinella proserpina*) and Rio Grande Darter (*Etheostoma grahami*) are state listed as threatened. The following are general habitat associations and life-history accounts for these species, an assessment of the likely occurrence of this species on Laughlin AFB, and current management needs.

Rio Grande Silvery Minnow

The Rio Grande Silvery Minnow (*Hybognathus amarus)* is extirpated from Texas. Historically, this species occurred in the Rio Grande and Pecos River systems and canals. Rio Grande Silvery Minnow prefers pools and backwaters of medium to large streams with low or moderate gradient in mud, sand, or gravel bottoms (Campbell 2003). Individuals feed on mud and bottom material for algae and other organic matter.

Needs and Assessment

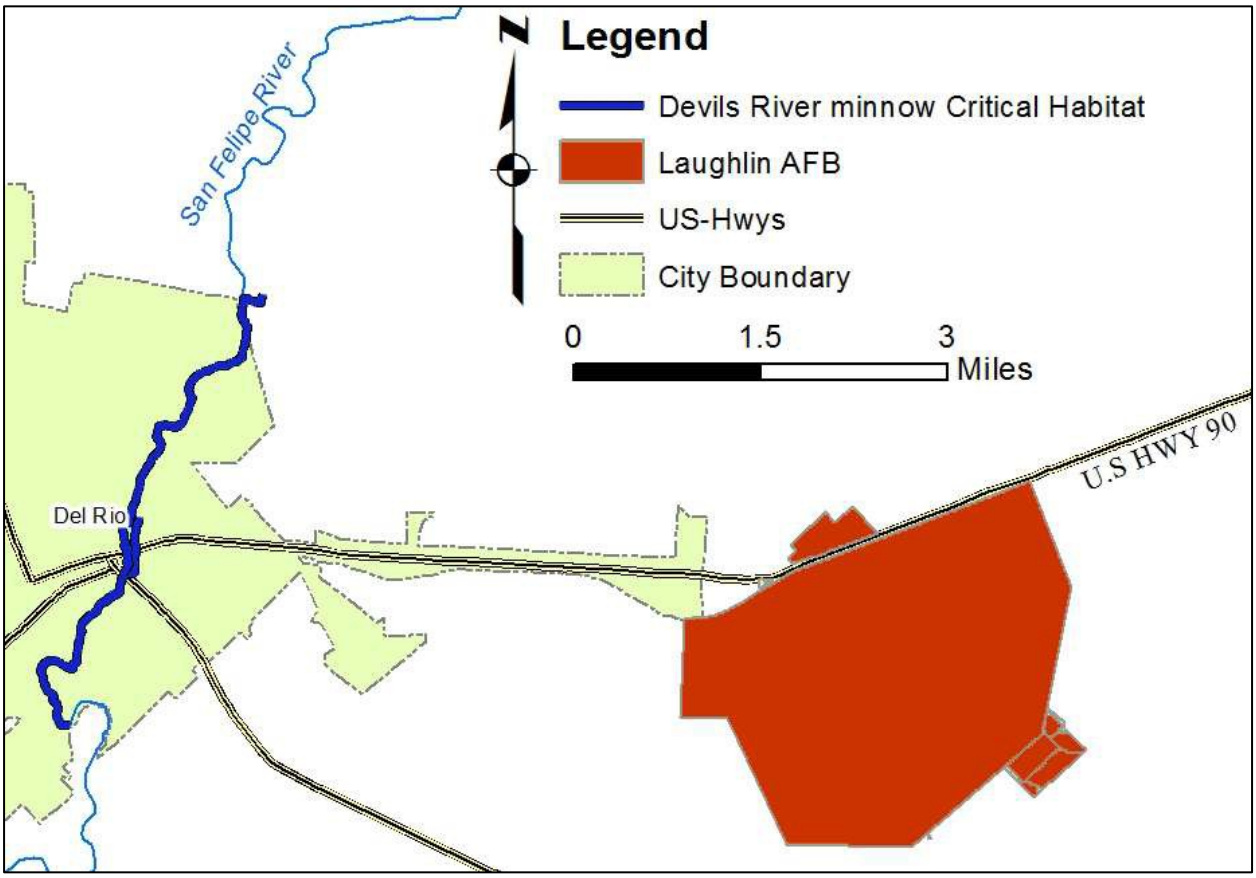
This species has been extirpated from Texas and potential habitat for this species does not exist on Laughlin AFB; therefore, no additional management for these species is necessary.

Devils River Minnow

The Devils River Minnow (*Dionda diabolic*) prefers rocky runs and flowing pools of spring-fed rivers and creeks. This species is known to occur in the Devils River and San Felipe, Sycamore,

Pinto, and Las Moras Creeks (Campbell 2003). The primary cause for this species' decline is believed to be reduction of water flow (Garrett et al. 1992). The reduction in water flow has increased water temperatures, particularly downstream or at a distance away from source springs. The elevated water temperatures restrict this species range and likely alter this species behavior. The Devils River Minnow (*Dionda diaboli*) is most at risk throughout its range during summer when temperatures of water away from the spring increase.

In 2008, the USFWS designated critical habitat for the Devils River Minnow (Dionda diaboli) along San Felipe Creek, see **Figure 5-2** (USFWS 2008). In addition, this species was observed and collected from San Felipe and Sycamore Creeks in 1989, **Table 5-7** and **Figure 5-1**.



Source: USFWS 2008

Figure 5-2
USFWS Designated Critical Habitat for the Devils River Minnow in Val Verde County, Texas.

Laughlin AFB currently purchases water from the City of Del Rio. The City pumps water from the San Felipe Creek upstream from the designated critical habitat for the Devils River Minnow. During discussions with USFWS staff, additional information about the monthly water levels of the San Felipe, the hydrology, quantity of water diverted by the City, and quantity consumed by Laughlin AFB was requested. A preliminary review of this data is presented below.

Base flow for the San Felipe Creek from 1961 to 2007 was presented in the City of Del Rio Water Conservation and Drought Contingency Study, Supplement–Drought & Water Emergency Plan Revisions, **Figure 5-3** (City of Del Rio 2009). Since 1970, base flow has dropped below 40 million

gallons per day once. This was for a period of 72 days in the summer months of 1996.

Based on annual water production data from 2003 to 2008, the City of Del Rio diverts between 7.3 and 9.7 million gallons per day (City of Del Rio 2008) from the San Felipe Creek. In 2010, Laughlin AFB purchased an average of 0.7 million gallons per day from the City of Del Rio, a fraction of the water diverted.

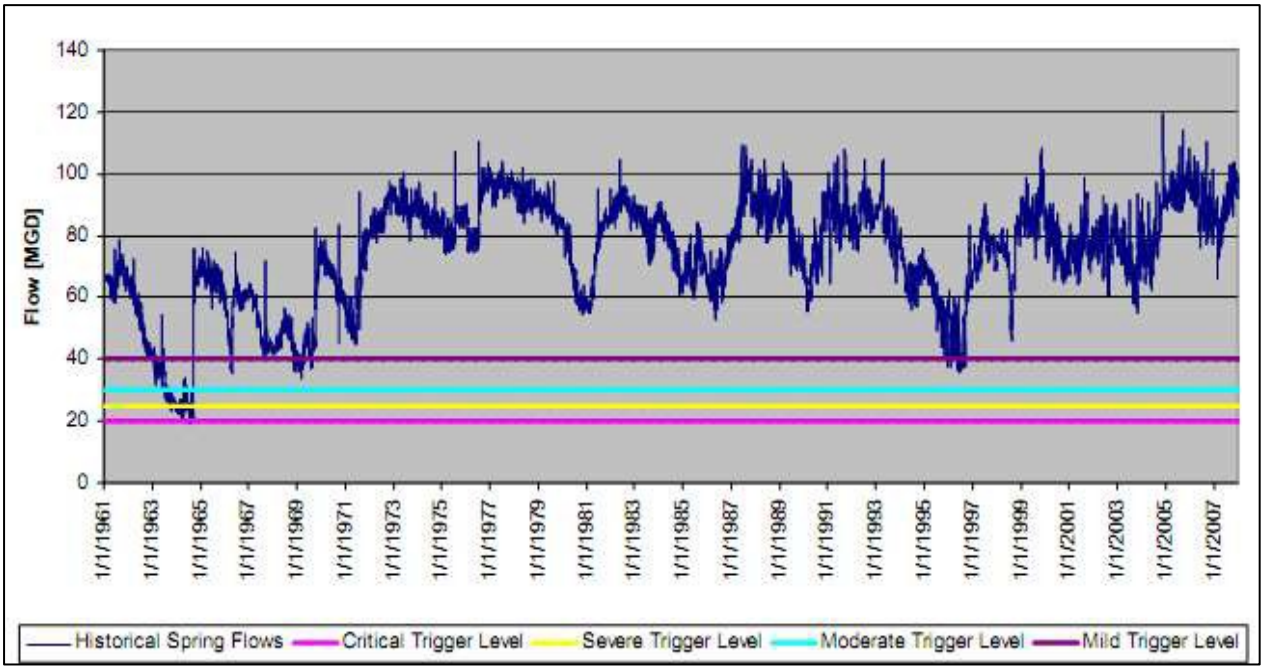


Figure 5-3
Historical Base Flows from the San Felipe Spring Needs and Assessment

Needs and Assessment

A biological assessment on the Devils River Minnow needs to be completed for Laughlin AFB regarding obtaining water from the City of Del Rio. The results of this assessment will determine if conservation measures could be implemented.

San Felipe Gambusia

This species is found only in San Felipe Creek (Garrett and Edwards 2003). The San Felipe Gambusia prefers quiet water habitat in close association to areas with significant spring flows.

Needs and Assessment

A biological assessment on the San Felipe Gambusia needs to be completed for Laughlin AFB regarding obtaining water from the City of Del Rio. The results of this assessment will determine if conservation measures could be implemented.

Blotched Gambusia

This species is believed to be extirpated from the state. This species was formerly known to occur in springs and vegetated quiet pools of the Devils River.

Needs and Assessment

This species has been extirpated from Texas and potential habitat for this species does not exist on Laughlin AFB; therefore, no additional management for this species is necessary.

Blue Sucker

This species occurs in larger portions of major rivers in Texas, typically in channels and flowing pools with moderate current. Channel substrates are usually of exposed bedrock, perhaps in combination with hard clay, sand, and gravel. Adults winter in deep pools and move upstream in spring to spawn in riffles.

Needs and Assessment

Potential habitat for this fish species does not exist on Laughlin AFB. Spring fed, large, perennial natural creeks are not present at Laughlin AFB; therefore, no additional management for this species is necessary.

Conchos Pupfish

This species is known to occur in the Rio Grande and Devils River basins in sloughs, backwaters, and margins of larger streams or channels of creeks.

Needs and Assessment

Potential habitat for this fish species does not exist on Laughlin AFB. Spring fed, large, perennial natural creeks are not present at Laughlin AFB; therefore, no additional management for this species is necessary.

Pecos Pupfish

This species originally occurred in Pecos River basin, but is presently restricted to the upper basin only. Pecos pupfish prefer the shallow margins of clear vegetated spring waters with high calcium carbonate.

Needs and Assessment

Potential habitat for this fish species does not exist on Laughlin AFB. Spring fed, large, perennial natural creeks are not present at Laughlin AFB; therefore, no additional management for this species is necessary.

Proserpine Shiner

This species occurs in the Rio Grande and lower Pecos River basins and prefers gravel and rubble riffles of creeks and small rivers. This species was recorded in the San Felipe Creek in 1979 and 1990; and in Sycamore Creek in 1990, **Table 5-6** and **Figure 5-1**. Proserpine Shiners are known to spawn in the winter.

Needs and Assessment

Obtaining water from the City of Del Rio may negatively impact the flow of the San Felipe Creek. This species is known to occur within the San Felipe Creek and additional information on Laughlin AFB's indirect impact on this species is warranted.

Rio Grande Darter

This species occurs in the Rio Grande and lower Pecos River basins and prefers gravel and rubble riffles of creeks and small rivers. This species was recorded in the San Felipe Creek in 1990, **Table 5-6** and **Figure 5-1**. The Rio Grande Darter spawns in the winter.

Needs and Assessment

Obtaining water from the City of Del Rio may negatively impact the flow of the San Felipe Creek. This species is known to occur within the San Felipe Creek and additional information on Laughlin AFB's indirect impact on this species is warranted.

5.4.3 Mammal Species

According to the USFWS and the TPWD, four listed mammalian species have potential to reside in Val Verde County. Two species, the Gray Wolf and Ocelot, are federal and state listed as endangered. The Black Bear and the White-nose Coati are state listed as threatened. The following are general habitat associations and life-history accounts for these species, an assessment of the likely occurrence of this species on Laughlin AFB, and current management needs.

Gray Wolf

This species has been extirpated from Texas and natural populations are not likely to return. Reintroductions to Big Bend National Park have been discussed. In 2016 the NRM contacted the NPS (David Larson and Raymond Skiles) at Big Bend National Park, and the park is not one of the identified long-term reintroduction areas of this species. The gray wolf formerly occurred within the western two-thirds of the state in forests, brushlands, and grasslands.

Needs and Assessment

The last authenticated reports of Gray Wolves in Texas occurred in 1970 (Schmidly 2004). Since this species no longer exists within Texas, mission objectives will not have an impact on this species and no additional management is necessary.

Ocelot

This species prefers dense chaparral thickets of mesquite scrub and live oak mottes and typically avoids open areas. Once ranged over southern Texas with occasional records from north and central Texas, the Ocelot is now restricted to several isolated patches of suitable habitat in three or four counties of the Rio Grande Plains (Schmidly 2004).

In 1998, TNC performed a helicopter flyover of the base and surrounding area searching for Ocelot habitat and densely vegetated drainages that may provide a corridor between the Rio Grande River and Laughlin AFB (TNC 1999). The results of the helicopter flight revealed that the creek drainages near Laughlin AFB lacked extensive vegetation cover, and in the region along the Rio Grande River no Ocelot habitat existed (TNC 1999). No extensive patches of habitat exist

that can support even a single Ocelot on Laughlin AFB (TNC 1999). The minimum brush patch size with the potential to support Ocelots is considered 100 acres or two adjacent patches of 75 acres or more (Tewes and Everett 1982).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. Additionally, no habitat corridors exist that might provide travel lanes for dispersing individuals. Therefore, mission objectives will not have an impact on this species and no additional management is necessary.

Black Bear

This species occupies bottomland hardwoods and large tracts of inaccessible forested areas. Black Bear populations in Mexico have increased from previously endangered levels to one of the highest densities in North America because of landowner initiatives and encouragement from the Mexican government (Schmidly 2004). Bear populations are now spilling over into the Big Bend region and other areas of west and southwest Texas. Sightings of Black Bear in Val Verde County occurred in 1988 south of Laughlin AFB and in 2008 and 2011 in the City of Del Rio. Black bear activity in the Hill Country and South Texas along the Rio Grande from Del Rio to below Laredo is increasing, according to TPWD biologists 2012. Most recent sighting in Val Verde was 3 November 2015. The TPWD lists the Black Bear as threatened in Texas. The USFWS list the Louisiana subspecies (*Ursus americanus luteolus*) as threatened and designates the entire species as threatened, by similarity of appearance to the threatened taxon.

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. However, this species' diet is extremely varied and individuals are sometimes drawn to urban areas to obtain food from trash cans and dumpsters. To help protect against attracting Black Bears on Laughlin AFB, trash should be properly disposed of, especially within wooded habitats. Mission objectives should not have an impact on this species.

White-nosed Coati

This species prefers woodlands, riparian corridors and canyons. Coati's are diurnal and crepuscular and forage on the ground and in trees. Most recent sightings have occurred along the Rio Grande River. The Coati population is likely impacted by degradation and loss of much of the riparian woodland habitat in south and west Texas. These animals require a sizeable habitat to maintain a viable population (Schmidly 2004).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB, therefore, mission objectives will not have an impact on this species and no additional management is necessary.

5.4.4 Mollusk Species

According to the USFWS and the TPWD, four listed mollusk species have potential to reside in Val Verde County. One species, the Texas Hornshell, is a Federal candidate species for listing and currently state listed as threatened. The remaining two species, Mexican Fawnsfoot Mussel

and Salina Mucket, are state listed as threatened. The following are brief habitat associations for these species, an assessment of the likely occurrence of this species on Laughlin AFB, and current management needs.

Texas Hornshell

This species is endemic to the Rio Grande Basin and several rivers of Mexico. Preferred habitat for the Texas Hornshell includes both ends of narrow shallow runs over bedrock, in areas where small-grained materials collect in crevices, along river banks, and at the base of boulders. This species is not known to occur in impoundments.

Needs and Assessment

Potential habitat for these mollusk species does not exist on Laughlin AFB. Perennial natural creek or ponds are not present at Laughlin AFB; therefore, no additional management for these species is necessary.

Mexican Fawnsfoot Mussel

Life history of this species is largely unknown. Species may be intolerant of impoundments and prefers flowing streams and rivers with sand or gravel bottoms. Species is endemic to the Rio Grande basin.

Needs and Assessment

Potential habitat for these mollusk species does not exist on Laughlin AFB. Perennial natural creek or ponds are not present at Laughlin AFB; therefore, no additional management for these species is necessary.

Salina Mucket

Species prefers lotic waters and soft sediment along river banks. Other habitat requirements are poorly understood. Salina Mucket is restricted to the Rio Grande basin.

Needs and Assessment

Potential habitat for these mollusk species does not exist on Laughlin AFB. Perennial natural creek or ponds are not present at Laughlin AFB; therefore, no additional management for these species is necessary.

5.4.5 Reptile Species

According to the TPWD, five listed reptilian species have potential to reside in Val Verde County. The five species, the Reticulated Collared Lizard, Texas Horned Lizard, Texas Indigo Snake, Texas Tortoise, and Trans-pecos Black-headed Snake, are state listed as threatened. In 2017 Texas A&M University is conducting a yearlong basewide reptile survey on Laughlin AFB. The following are general habitat associations and life-history accounts for these species, an assessment of the likely occurrence of this species on Laughlin AFB, and current management needs. Extensive surveys of the Spot-tailed Earless Lizard (STEL) have been ongoing at Laughlin AFB since 2013. This lizard is under review for listing by the USFWS.

Reticulated Collared Lizard

This species requires open brush-grasslands and thorn-scrub vegetation on well-drained rolling terrain of shallow gravel, caliche, or sandy soils (Conant and Collins 1998). Habitat is often scattered with flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite (Conant and Collins 1998). This species is wary and quick, sometimes running upright, to evade predators (Conant and Collins 1998).

Needs and Assessment

Very little information is currently available concerning the occurrence of the Reticulated Collared Lizard on Laughlin AFB.

Texas Horned Lizard

This species prefers open, arid and semi-arid regions with sparse vegetation of grass, cactus, scattered brush or scrubby trees (Conant and Collins 1998). Soil may vary in texture from sandy to rocky (Conant and Collins 1998). This species burrows into soil, enters into rodent burrows, or hides under rocks when inactive. The Texas Horned Lizard's diet consists primarily of Harvester Ants (genus *Pogonomyrmex*). Breeding takes place between March and September (Conant and Collins 1998).

A single juvenile Texas Horned Lizard was found by TNC in May 1993 (TNC 1999). The individual was located on the northeast sector of Laughlin AFB, and observed on a dirt road approximately 0.2 miles west of Gould's Gulch training area, see **Table 5-6** and **Figure 5-1**.

Needs and Assessment

Some information is currently available concerning the occurrence of Texas Horned Lizards on Laughlin AFB. A reptile survey is being conducted at Laughlin AFB to determine the extent of the Texas Horned Lizard population. Several siting have occurred at Laughlin AFB as shown at **Figure 5-1**. Additionally, impacts to native Harvester Ants should be avoided in areas which meet the description of the preferred habitat for the Texas Horned Lizard. These areas include all of the undeveloped areas including the air field. The use of insecticides should be evaluated prior to the application.

Spot-tailed Earless Lizard

This species optimal habitat includes flat areas free of vegetation and other obstructions, which may occur in parts of the project area. The STEL (*Holbrookia lacerate*) have been observed on Laughlin AFB and the Auxiliary field. This lizard is considered a species of concern by TPWD and is promoting their conservation.

Needs and Assessment

Laughlin AFB in cooperation with other agencies and educational institutions will continue to assess the listing status of the STEL. In January 2010, the STEL was petitioned for listing under the ESA. On May 24, 2011, the USFWS issued a 90-day finding on that petition. Based on their review, the USFWS found the petition presents substantial scientific or commercial information indicating that the listing the STEL may be warranted. Laughlin AFB will monitor the status throughout any project planning, construction, and operations on the installation and will perform consulting, permitting and mitigation with the USFWS if the species becomes listed under the

ESA. Any activities by contractors must avoid impacting any individuals of this species if found on site. Multiple surveys have been conducted from 2013–2017 and will continue to support sustainment of this species.

Texas Indigo Snake

This species prefers Thornbush-chaparral woodlands of south Texas, in particular dense riparian corridors (Conant and Collins 1998). Texas Indigo Snakes can survive in suburban and irrigated croplands if not molested or indirectly poisoned (Conant and Collins 1998). Individuals require moist microhabitats, such as rodent burrows, for shelter.

Needs and Assessment

Very little information is currently available concerning the occurrence of the Texas Indigo Snake on Laughlin AFB. In 2017 Laughlin AFB is conducting surveys throughout the base to determine if the Texas Indigo Snakes are residing on the base.

Texas Tortoise

This species prefers open brush with a grass understory, but typically avoids open grass and bare ground. Individuals are active in hot weather and usually rest in shallow depressions at the base of a bush or cactus and sometimes in underground burrows or under objects (Conant and Collins 1998). Diet consists mainly of grass and the pads, flowers and fruits of the prickly pear, but other vegetation are also consumed. Individuals can live for more than 50 years.

Needs and Assessment

Very little information is currently available concerning the occurrence of the Texas Tortoise on Laughlin AFB. In 2017 Laughlin AFB is conducting surveys throughout the base to determine if the Texas Tortoise are residing on the base.

Trans-pecos Black-headed Snake

Individuals of this species have been found only in western Texas. Its known distribution extends along a north-south axis beginning at the Davis Mountains in the north and ending in the Chisos Mountains at Big Bend National Park and from the Cuesta del Burro Mountains in the West to the vicinity of the Pecos and Devils Rivers in the east and northeast. This species prefers a variety of habitats including high-elevation steep canyons and arid grasslands and low-elevation areas of the Chihuahuan Desert (Dixon and Werler 2005). Individuals are known to occur in the arid environments of the Pecos and Devils River systems in Pecos and Val Verde counties. This species is secretive and mostly nocturnal.

Needs and Assessment

Very little information is currently available concerning the occurrence of Trans-pecos Black-headed Snake on Laughlin AFB. In 2017 Laughlin AFB is conducting surveys throughout the base to determine if the Trans-pecos Black-headed Snakes are residing on the base.

5.4.6 Plant Species

According to the USFWS, two listed plant species have potential to reside in Val Verde County. The Texas Snowbells, is federal and state listed asendangered . The and Tobusch Fishhook Cactus is listed as threatened federal and state. The following are general habitat associations and life-history accounts for these species, and a discussion on the probability of these species occurring on Laughlin AFB.

Texas Snowbells

This species is endemic to Texas. Individuals are found on limestone bluffs, boulder slopes, cliff faces, and gravelly streambeds along perennial streams and intermittent drainages in canyon bottoms. It grows in full sun or partial shade of cliffs and woodlands. Species is restricted to Devils River in Val Verde County (Poole et al. 2007).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. Mission objectives will not have an impact on this species and therefore no additional management is necessary.

Tobusch Fishhook Cactus

This species is endemic to Texas. Plants are found on shallow, moderately alkaline, stony clay and clay loam over limestone; and typically on level to slightly sloping hilltops, occasionally on relatively level areas on steeper slopes, and in rocky floodplains. Such sites are usually open with only herbaceous cover, although the cacti may be somewhat protected by rocks, grasses, or spikemosses (Poole et al. 2007). These openings are scattered within a mosaic of Oak-juniper woodlands, occasionally Pine-oak woodlands, and rarely Cenizo shrublands or little Bluestem grasslands (Poole and Janssen 1996). This species has been observed in the northeast corner of Val Verde County and in the uplands in the Devils River drainage (J. Poole *personal communication*, 2011).

Needs and Assessment

Preferred habitat for this species does not exist on Laughlin AFB. Mission objectives will not have an impact on this species and therefore no additional management is necessary.

5.5 Wetlands

The National Wetlands Inventory (NWI) maps prepared by the USFWS were reviewed (Cowardin et al. 1979). Thirteen bodies of water were identified on the NWI maps, see **Figure 5-4** and **Table 5-8**. It is important to note that these maps only show potential wetlands and surface waters based on aerial photography and little or no verification has been conducted. A more detailed wetland map can be found in the Environmental Assessment for Salt Cedar Eradication on Laughlin AFB, and will facilitate compliance with the CWA. First Phase of Salt Cedar eradication completed July 2018. Salt Cedar eradication and monitoring will be on going.

The CWA sets the basic regulatory framework for regulating discharges of pollutants to U.S. waters. Section 404 of the CWA establishes a federal program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands.

Four federal agencies are responsible for identifying and regulating wetlands: the USACE, the EPA, the USFWS, and the Natural Resources Conservation Service (NRCS). The USACE and EPA are primarily responsible for making jurisdictional determinations and regulating wetlands under Section 404 of the CWA. The USACE also makes jurisdictional determinations under Section 10 of the Rivers and Harbors Act of 1899. The NRCS has developed procedures for identifying wetlands in compliance with the Flood Security Act of 1985 and the USFWS has developed a classification system for identifying wetlands.

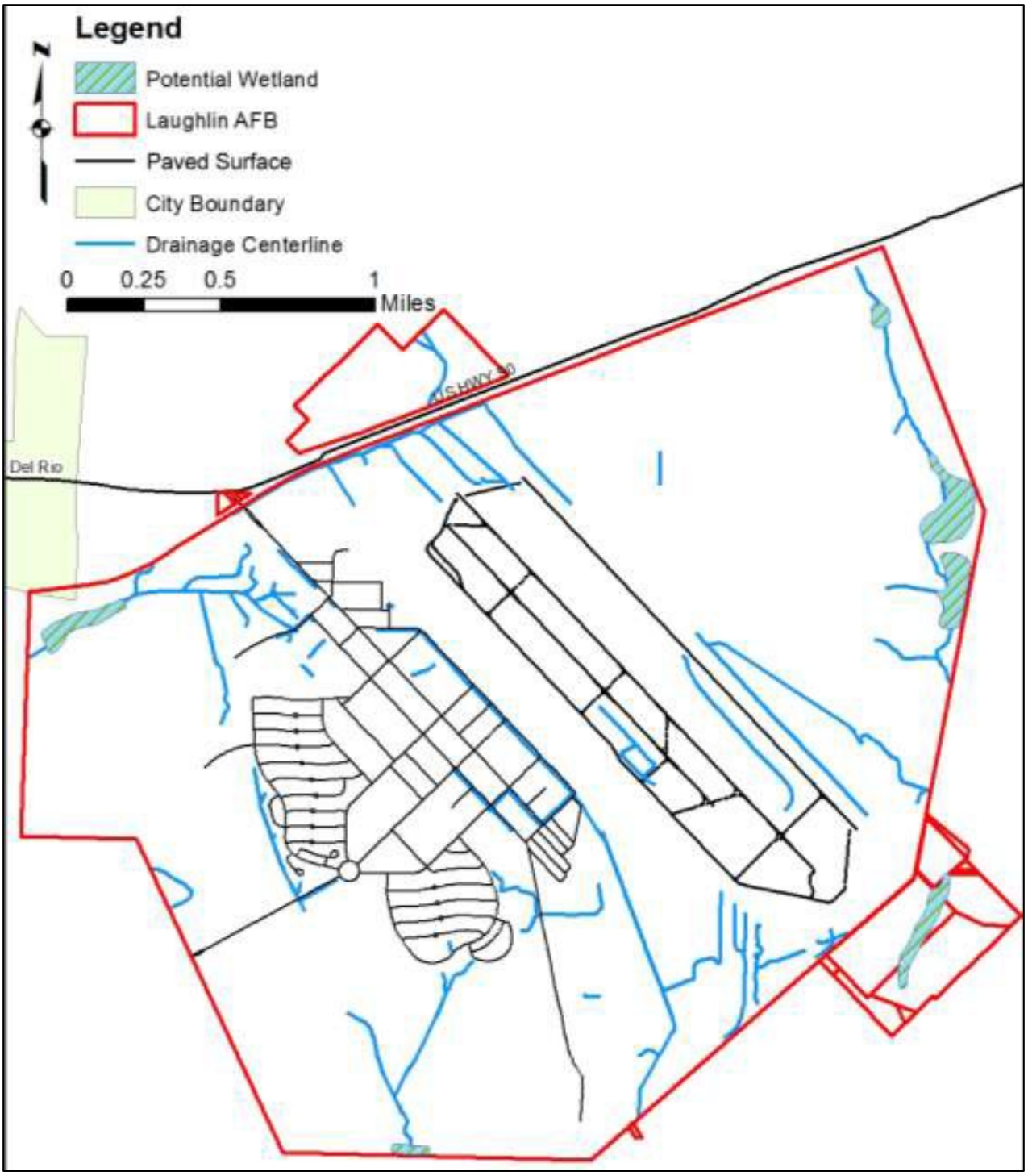


Figure 5-4
Potential Wetland Areas Identified on Laughlin AFB, Texas

Table 5-8
Water Bodies Identified on the NWI Maps on Laughlin AFB

Classification (Cowardin et al. 1979)	General Location on Laughlin AFB
Palustrine, Unconsolidated Shore, Temporarily Flooded, Excavated	Near northwest boundary
Palustrine, Unconsolidated Shore, Intermittently Flooded, Excavated	Near northwest boundary
Riverine, Intermittent, Streambed, Temporarily Flooded, Excavated	Near northwest boundary
Palustrine, Emergent, Persistent, Diked/Impounded	Near northwest boundary
Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated	Golf course
Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated	Golf course
Palustrine, Unconsolidated Shore, Temporarily Flooded, Diked/Impounded	Near southern boundary
Palustrine, Unconsolidated Shore, Seasonally Flooded, Diked/Impounded	Near southern boundary
Palustrine, Unconsolidated Shore, Intermittently Flooded, Diked/Impounded	Adjacent to southwest corner of main airfield
Palustrine, Unconsolidated Shore, Artificially Flooded, Seasonally Flooded, Excavated	Wastewater treatment ponds
Palustrine, Unconsolidated Shore, Artificially Flooded, Seasonally Flooded, Excavated	Wastewater treatment ponds
Palustrine, Unconsolidated Shore, Artificially Flooded, Seasonally Flooded, Excavated	Wastewater treatment ponds
Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated	Adjacent to south boundary of main airfield
Riverine, Intermittent, Streambed, Temporarily Flooded, Excavated	Runs adjacent to the west boundary of the main airfield

The U.S. Supreme Court in S*olid Waste Agency of Northern Cook County* (SWANCC) *v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) narrowed the definition of jurisdictional U.S. Waters. This INRMP includes consideration of jurisdictional wetlands as defined by the SWANCC case to the effect that isolated, non-navigable, intrastate waters, with no connection to navigable waters, are not jurisdictional wetlands.

The limited surface water resources occurring on Laughlin AFB are unlikely to be designated as waters of the U.S. by the USACE due to the fact that most of the water ways are not directly connected to a navigable water of the U.S. However, drainages in areas proposed for disturbance should be surveyed and assessed to determine if they have a discernible ordinary high water mark or meet wetland criteria, and if they are connected to navigable waters of the U.S., consultation with USACE should be initiated. Zorro and Sacatosa Creeks are connected to navigable waters.

5.6 Other Natural Resource Information

The following section presents a brief summary of two rare plants, Texas Trumpets (*Acleisanthes crassifolia*) and Longstalk Heimia (*Nesaea longipes*), that were identified on Laughlin AFB. These

species are not state or federal listed, and therefore are not protected by the ESA. However, the USFWS and the TPWD encourage conservation of these species. Protection of such species may reduce the likelihood of their future listing.

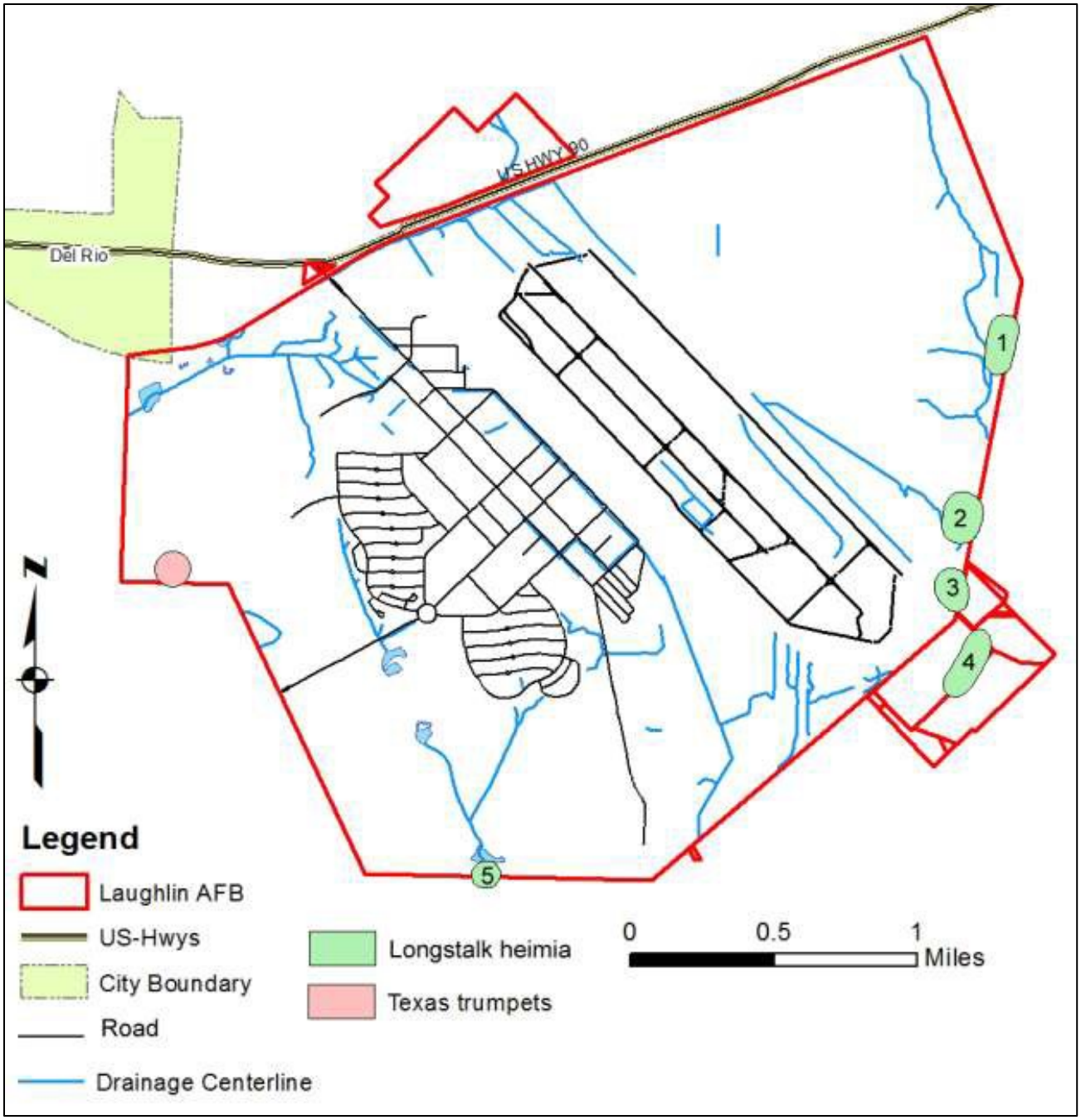
5.6.1 Rare Plants Species

Previous reports have identified two globally rare plant species at Laughlin AFB (TPWD 1995, TNC 1999). The locations of these plant species are displayed in **Figure 5-5**. A small population of Texas Trumpets was found in shrub land on a gravelly slope in the northwest quarter of the installation (TNC 1999). Several populations of Longstalk Heimia were found in the moist soils along Sacatosa Creek and along an unnamed drainage near the installation's south boundary (TPWD 1995, TNC 1999).

Texas Trumpets

The Texas Trumpets are globally imperiled with a known distribution limited to ten populations in three Texas counties: Kinney, Maverick, and Val Verde. Three of the ten populations are in the Del Rio area. The discovery of this population on Laughlin AFB is of considerable conservation significance. This population is the only one known to occur on publicly owned lands, which are not within the state's highway rights-of-way.

Most populations of Texas Trumpets are located in open, low shrublands on shallow, well-drained, calcareous gravelly loams over caliche on gentle to moderate slopes, often in sparsely vegetated openings in Cenizo shrublands (Poole et al. 2007). This population was found in similar habitat (TNC 1999). Six Texas Trumpets plants were observed on Laughlin AFB in a small, less than 50 feet diameter, brush-covered slope in an undeveloped area near the western perimeter fence (TNC 1999). Additional shrubs of this plant may be present in similar habitat elsewhere on the base.



Source: TPWD 1995, TNC 1999

Figure 5-5
Rare Plant Species Located on Laughlin AFB during Field Surveys in 1993, 1994, and 1997

Longstalk Heimia

The Longstalk Heimia is a globally imperiled species ranging from south central Texas into northeast Mexico. This species requires moist or sub-irrigated alkaline or gypsiferous clayey soils along unshaded margins of wetlands (Poole et al. 2007). Longstalk Heimia is dependent upon

seeps or springs, a habitat that is very rare in this arid landscape. Consequently, although the range of this species is wide, its distribution is very limited. This species has been collected from three spring courses in Pecos County, one site in Medina County, two sites in Brewster County, and two locations in Mexico. Many of these collections were made in the 1800's and most others prior to 1960. Many wetland sites where Longstalk Heimia was formerly collected have been impacted by aquifer depletion, water diversion, and impoundment and collection sites may no longer harbor extant populations (TPWD 1995).

Several populations of Longstalk Heimia were identified on Laughlin AFB in 1993 and 1994 (TPWD 1995), and in 1997 by TNC (TNC 1999). In 1997, this species occurred at five locations on Laughlin AFB, see **Figure 5-5**. The four largest populations lie on the floodplains of Sacatosa Creek, in soils mapped as Pintas clay, frequently flooded (Golden et al. 1982). These soils are deep, nearly level, poorly drained, and have a high available water capacity. They are moderately alkaline in both the clay surface layer and the clay subsoil, and a few spots within each mapped area may be slightly saline. The fifth site lies on the floodplain of the unnamed southwestern creek, below the dam along the southern perimeter road and west of the sewage ponds. Soils at this site are mapped as Acuna silty clay, 0-3 percent slopes. These are deep, nearly level to gently sloping soils with a surface layer of dark grayish brown silty clay; subsoils are clays and silty clays. These soils are moderately alkaline, well drained, and have medium available water capacity.

According to TNC, hundreds of Longstalk Heimia plants were found at Site 1 scattered throughout a grassland patch on a sub-irrigated terrace of Sacatosa Creek. This site is likely inundated after severe rainfall events, but is normally dry at the surface. The area was composed of a low carpet of Aparejograss (*Muhlenbergia utilis*) punctuated with clumps of two tall bunchgrasses Lindheimer Muhly (*Muhlenbergia lindheimeri*) and Alkali Sacaton (*Sporobolus wrightii) and* various Spikesedges (*Eleocharis* spp.) and Baccharis (*Baccharis neglecta*) were common along drier margins. The presence of scattered Buttonbush (*Cephalanthus occidentalis*) attests to the presence of reliable subsurface water. Most of this Site 1 was burned during a wildfire that killed most of the invading Baccharis but apparently had no adverse effect on the deep-rooted Longstalk Heimia plants (TNC 1999).

Longstalk Heimia at Sites 2 and 3 is generally associated with Cattail (*Typha angustifolia*) in the wetter portions of disturbed, low lying areas. Because of its branching and trailing habits, Longstalk Heimia is difficult to census among dense cattail vegetation. The species can be considered locally abundant, particularly at Site 3 where the population extends well up the seemingly dry embankment of the roadbed to the south (TNC 1999).

At Site 4, Longstalk Heimia occurs in large numbers on an open terrace along the banks of Sacatosa Creek, only a few inches above the normal water level. Vegetation in this area is mostly a dense cover of spikesedges with insignificant grass cover, likely due to livestock grazing (TNC 1999).

The population at Site 5 is much smaller, consisting of only a few plants in the shade of Black Willow along the wettest part of a normally dry creek bottom. No Longstalk Heimia plants were found along the edge of the duck pond immediately north (TNC 1999).

Needs and Assessment

Laughlin AFB should continue to monitor the population of these species on the installation. This species should be conserved in an effort to prevent its future listings as threatened or endangered.

Other globally rare plant species, such as the Stalkflower (*Nesaea longipes*), should be monitored if found to be present on Laughlin AFB.

Chapter 6 – Mission Impacts on Natural Resources

6.1 Land Use

"Improved grounds" are defined as an area which is under intense land management and includes land occupied by buildings and other permanent structures as well as lawns and landscaped plantings on which personnel annually plan and perform intensive maintenance activities. "Semi-improved grounds" are areas where landscape maintenance is performed primarily for functional, operational, or aesthetic reasons. On Laughlin AFB approximately 3,357 acres of land are maintained, this includes 402 acres at the Laughlin Auxiliary Airfields, 101-acre Southwinds Marina, and two acres for the NEXRAD site.

The remaining area, approximately 1,550 acres, is classified as unimproved grounds. "Unimproved grounds" are described as areas where natural vegetation is allowed to grow unimpeded by maintenance activities, and includes forest lands, croplands, lakes, ponds, and wetlands. Land use on Laughlin AFB is depicted in **Figure 6-1**.

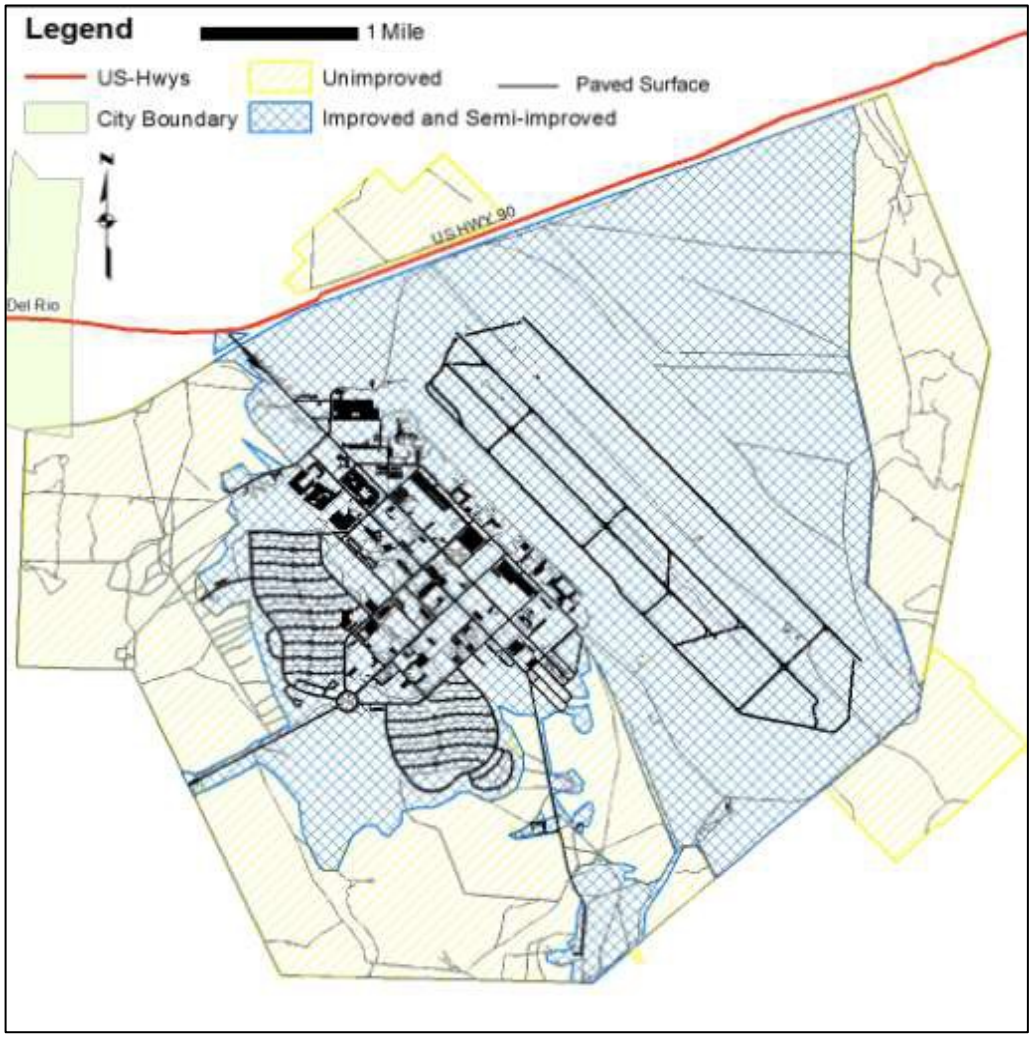


Figure 6-1
Areas of Improved and Unimproved Grounds on Laughlin AFB, Texas

Currently, no detailed breakdown of the land-use classifications exists in GIS for Laughlin AFB. Recent aerial photographs were used to create **Figure 6-1**.

6.2 Current Impacts

Impacts on the local environment are a concern for all USAF installations. Degradation of the environment resulting from poor planning or inappropriate mission-related activities can negatively impact the efficiency for an installation to accomplish its mission. Identification of potential impacts on the local environment is necessary to avoid significant or irreversible damage to natural resources.

Impacts on the local environment resulting from the current military mission are considered minor. Six primary areas of impacts have been identified:

- Water
- Hazardous Waste Generation
- Environmental Restoration Programs (ERP) Sites
- Air Emissions
- Noise and Accidents (AICUZ Program)

6.2.1 Water

Water is scarce in Val Verde County. The area receives an average of only 19 inches of precipitation annually and is considered to be semi-arid. In 2016 and 2017 the average precipitation amounts increased. Fortunately, groundwater resources are ample in the area as the Edward's Aquifer extends into eastern Val Verde County. Del Rio obtains its water from the San Felipe Spring. Laughlin AFB purchases its potable water from the City of Del Rio.

Springs of the San Felipe Creek are located north of U.S. Highway 90, at the eastern city limits of Del Rio, approximately seven miles from Laughlin AFB. Water flows under artesian conditions at the springs forming the headwaters of San Felipe Creek. A groundwater divide near Brackettville separates this portion of the Edward's Aquifer from the central portion and the much larger springs in San Marcos and New Braunfels.

Although Laughlin AFB maintains two pumps on a feeder line at San Felipe Springs, the pump station is owned by Del Rio. The water is pumped from two pumps at a rate of 2,100 gallons per minute. A backup pump exists on site with a capacity to pump 5,000 gallons per minute. Water is treated by the City of Del Rio with microfiltration, chlorination, and fluoridation at the pump station, and is pumped to the base by way of a 16-inch diameter ductile iron cylinder pipeline encased by concrete at the relief joints. The pipeline is six miles long and maintained by Laughlin AFB. Water arriving at Laughlin AFB is stored in a ground storage tank with a 1,000,000 gallon capacity. Water is then pumped to two water storage towers, one with 100,000 gallon storage capacity and the other with 300,000 gallon storage capacity.

The highest rate of water consumption typically occurs during June through August **Figure 6-2**. During these months potable water is used to irrigate lawns, playing fields, landscapes, and the golf course.

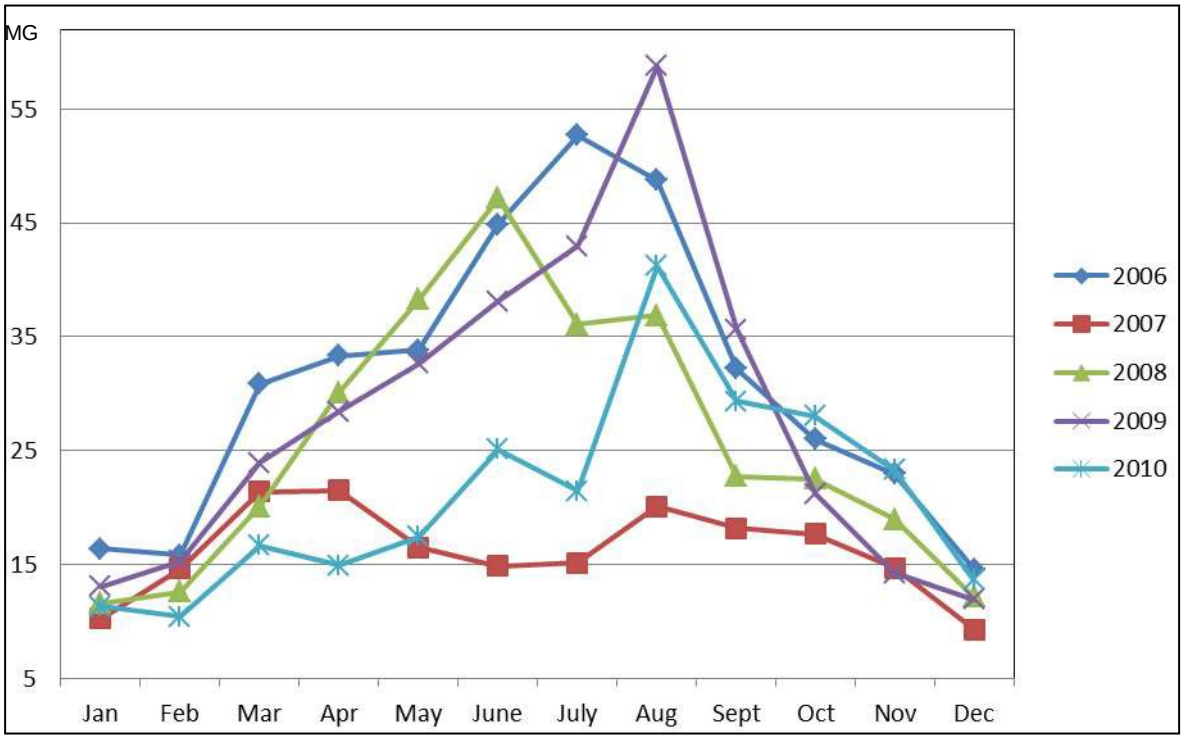


Figure 6-2
Monthly Water Usage on Laughlin AFB

Wastewater is treated in facultative lagoons located along the south boundary of the base. There are two facultative lagoons in series and one overflow lagoon which allow Laughlin AFB to capture and treat possible contaminated wastewater. Effluent is discharged to an unnamed surface drainage following treatment. Influent and effluent flows are measured by Laughlin AFB personnel on a daily basis. The wastewater ponds effluent flows are influenced by precipitation amounts. Influent and effluent flows do not always directly correlate, due to seasonal weather variations and evaporation, as seen in **Figure 6-3**.

According to the Texas Commission on Environmental Quality (TCEQ), Laughlin AFB wastewater treatment facility operates under a minor National Pollutant Discharge Elimination System (NPDES) individual permit (ID TX0022608). The permit is valid and TCEQ inspects the facility periodically. This wastewater treatment facility is operated and monitored by full-time licensed Wastewater Treatment Plant Operator. Data is collected daily, summarized and reported to TCEQ monthly per the permit requirements.

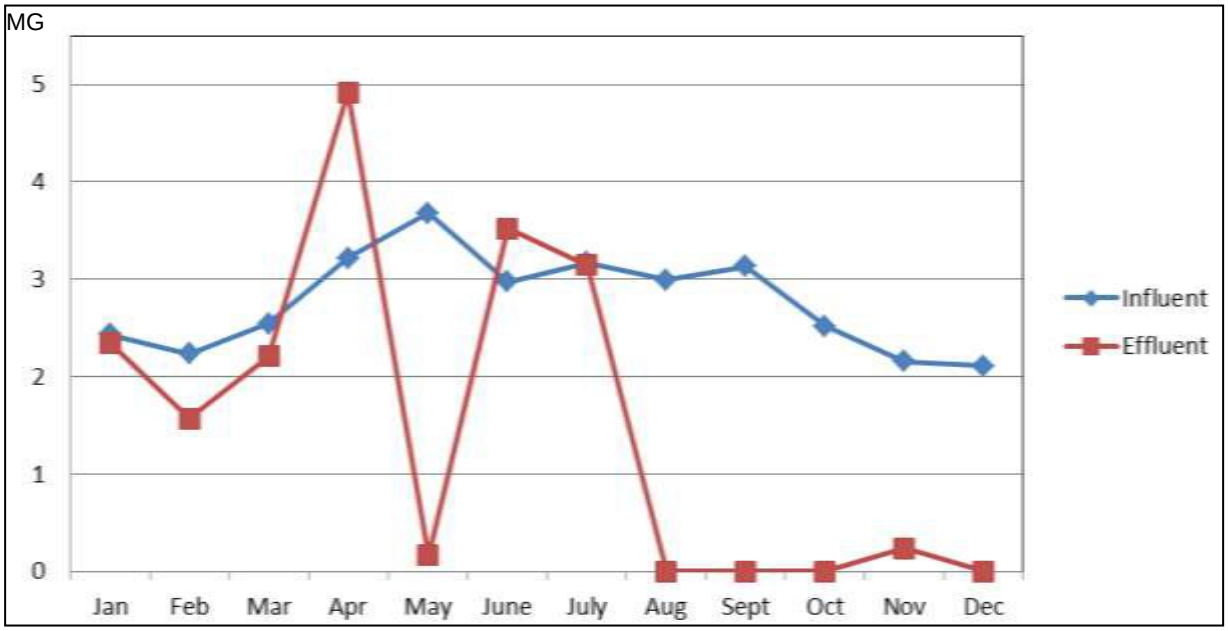


Figure 6-3
Monthly Wastewater Production at Laughlin AFB, Texas 2015

Management Concern

Steps are taken to ensure the effluent water quality of wastewater generation systems are in the proper condition to keep facilities up to current standards at Laughlin AFB, Southwinds Marina and the Laughlin Auxiliary Airfield. Projects are programmed to correct any deficiencies.

6.2.2 Hazardous Waste Generation

Laughlin AFB is a Large Quantity Generator of Hazardous Waste. Laughlin AFB continues to strive for reduction in the amount of hazardous waste generated. The following **Table 6-1** summarizes hazardous waste production on Laughlin AFB. According to the Laughlin AFB GIS database, 41 active hazardous waste storage areas exist on Laughlin AFB.

Table 6-1
Amount of Hazardous Waste Generated Each Year on Laughlin AFB

Year	Hazardous Waste Generated (pounds)
2011	47,066
2012	38,367
2013	64,147
2014	24,709
2015	41,415
2016	45,482
2017	16,996

Laughlin AFB currently has a Hazardous Waste Management Plan in effect, signed November 2017. The reader is directed to that document for details on hazardous waste management. A copy of this plan may be obtained through 47 CES/CEIE.

6.2.3 Environmental Restoration Program Sites

Typical restoration program sites include landfills, drainage ditches, runways, storage facilities and accidental spill areas. An intensive program of identification, investigation, and clean-up is used to restore the sites. Environmental Restoration Account funds are used for Environmental Restoration Program (ERP) sites, and are used to investigate and clean-up activities that occurred before 1984. Environmental Compliance Program funds are used for non-ERP sites, and are used to investigate and clean-up sites occurring after 1984. In addition, the community plays an important role in site restoration and clean-up through USAF-sponsored public involvement activities which may include opportunities to comment on proposed site activities and the comments are reviewed by the Laughlin AFB environmental team. The original Restoration Advisory Board was adjourned 16 March 2012 due to the local community stakeholders not being overly concerned as Laughlin AFB's restoration program is in advanced stages of restoration. Laughlin AFB remains committed to the site restoration process and if the community expresses a renewed interest or concern, Laughlin AFB will act upon these needs via town-hall forum. As of 2017, Laughlin AFB has five active sites and 27 closed sites, (including Southwinds Marina) **Table 6-2**. A full-color map of ERP sites is provided in the **Appendix B**.

Table 6-2
Environmental Restoration Program Sites on Laughlin AFB

Status	Site ID	Description	Source of Contamination
Closed	ST003	Defueling Pit	Jet fuel dumping
Open	FT005	Old Fire Training Area	Fire training activities
Open	SS014	Jet Fuel Farm	Jet fuel storage and transfer activities
Open	SS016	MARS Building and Area	Fuel dumping
Open	STA/AS-C500 (AS001)	Marina	Fuel Tank piping leak
Closed	PR M203 (ML005)	Former M203 Grenade Practice Range	Training
Closed	TS001	Former West Skeet Range	Target materials
Closed	SR002	Former West Pistol Range	Target materials
Open	CG022	Individual well of former SS020 site	Engine Test Cell area
Closed	OWC502	Building 18	Oil Water Separator
Closed	OWC503	Building 51	Oil Water Separator
Closed	WTC504	Wastewater Treatment Ponds	Wastewater
Closed	LF001	Base Landfill	Municipal Waste
Closed	WP002	Old Industrial Waste Pond	Industrial Waste
Closed	SS004	DRMO	Hazardous Waste or petroleum product storage
Closed	WP006	New Industrial Waste Pond	Industrial Waste
Closed	DP007	Sludge Disposal Area	Wastewater treatment plant sludge disposal
Closed	DP008	South Boundary Dike	None – Record search showed area of no suspected contamination
Closed	SS009	Env Supply Storage Area	Hazardous material storage
Closed	STO10	Facility 121, 1 UST	Jet Fuel leak
Closed	STO11	Facility 126, 1 UST	Jet Fuel leak
Closed	STO12	Facility 640, 2 UST	Jet Fuel leak
Closed	STO13	Facility 660, 1 UST	Jet Fuel leak
Closed	SS015	Storm Drainage Ditch	Industrial Waste
Closed	SS017	Area South of the Flight Line	Not available

Status	Site ID	Description	Source of Contamination
Closed	PS018	Bldg 116 HVAC Shop	chlorinated solvents, metals, and other contaminants to soil and groundwater
Closed	SS019	Jet Engine Test Cells	Fuel leak
Closed	SS020	Jet Engine Test Cells	Fuel leak
Closed	TG257/AOC-1	Gun Alignment	Training
Closed	AOC-4	Parking Apron	Industrial Area
Closed	AOC-11	Ammunition Storage	Ordnance Site
Closed	AOC-12	Tar Disposal Area	Disposal Area

6.2.4. Air Emissions

Laughlin AFB is located in a non-industrialized portion of rural west Texas where air emission sources are uncommon. Aside from mobile sources such as automobiles and aircraft, very few major stationary sources of air emission are located in Val Verde County. Stationary air emission sources at Laughlin AFB include:

- Abrasives Cleaning;
- Aircraft/Vehicle painting operations;
- Bulk fuel storage tanks and associated off-loading operations;
- Cooling towers;
- Degreasing Operations;
- Fire training;
- Fuel Cell Maintenance;
- Internal and external combustion machinery (natural gas-boilers and diesel generators);
- Jet engine testing;
- Large spark-ignition engine rebuilding;
- Miscellaneous Chemical Usage;
- Pesticide Usage;
- Refrigerant Maintenance;
- Small Arms Firing;
- Welding; and
- Woodworking.

Overall, air quality in Val Verde County is considered good and the county is currently in attainment with National Ambient Air Quality Standards. There are no management concerns or recommendations.

6.2.5 Noise and Accidents (AICUZ Program)

The purpose of the DoD's AICUZ Program is to promote compatible land development in areas subject to increased noise exposure and accident potential due to aircraft operations.

Noise

Noise is a common and significant issue at most USAF facilities that conduct air operations. Laughlin AFB has an extremely active air traffic pattern due to the nature of pilot training

operations. The large number of takeoffs and landings involve low-level flight with high engine thrust, resulting in significant noise levels surrounding the airfield. To protect human health and welfare, the EPA has identified 55 decibels (dB) as the acceptable level. DoD, the Federal Aviation Administration, and the Department of Housing and Urban Development however, has determined an acceptable level of 65 dB. The location of residential units and other noise-sensitive land uses are:

- Unacceptable in areas where noise exposure exceeds 75 dB;
- Normally acceptable in areas where noise exposure is between 65 dB to 75 dB;
- Acceptable where noise levels are less than 65 dB.

Noise models were created in NOISEMAP (Version 7.0) to calculate and plot the average busy-day dB contours. Results from NOISEMAP are presented in Laughlin AFB, Texas AICUZ Update Final Report 2008. The total land area underlying an area of noise exposure greater than 65 dB is 10,644 acres, with 8,427 of those acres located off-base, see **Figure 6-4**.

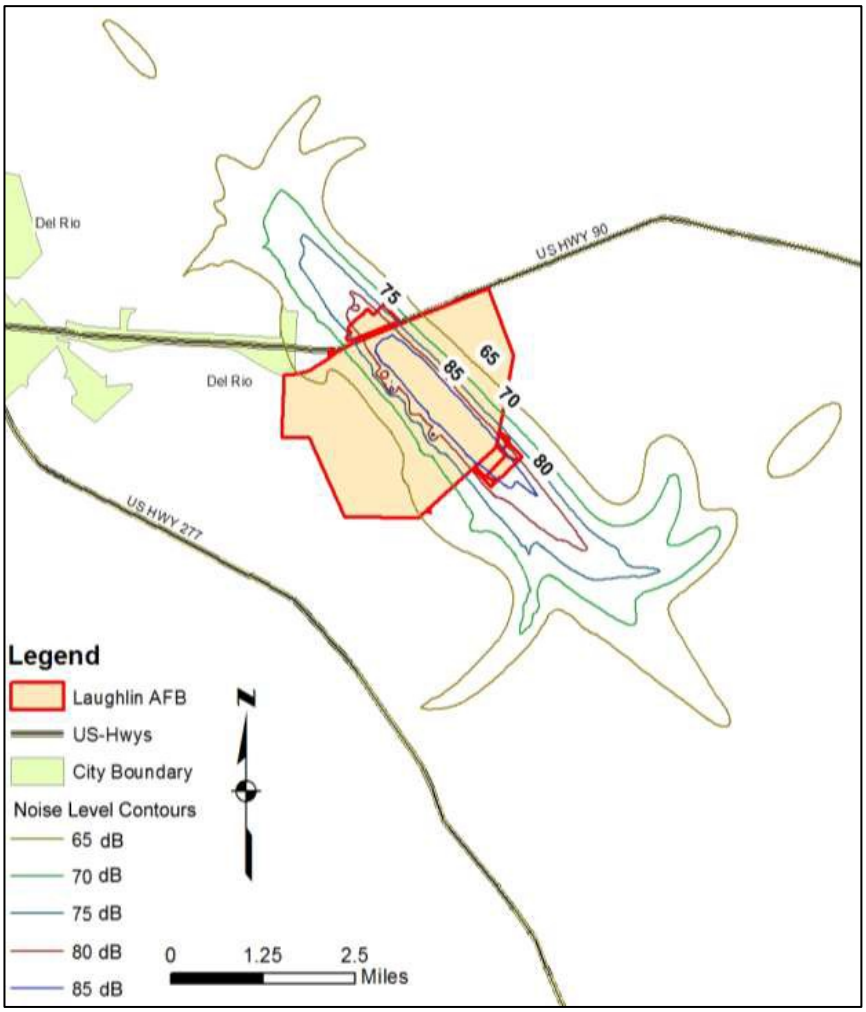


Figure 6-4
Noise Level Contours Associated with Average Busy-Days for Laughlin AFB

Laughlin AFB is located near Del Rio, a populated city. The urban limits of Del Rio are located several miles from the base and runway, and the area immediately adjoining the base is sparsely populated. Laughlin AFB has purchased tracts of adjoining property at each end of the runway to minimize noise exposure to local residents. Large portions of the base and adjoining property are subject to noise levels exceeding the 65 dB level.

Accidents

Areas around military airfields are exposed to the possibility of aircraft accidents. While maintenance of aircraft and the training of aircrews are rigorous, it should be understood that military flights at Laughlin AFB are primarily for the purpose of training. Despite stringent maintenance requirements and numerous hours of training, history shows that accidents occur. As part of the AICUZ program and to aid in land use planning surrounding military bases, the DoD established Accident Potential Zones (APZ).

Based on analysis of USAF accidents that occurred within 10 miles of an USAF base, three planning zones were established; the CZ, APZ I, and APZ II. Each end of the runway has a CZ that starts at the runway threshold and extends outwards 3,000 feet with a width of 3,000 feet. Of the three safety zones, the CZ has the highest potential for accidents. The USAF has a policy of acquiring property rights through purchase or easement to designated CZs.

APZ I extends outward from the CZ an additional 5,000 feet and is also 3,000 feet wide. This area has a significant, though reduced, accident potential. The APZ II extends from the outer end of APZ I an additional 7,000 feet and is also 3,000 feet wide. This area has a lesser, but still significant potential for accidents.

The Laughlin AFB CZs and APZs are based on the configuration of the runway, see **Figure 6-5**. The total land area within the CZs is 982 acres, of which 111 acres are located off-base. The total land area within the two APZs is 2,793 acres, of which 2,649 acres are off-base.

Management Concern

Continued development near Laughlin AFB may present future issues with noise and accident potential for Laughlin AFB. Laughlin AFB will continue to follow the DoD's AICUZ Program to promote compatible land development in areas subject to increased noise exposure and accident potential due to aircraft operations.

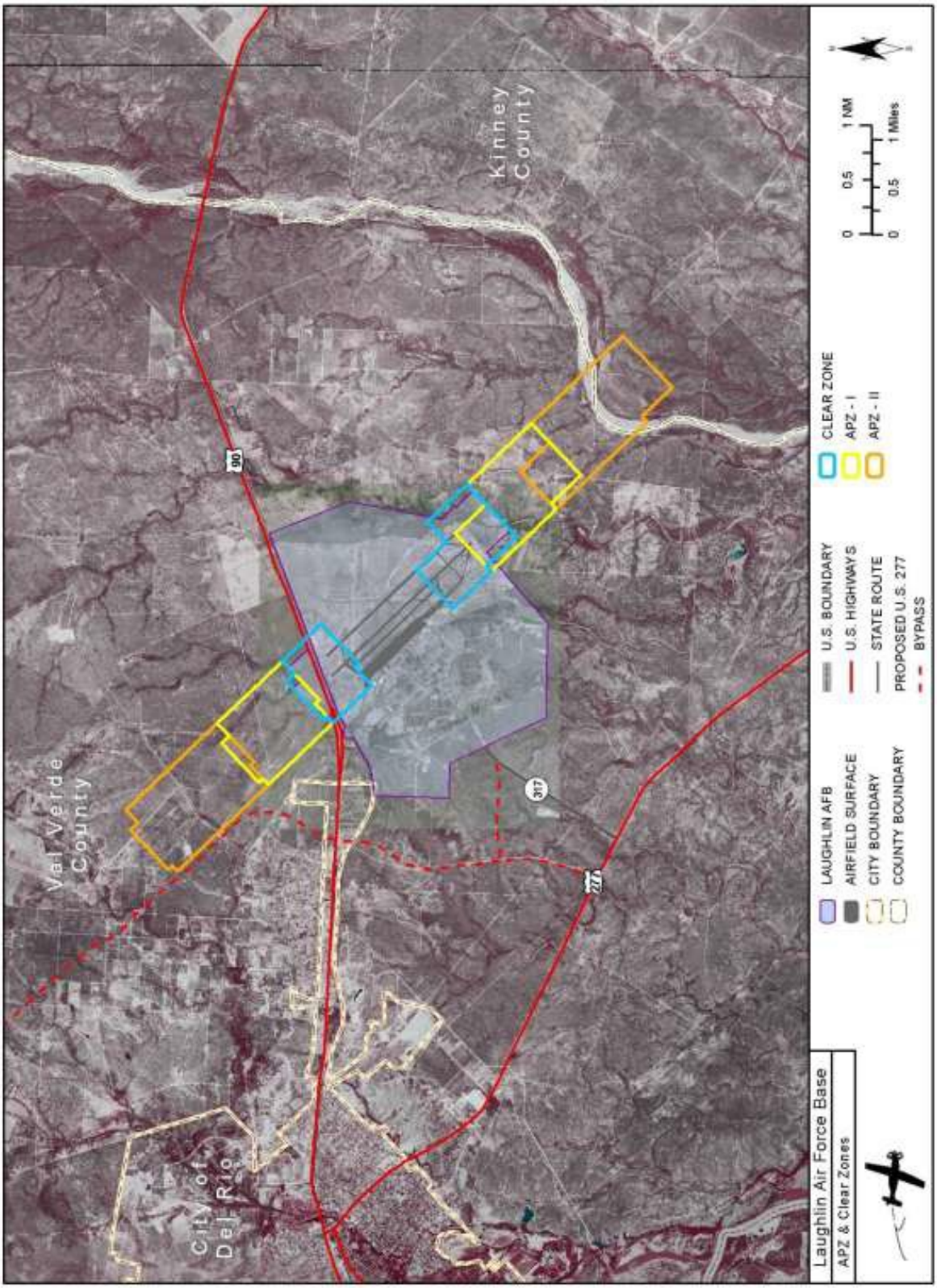


Figure 6-5
CZs and APZs Associated with the Runways on Laughlin AFB

6.3 Potential Future Impacts

Laughlin AFB has developed a Six Year Infrastructure Improvement Plan that identifies known major construction/renovation projects to be implemented within the next decade. The majority of these projects occur in the developed portions of the base. Direct impact of these projects on natural resource values is generally minor. Prior to any project development, Laughlin AFB will complete the Environmental Impact Analysis Process (EIAP) to determine and mitigate any impacts to natural resources. Of note, the projected site for a future photo voltaic array is adjacent to the site of the Texas Trumpets (*Acleisanthes crassifolia,* reference 5.6.1). See Environmental Assessment for Construction of the Photovoltaic Solar Array Oct 2011. A small population of Texas Trumpets was found in a shrubland on a gravelly slope in the northwestern quarter of the installation near the western perimeter fence. This area would be protected from any construction and disturbance.

An Installation Development Plan for Laughlin AFB, dated 17 October 2014, provides an overview of existing conditions, identification and evaluation of issues facing the installation; and, documentation of existing needs and future expectations. The Installation Development Plan is designed to provide decision makers at the installation and the local community with essential information on the plans for the future of Laughlin AFB and the projects needed to make Laughlin AFB's vision a reality.

Laughlin AFB has no new missions planned at this time (Laughlin AFB 2017). The installation expects its mission of training pilots for the USAF and other nations to remain unchanged for the foreseeable future.

Chapter 7 – Natural Resource Program Management

This chapter describes the current status of the installation natural resources management programs. For each of the programs listed, a discussion on the current natural resource management practices, significant management issues, and compliance with regulatory requirements is provided.

7.1 Natural Resources Program Management

Natural Resources Program Management includes conservation of biodiversity. This is accomplished by maintaining and reestablishing viable populations of native plant and animal species on Laughlin AFB when practical and consistent with the military mission. Additionally, exotic and invasive species must be controlled to prevent loss of more desirable, endemic species. Laughlin AFB should identify and manage natural communities and species at risk to help prevent them from becoming listed as threatened or endangered in the future.

7.2 Geographic Information Systems (GIS)

Natural resource management planning and decision-making are based upon an analysis of the complex relationships of the current condition of natural resources, interrelationships among natural resources, and the effects of human actions upon natural resources. To reach effective decisions, natural resource planners and Laughlin AFB land planners need to have accurate information regarding the status of the resources, potential factors that may change that status, and the spatial relationship between the resource and those factors. Frequently, this involves analyzing information from numerous maps, surveys, and databases. GIS is a computer-based tool that allows integration and analysis of spatial resource data derived from fieldwork, maps, and databases. The visual display and analytical power of the system enables natural resource managers to interpret the relationships among numerous factors affecting the resources they manage. A well-developed and maintained set of GIS data provides the resource manager with a long-term monitoring tool. The development of new GIS software programs, such as ArcGIS Desktop, provides program managers tools to assist in decision-making. Sensitivity models, alternative analyses models, and facility siting models can be efficiently and economically developed for use on a practical basis. Currently the USAF has an enterprise-level contract to update the data; the information is then distributed to Laughlin AFB. Laughlin AFB can execute a contract for specific model needs.

Laughlin AFB has developed a detailed GIS, developed in accordance with the current USAF adaptation of the Spatial Data Standards for Facilities, Infrastructure, and Environment. Currently one datum and projection is used within Laughlin AFB's GIS database: WGS_1984_UTM_Zone_14N.

Management Concerns

The major GIS issue at Laughlin AFB project planning does not sufficiently address environmental GIS data and therefore insufficient GIS data to allow for use as a natural resource management tool and range management tool. A contract to improve the Environmental GIS layers at LAFB was completed early 2018, however the layers will be continually updated as funding becomes available. Historic and current data on natural resources must be incorporated into the GIS database for it to be useful for resource management. Some of the additional themes that need to be incorporated into the existing GIS database include: soils, geology, drainage basins,

locations of flora and fauna sampling, and endangered species critical habitat.

Significant effort has been put forth to develop the spatial data and associated data tables. Management of the GIS data requires continual updating of information and standard procedures to ensure updates are accomplished in a suitable timeframe. Data collected in the field needs to be standardized to allow for ease of integration into the existing database.

7.3. Fish and Wildlife Management

Fish and wildlife management can be defined as a coordinated process of actions specifically designed to maintain, enhance, and regulate indigenous wildlife and habitats. Management includes conservation of federal listed, state listed, and non-game species, management and harvest of game species, reduction in BASH, animal damage control, and habitat conservation. Effective vegetation management and understanding the diversity, abundance, distribution, population dynamics, and habitat requirements of species will conserve the viability of wildlife populations.

The main facility of Laughlin AFB has undeveloped land well suited for wildlife management. Wildlife resources on Laughlin AFB may be more abundant than on surrounding lands due to the lack of grazing, and low levels of human activity. This undeveloped land offers an opportunity to initiate a wildlife management program. This section provides a general oversight into fish and wildlife management practices and opportunities at Laughlin AFB.

Information on existing fish and wildlife resources, along with recommendations for improving wildlife habitat, are included in the Fish and Wildlife Plan, located on Laughlin AFB's eDASH website. See the following documents that supplement the Fish and Wildlife Plan for more detailed information:

- *Biological Survey of Laughlin Air Force Base*; Texas Natural Heritage Program, Resource Protection Division, TPWD, April 1995
- *Survey of Rare, Threatened, and Endangered Plants and Animals at Laughlin Air Force Base, Texas*; TNC of Texas, February 10, 1999
- *Summary of Flora and Fauna Data Collected*; Baer Engineering and Environmental Consulting, Inc., 2011.

Management Concerns

There is a lack of detailed population information for most wildlife species on Laughlin AFB. Additional quality information regarding a wildlife species' population status, distribution, movement, and interactions will aid the decision makers' task of identifying indicator species on Laughlin AFB. Indicator species could be monitored to help identify the impacts of military activities on wildlife.

Deer are a concern at Laughlin AFB as they have the potential to interfere with air flight operations. Keeping the airfield clear of deer, and other animals, is necessary for the safety of aircraft and air crews. A deer-proof fence has been installed around the North, East and partial South sides of the airfield perimeter to prevent deer and other large animals from accessing the airfield. There is a future project planned to complete a deer proof fence around the airfield.

Seasonal bird populations, migration routes, and nesting site information could be collected for more effective management of birds and reduction of BASH potential. The USDA Biologist under the authority of airfield safety will execute the depredation permit and will provide the depredated species data to the NRM for analysis annually.

A hunting program has been initiated to help control the number of deer. Hunting is conducted in accordance with Laughlin Air Force Base Instruction 32-7064, *Base Hunting*, located on Laughlin AFB's eDASH website. The Laughlin AFB Environmental and Safety teams may utilize the depredation permit to manage the deer population.

Fundamental requirements, which are considered when managing wildlife habitat, include food, cover, water and the proper distribution of these elements. Habitat management is directed at maintaining a productive and healthy ecosystem. The ecosystem consists of biotic elements, such as plant and animal communities, and abiotic elements, such as soil, air, water and sunlight, which occur in an area. Management activities should be aimed at conserving and improving the quantity and quality of both biotic and abiotic elements.

Managing for plant diversity is important. The diversity of vegetation increases the availability of food and cover for wildlife species. A diverse plant community can result in year-round productivity and can provide food for wildlife at different periods of the year. A healthy vegetation community can improve the water cycle by facilitating water infiltration and storage, thereby preventing excessive runoff, which can lead to the erosion of soils and flooding of streams. Additionally, a diverse and healthy vegetation community can result in diversity of all forms of life, including microorganisms, insects, reptiles, amphibians, birds and mammals.

Management of vegetation requires long-term planning. Vegetation manipulation will impact resident wildlife species, positively or negatively, depending on the type of treatment used, the degree of use, and location. Before implementing vegetation manipulation techniques, short-term and long-term effects on wildlife occurring in the habitat should be determined. The location and size of sensitive wildlife habitats that provide important nesting or roosting sites, feeding areas, desirable plants which prduce food for wildlife , cover, water, and space needs should be considered. Wildlife can be displaced by disturbance from an area without adequate escape or security cover when manipulating vegetation.

7.4 Management of Threatened and Endangered Species and Habitats

There is evidence that three state listed threatened species use habitats on Laughlin AFB. The **Table 7-1 shows** records of these listed-species . The mission of Laughlin AFB currently does not pose a direct negative impact to these three species.

Although, the current mission of Laughlin AFB does not pose a direct impact to federal and state listed species, indirect impacts should also be considered. Currently, Laughlin AFB purchases water from the City of Del Rio. The City pumps water from the San Felipe Creek upstream from the designated critical habitat for the Devils River Minnow (USFWS 2008). The primary cause for this species decline is believed to be reduction of water flow (Garrett et al. 1992). There is a concern that pumping water from the San Felipe Creek may impact this critical habitat.

Table 7-1
List of Threatened and Endangered Species Observed on Laughlin AFB

Species	Date Last Observed at this location	Federally Listed Endangered	State Listed Endangered	State Listed Threatened
Texas Horned Lizard	2017			X
Texas Tortoise	2015			X
Texas Indigo Snake	2016			X

Management Concerns

Each of the three documented flora and fauna surveys conducted on Laughlin AFB have identified a new species of concern; Baer Engineering recorded an endangered species (Baer 2011), TNC recorded a threatened, a rare, and a candidate species (TNC 1999), and TPWD recorded a rare species (TPWD 1996). Information collected on Laughlin AFB that pertains to listed TES will be shared with the USFWS and, if practical, with the TPWD.

7.4.1 Rare Species

Two rare plants have been documented as existing on Laughlin AFB; these are the Longstalk Heimia and Texas Trumpets. Both were observed in remote areas of the base. If construction were planned in these areas a survey must be conducted to determine if these species are present.

Management Concerns

Although these species are not listed by state or federal agencies as threatened or endangered, they are representatives of species with limited ranges, habitats, and populations. Conservation of habitat is necessary to perpetuate the existing populations located on base. These species have been identified in relatively remote portions of the base where future improvements have not been planned. Planning for future expansion and development of base infrastructure should consider the location of these habitats. Future projects should avoid impact on these areas when feasible.

Recommendations

It is recommended that the populations on Laughlin AFB be monitored at least once every five years. In addition, construction activities, military operations, and recreational activities should not impact habitats where these species have been documented.

7.5 Water Resource Protection

State and federal regulations require industrial facilities, such as Laughlin AFB, to receive coverage under the EPA NPDES program for discharges of “storm water associated with industrial activities.” Most facilities can use the Multi-Sector General Permit (MSGP), which provides specific coverage requirements for multiple industrial sectors. Laughlin AFB currently has authorization under the Texas MSGP, TXR050000. Laughlin AFB is required to author and

update a SWPPP, conduct quarterly visual monitoring, conduct semi-annual benchmark monitoring, and conduct annual analytical sampling at two of the four outfalls in accordance with its permit TXR05M844 located within Laughlin AFB. Parameters have been designated by the MSGP and sampling is conducted per guidance set by the MSGP.

If a construction project disturbs greater than one acre of land or a potential to violate a water quality standard is present, a SWPPP must be composed and implemented, and erosion and sedimentation controls in accordance with the TCEQ Texas Pollutant Discharge Elimination System General Permit TXR050000 must be in place. The prepared SWPPP is to be kept on site during construction activities.

A Notice of Intent (NOI) and Notice of Termination are required as submittals to the TCEQ for construction projects that will disturb greater than five acres.

Installations must evaluate the potential effects of any proposed actions in a floodplain. For all major federal actions significantly affecting the quality of the human environment, the evaluation must comply with the NEPA. A description of the EIAP for floodplains is provided in 32 Code of Federal Regulations (CFR) Part 989.

It is the USAF's goal to reduce the risk of flood loss, minimize the impacts of floods on human health, safety and welfare, and restore and preserve the natural and beneficial values of floodplains (Executive Order (EO) 11988, "Floodplain Management"). If an action is taken within a floodplain that permanently alters the flood hazard delineations on the National Flood Insurance Program map, the installation must submit an analysis reflecting those changes to FEMA. A reference regarding this procedure can be found in FEMA booklet MT-2, *Revisions to National Flood Insurance Program Maps* and EO 13690, establishing a *Federal Flood Risk Management Standard*.

Management Concerns

Existing GIS data for local watershed boundaries does not exist and floodplain boundaries change overtime. Hydrological modeling to delineate watersheds, if created in ArcGIS, would assist in construction planning and SWPPP preparation. In conjunction, a standard schedule to review current floodplain maps for Laughlin AFB could be developed.

Discharges flowing from and across Laughlin AFB impact downstream water quality, wildlife habitat, agricultural operations, and outdoor recreation activities as they flow toward the Rio Grande River across private land holdings. Degradation of streams from on-base activities should not occur and if identified, should be corrected.

Laughlin AFB continues to update and implement the SWPPP. 47 CES/CEIE representatives track the status of the new TCEQ Storm Water program and update the existing SWPPP and NOI as required. Laughlin AFB ensures that the appropriate paperwork is submitted and maintained for all construction projects disturbing more than one acre.

7.6 Wetland Protection

Wetlands are areas that are covered by water or that have waterlogged soils for significant periods during the growing season and support characteristic vegetation. They are important to the health of an ecosystem. They help filter pollutants out of water, provide habitat for wildlife species, and serve as buffer zones to protect shorelines from erosion. NRMs should determine how wetlands

fit into the ecosystems they manage.

The USAF goal for the management of wetlands is that all wetlands are to be protected, as stipulated in EO 11990, "Protection of Wetlands." To the maximum extent practicable, the USAF will avoid actions which would either destroy or adversely modify wetlands. Supporting these goals is the policy that all wetland impacts are to be assessed under the NEPA unless there is a finding of no practicable alternative. If there is no practical alternative, then the USAF is required to conduct an environmental impact analysis in accordance with NEPA and USAF EIAP at 32 CFR Part 989.

The NWI of the USFWS has mapped the potential wetlands of the U.S. These maps are sufficiently accurate for broad planning purposes. As part of the Salt Cedar, or Tamarisk, invasive species project, PIKA-Pirnie conducted a survey for USACE Nationwide Permit 27 Wetland Restoration Plan, with a Pre-Construction Notification Wetland Restoration Plan for wetlands on Laughlin AFB. USACE permits require approved jurisdictional wetland delineation. Field surveys were completed from 14-16 October 2014. The purpose of the surveys was to identify areas of Salt Cedar incursion and to map potential jurisdictional "Waters of the U.S." (as outlined in the USACE Regulatory Program Regulations Section 33 CFR 328.2) that occur on Laughlin AFB. This survey included all information required by the USACE for standard field determination of wetlands. In conjunction with the USACE survey, Laughlin AFB performed an environmental assessment for the Salt Cedar eradication in April 2016.

Management Concerns

Wetlands should be protected installation-wide. The detailed wetlands delineation for Laughlin AFB identified several potential wetland areas. The first area is near the northeast corner of the base along Zorro Creek. This area is dominated by spikesedges (*Eleocharis palustris* and *E. montividensis*) and Cattail (*Typha angustifolia*). The second area is located along Sacatosa Creek and contains a wider variety of wetland-like vegetation including Beaked Spikerush (*Eleocharis rostellata)*, Lindheimer Muhly (*Muhlenbergia lindheimeri*), and other bunch-type grasses.

7.7 Grounds Maintenance

Grounds maintenance activities at Laughlin AFB are conducted by a grounds maintenance contractor and are supervised by base personnel to ensure compliance with contract requirements. Specifications for maintenance of the grounds address base-wide lawns, shrubs, turf areas, and trees in the developed portions of the base. The grass area surrounding the airfield is also maintained under this contract. Privatized Military Family Housing (MFH) areas are maintained by individual tenants. The contractor is required to conduct all activities specified in the Grounds Maintenance Contract including mowing, pruning, trimming, fertilizing, and irrigating. The current Grounds Maintenance Contract calls for installation of new shrubs and trees on an annual basis. Specific details and requirements for grounds maintenance activities can be found in the Grounds Maintenance Contract.

Airfield grounds maintenance requirements for the Laughlin AFB flightline and the Laughlin Auxiliary Airfield are detailed in the BASH plan for these facilities.

7.7.1 Grounds Maintenance Categories

There are three levels or categories of grounds maintenance for all Laughlin AFB areas. These

categories will be the basis for the quality and frequency of landscape maintenance performed on Laughlin AFB.

Improved Grounds

Improved grounds usually consist of turf grass areas and plant material requiring intensive maintenance primarily in heavily developed areas of Laughlin AFB. These areas are serviced by the grounds maintenance contractor.

Semi-improved Grounds

Semi-improved grounds are areas where landscape maintenance is performed primarily for functional, operational, or aesthetic reasons. The semi-improved category may contain airfield safety zones, rifle range, and open spaces in developed areas generally maintained under the grounds maintenance contract.

Unimproved Grounds

The unimproved grounds category usually includes all other grounds on Laughlin AFB and is largely made up of undeveloped areas. This category is comprised of natural landscapes such as indigenous areas, grazing lands, water features, and airfield areas outside the CZ. Little or no maintenance is required, and these areas are generally not included in the grounds maintenance contract.

Management Concerns

Laughlin AFB has a Drought Contingency Plan as required by 30 TAC 288. Laughlin AFB also has a Water Management Plan which is used to manage water resources. The intent of these documents is to promote water conservation and to help develop procedures to address drought related water shortages. Laughlin AFB receives its water from the City of Del Rio and therefore Laughlin AFB plans parallel the City of Del Rio plans.

Laughlin AFB uses the PMP to minimize the use of pesticides and herbicides.

Bermuda and St. Augustine are the most abundant grass species used for lawns and landscapes at Laughlin AFB. To limit water usage these grasses are sparingly irrigated. Warm season grasses such as Buffalograss (*Buchloe dactyloides*) and Common Curlymesquite (*Hilaria belangeri*) require less irrigation than Bermuda and St. Augustine and are better suited to the semi-arid environment. In future it would be advantageous to develop a policy to encourage the use of native, drought-tolerant grasses.

7.7.2 Golf Course Maintenance Plan

The Laughlin AFB golf course includes a nine-hole golf course covering approximately 94 acres of land. Two small ponds and a swale are located within the golf course area, along with a clubhouse and maintenance facility. A staff of thirteen people maintains the golf course and associated facilities. Use of the course averages around 10,000 rounds per year.

Funding for the Laughlin AFB golf course is provided by support from Appropriated Funds (APF). Laughlin AFB is considered “remote and isolated,” making APF funding available to the golf course. This is one of the few courses in the USAF to receive APF support as most are funded through Non-Appropriated Funds. Due to the “remote and isolated” status of the base, the golf

course does not pay a fee for water usage and thus is not incentivized to conserve water.

Management Concerns

Potable water usage at the golf course is a concern at Laughlin AFB. The golf course utilizes non-treated groundwater and surface water to maintain water levels within the two golf course ponds. Potable water is used for irrigation of the landscaping and greens.

7.8 Wildland Fire Management

Prescribed wildland fire can be used to enhance and maintain the installation mission, natural and cultural resources management and BASH goals. Ultimately, the Laughlin AFB Wildland Fire Management Plan will guide the actions to reduce wildfire potential, outline program safety, protect and enhance valuable natural resources, integrate applicable state and local permit and reporting requirements, and implement ecosystem management goals outlined in the INRMP and the BASH Plan.

Potential wildland fire management activities include wildfire suppression by personnel meeting qualification standards as outlined in DoDI 6055.06, Section E3.8, and/or AFI 32-7064, Chapter 13 and prescribed fire activities on improved and semi-improved grounds. Examples of covered prescribed fire activities include debris pile burning or burning of main airfield to support BASH requirements.

Management Concerns

Wildfires are a natural component in the region's ecosystem. Not implementing Wildland Fire Management procedures may leave Laughlin AFB without a complete ecosystem management approach. Laughlin AFB is pursuing the development of a Wildland Fire Management Plan however, it is currently not in place to address existing wildland management concerns. For example, areas with large amounts of overgrown vegetation that could fuel a wildfire.

7.9 Pest Management Plan

An IPMP exists for Laughlin AFB. The current version of this plan is updated by 47 CES/CEIE and located on Laughlin AFB's eDASH website.

Management Concerns

The PMP does not identify projects to control noxious and invasive species on Laughlin AFB. Laughlin AFB should identify and monitor populations of invasive plant and animal pests.

7.10 Bird-Aircraft Strike Hazard

A BASH plan exists for Laughlin AFB. The current plan can be obtained from 47 FTW/SE.

7.11 Outdoor Recreation

Outdoor recreation facilities are important to USAF installations to maintain morale. Many USAF installations are located in remote areas where typical outdoor recreational opportunities are limited. These facilities provide convenient outdoor recreational opportunities for active duty military personnel and their families. Several types of outdoor recreation facilities exist on Laughlin AFB as shown in **Figure 7-1**. Facilities dedicated to outdoor recreation at Laughlin AFB include:

- A nine-hole golf course;
- One baseball diamond;
- Two swimming pools;
- One skeet & trap range;
- Horse stables;
- Running track and field;
- Football/soccer field;
- The Southwinds Marina on Lake Amistad;
- Recreational vehicle parking area;
- Nature trail;
- Frisbee golf;
- Paintball course;
- Climbing wall;
- Volleyball courts;
- Basketball courts;
- Tennis courts; and
- Jogging trail.

Other outdoor recreation opportunities available include:

- Fishing opportunities at Lake Amistad and the golf course ponds (catch and release not for consumption);
- Seasonal hunting opportunities when prescribed in undeveloped portions of the base; and
- Base-sponsored services include rentals of bicycles and camping equipment.

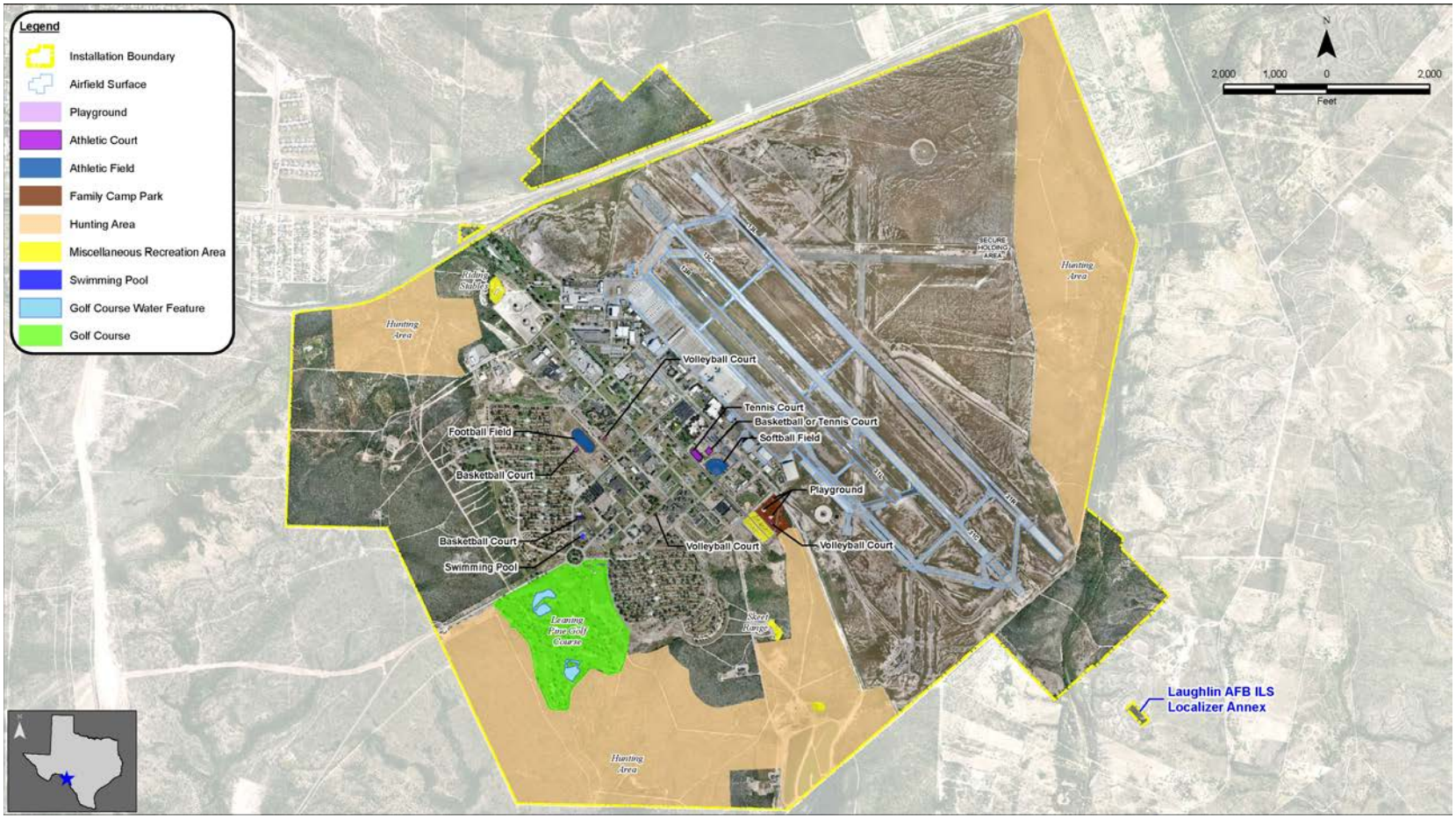


Figure 7-1
Outdoor Recreational Facilities Located on Laughlin AFB

7.11.1 Public Use and Access

Per the Sikes Act of 2012, military installations are mandated to provide public use and/or access to the following areas as appropriate:

Class I areas (General Outdoor) are areas which are suitable for intensive recreational activities such as camping, winter sports, and water sports.

All such areas on the main base and Southwinds Marina are open year-round to all military personnel, their guests and dependents, and all civilian personnel employed by Laughlin AFB. No clearance must be obtained prior to using these areas.

Class II areas (Natural Environment) are areas which are capable of supporting dispersed recreational activities such as hunting, fishing, birding, hiking, sightseeing, jogging, climbing, and riding.

These areas on the main base are open to all military personnel, DoD and retired military and their escorted guests and dependents, and authorized public by Laughlin AFB, provided the security posture is appropriate. These areas are open only for hunting during hunting season in accordance with the Laughlin AFB requirements.

Class III areas (Special Interest) are areas which contain valuable archaeological, botanical, ecological, geological, historic, zoological, scenic, or other features which require protection.

There are some archaeological sites not fitting Class III criteria. No other areas above have been identified within the boundaries of Laughlin AFB, Laughlin Auxillary Airfield, or the Southwinds Marina on Lake Amistad.

7.11.2 General Management and Regulatory Considerations

Table 7-2 outlines the general management and regulatory considerations for recreational areas by USAF policy to help facilitate proper use and etiquette.

Table 7-2
General Management and Regulatory Considerations for Recreational Areas

Fishing Considerations and Policies - Southwinds Marina on Lake Amistad	
Consideration	**Policy**
Access	Fishing tournaments are scheduled each year through the Outdoor Recreation Program. Hunting is authorized during TPWD-designated hunting season dates on Amistad National Recreation Area, but is not authorized at the Southwinds Marina. To hunt at the Amistad National Recreation Area, NPS must issue a hunting permit.
Reservations	The Outdoor Recreation coordinates the intramural tournaments and is responsible for tournament dates.
Restrictions on usage or number users	All personnel, whether military or civilian, who work on Laughlin AFB are eligible participate in tournaments.
Provisions of Rules of Conduct	Intramural fishing is controlled by the Sports Council Protest Committee, which enforces the rules of conduct and establishes penalties.

Fishing Considerations and Policies - Southwinds Marina on Lake Amistad	
Consideration	**Policy**
Maintenance of Southwinds Marina, Lake Amistad	Annual, weekly, and daily maintenance is conducted by the assigned staff. Painting, repairs and replacements are completed by the Base Operations Support contractor. This includes the AETC long-range construction program. The facility is inspected by Grounds Safety, Fire Department, Environmental Health, Environmental, and Force Support Squadron (FSS) personnel on a regular basis.
Public relations and publicity	FSS publishes activities through the weekly calendar of events, flyers, television, posters, Laughlin Services website, messages from Public Affairs office and the Laughlin Herald newspaper.
Hunting and Shooting Considerations and Policies	
Consideration	**Policy**
Access	The skeet and trap range is open by appointment only. The hunting program is open to the general public, subject to the requirements for safety, security of government property, accomplishment of the military mission and being within the ability of the resources to support such activities without a bona fide impairment to base resources. All non-military personnel have the same privileges of hunting on Laughlin AFB as military personnel with the exception of access to morale, welfare, and recreational facilities as governed by AFI 34-101.
Reservations	Contact Outdoor Recreation
Restrictions on usage or number users	The skeet and trap range is open to everyone on base, and guests are welcome.
Provisions of Rules of Conduct	The state of Texas regulates hunting. The 47th Security Forces Squadron (SFS) on base regulates shotgun usage at the skeet and trap range. To use the skeet and trap range, contact the skeet and trap range manager at Outdoor Recreation.
Maintenance of Outdoor Recreation Area	CES performs annual and weekly maintenance at the skeet and trap range. FSS and the skeet and trap management conduct self-help projects. This facility is inspected by Grounds Safety on an annual basis with several spot checks during the year.
Conduct of census	The skeet and trap range is rarely used. It is open by appointment only.
Public relations and publicity	Information on skeet and trap shooting is disseminated through flyers, weekly calendars of events, and the FSS pamphlet.

Picnicking	
Consideration	**Policy**
Access	Picnic areas include the base picnic area (FAMCAMP), golf course picnic, observation area, outdoor recreation area, and Southwinds Marina picnic area. All picnic areas may be used from dawn to dusk.
Reservations	The base picnic area is handled by the Outdoor Recreation staff. The golf course picnic area is handled by the Golf Course management. The outdoor recreation area, Southwinds Marina picnic area, is handled by the Outdoor Recreation staff.
Restrictions on usage or number users	None
Provisions of Rules of Conduct	At their respective facilities, staff of Outdoor Recreation, golf course, and Southwinds Marina patrol and enforce rules established by their operating instructions.
Boating	
Consideration	**Policy**
Access	Laughlin AFB members may rent boats at the Southwinds Marina on Lake Amistad, during normal operating hours.
Reservations	The Outdoor Recreation staff books boat reservations on a first come, first serve basis. Individuals renting a boat must have a license issued by FSS.
Restrictions on usage or number users	The number of users is limited by the type of boat rented.
Provisions of Rules of Conduct	Outdoor Recreation management and the NPS enforce the rules.
Maintenance of Southwinds Marina on Lake Amistad	Boat maintenance facility is operated by FSS staff.
Conduct of census	A daily headcount is conducted by Outdoor Recreation staff.
Public relations and publicity	Boating is advertised through the weekly calendar of events, Outdoor Recreation brochure, and special flyers.
Horseback Riding	
Consideration	**Policy**
Access	Horseback riding is only for stable members and their guests.
Reservations	The stable manager can be contacted for stall rental.
Restrictions on usage or number users	Horses housed in the stable are all privately owned.
Provisions of Rules of Conduct	FSS conducts periodic inspections. There is also a 47 FTW instruction covering the stable operation. Patrons that house their horses at the stables have a committee that meets on a regular basis to enforce rules established by the committee.

Horseback Riding	
Consideration	**Policy**
Maintenance of horse stables	The stable committee holds self-help projects for improvement. Horse manure is hauled away by private individuals. The Grounds Safety Office, the Fire Department, and Environmental Health inspect on a periodic basis.
Conduct of census	There are 12 stalls.
Public relations and publicity	Anyone coming to Laughlin AFB with a horse may contact FSS for information regarding the stables.

7.11.3 Multiple Use Coordination

There is no conflict between land areas designated for pilot training and existing or proposed recreation areas. Activities in this plan do not adversely affect other natural resource management activities at Laughlin AFB.

Recreation areas at Lake Amistad and their designated use are coordinated with the NPS, the IBWC, and the TPWD.

7.11.4 Off-Road Vehicle Usage

Recreational use of off-road vehicles (ORV) is prohibited at Laughlin AFB. Contrary to the rugged appearance of the terrain in the undeveloped portions of the base, these areas are often fragile and susceptible to significant impact from ORV use. The arid climate, limited vegetative cover, and soil characteristics present a condition where impacts from ORV use can quickly lead to increased soil erosion. The sparse vegetation is typically slow-growing and will not regenerate quickly following impact from ORVs. Wildlife cover and habitat is limited in the open and arid environment, and impacts from ORV use can adversely affect available wildlife habitat.

Motor vehicles (including motorcycles and ORVs) are prohibited from driving on anything other than established roads and/or utility roads (not including walking/nature/bicycle trails). Travel on other areas is restricted to official patrols, required maintenance, access to officially recognized outdoor recreation areas (nature trails, hunting areas), or other official activity or work. The all-terrain vehicle training area, located on the western boundary of the base between perimeter marker 10 and 11, is restricted to SFS and CES Readiness personnel and is not open to the public.

7.12 Cultural Resources Protection

The management of cultural resources is covered by an ICRMP for Laughlin AFB. A copy of this plan is maintained by 47 CES/CEIE.

7.13 Enforcement

Currently, Laughlin AFB does not have a natural resource law enforcement officer on-site. Natural resources protected by federal laws, such as TES and wetlands are enforced by the applicable federal agency (e.g. USFWS enforces the ESA; USACE enforces the CWA, etc.). 47 CES/CEIE personnel are responsible for notifying the appropriate federal, state, or local law enforcement agency when enforcement is required.

The 47 SFS is the primary law enforcement agency on Laughlin AFB. 47 SFS personnel at

Laughlin AFB perform tasks such as base perimeter checks and are responsible for ensuring the safety of base weapons, property, and personnel.

7.14 Public Outreach

An important part of the public relations component of natural resource management on secure bases such as Laughlin AFB should include public awareness. Whenever possible, the public should be provided with information concerning how the USAF is addressing environmental problems and conserving natural resources. Although the public cannot regularly access Laughlin AFB, brochures, posters, videos and other natural resource program education materials should be developed and distributed.

Chapter 8 – Management Goals and Objectives

The emphasis of an INRMP using this format is to achieve certain goals for the maintenance and improvement of the natural environment at Laughlin AFB when resources are available and practical. This chapter lists the goals and objectives for future natural resources management on Laughlin AFB. The following is a list of specific natural resources management goals formulated for the INRMP from an assessment of the resources, current conditions, and management issues identified in the previous chapters. Consecutively numbered goals are accompanied by supporting objectives and projects in tiered format. The relationship between goals, objectives, and projects is outlined below.

Goals

A natural resources management program cannot be implemented efficiently and effectively without first defining clear goals. Goals are the primary focal points for the implementation of the INRMP over the five years covered by the plan. A goal should reflect the values of the installation by expressing a vision of a desired condition for the installation's natural resources in the foreseeable future. Each goal should be supported by one or more objectives.

Objectives

Each goal is supported by objectives which indicate a management initiative or strategy that will be used to achieve that stated goal. This enables managers to determine exactly when the objective is completed. All objectives listed below are anticipated to be completed between FY18 and FY22.

8.1 GIS Goals and Objectives

Goal 1: Collect, enhance, update, and maintain natural resources GIS data.

Objective 1.1: Ensure continual development, use, and maintenance of Laughlin AFB GIS database for Natural Resource Management.

Objective 1.2: Ensure that new natural resources data for Laughlin AFB are managed in a standardized and accurate way.

8.2 Fish and Wildlife Goals and Objectives

Goal 2: Manage fish and wildlife, based on an ecosystem-management approach.

Objective 2.1: Improve overall knowledge of base species and populations.

Objective 2.2: Manage deer population.

Goal 3: Maintain partnerships with agencies and groups involved in fish and wildlife management.

Objective 3.1: Maintain communication with USFWS and TPWD at least annually.

8.3 Threatened, Endangered, and Rare Species Goals and Objectives

Goal 4: Manage and protect sensitive species and priority habitats while protecting operational functionality of Laughlin AFB mission.

Objective 4.1: Monitor populations of threatened, endangered, and rare species.

Objective 4.2: Survey for species lacking in data on Laughlin AFB, as funding allows.

Goal 5: Remain in compliance with the ESA and continue to cooperatively support state protection goals.

Objective 5.1: Ensure development plans on base consider threatened, endangered, and rare species and their associated habitats by maintaining communication with project planning personnel.

Objective 5.2: Maintain correspondence with USFWS and TPWD regarding updates to federal and state listed threatened, endangered, and rare species.

8.4 Ground Maintenance Goals and Objectives

Goal 6: Improve effectiveness of grounds maintenance to the overall ecosystem.

Objective 6.1: Lessen or avoid adverse effects to the overall ecosystem and its sensitive resources from grounds activities.

Goal 7: Make maximum use of regionally native plant species and avoid introductions of invasive and exotic species in re-vegetation and landscaping activities.

Objective 7.1: Convert improved and semi-improved grounds on Laughlin AFB to semi-improved and unimproved grounds, respectively.

Goal 8: Protect life and property and accomplish resource management objectives.

Objective 8.1: Maintain trees and shrubs to avoid impact to buildings and infrastructure.

8.5 Wildland Fire Goals and Objectives

Goal 9: Decrease the potential for uncontrolled wildland fires at Laughlin AFB.

Objective 9.1: Prepare Laughlin AFB for wildland fires.

8.6 Pest Management Goals and Objectives

Goal 10: Prevent short- and long-term damage to natural resources by implementing coordinated pest and noxious species control.

Objective 10.1: Develop a noxious weed and invasive species control strategy.

8.7 Outdoor Recreation Goals and Objectives

Goal 11: Provide quality outdoor recreation experiences in the natural environment while sustaining ecosystem integrity.

Objective 11.1: Conserve and protect current environmental resources used in outdoor recreation.

Chapter 9 – Implementation

9.1 Work Plans

USAF general goals are discussed in the individual component 5-Year Work Plan, included in **Appendix C**. Key goals are summarized in **Table 9-1**.

Table 9-1
Identified Key Goals for Laughlin AFB's Existing plans within the 5-Year Work Plan

Item	Date Last Completed	Revision Frequency
List federal and state listed species observed on Laughlin AFB and from Val Verde County	2018	Annually
Update installation TES survey report	2018	Annually
Establish and maintain USFWS and TPWD contacts and coordination	2018	Annually
Maintain and update maps showing critical habitat within Val Verde County	2011	As necessary
Develop maps depicting hydric soils	2015	Update every 5 years
Update and develop non-point pollution plans addressing soil erosion prevention, pesticide and fertilizer use, and other natural resources management activities	2018	Update every 5 years
Develop and update map showing permitted wastewater and storm water discharge points	2018	Update every 5 years
Maintain and update floodplain maps	2016	Obtain from FEMA
Maintain copies of cooperative agreements and implementation plans for watershed protection	2015	Revise as necessary
Update water quality monitoring programs and sampling points	2017	Update every 5 years
Establish annual environmental compliance budget for watershed protection	2018	Annually, revise as necessary
Maintain, enforce, and update regulations for hunting, fishing, and trapping.	2018	Review annually, revise as necessary
Maintain and update SWPPP	2017	Review annually, revise as necessary
Develop and update specifications for landscape construction materials and irrigation system components	2016	Review and revise as necessary
Implement NPS cooperative agreement and coordination	2018	Review and renew every 5 years
Maintain and update Cultural Resources Management Plan	2018	Annually

Item	Date Last Completed	Revision Frequency
Update Assessment of Cultural Resources	1994	Review and update as necessary.

9.2 Natural Resources Management Staffing

Laughlin AFB has authorized six full-time positions devoted to environmental management: one Environmental Management Section Chief and five Environmental Program Managers. The Environmental Management Section Chief coordinates all activities to facilitate natural resource conservation without significantly impacting the goals and objectives of the military mission. The Environmental Management Section Chief coordinates mission activities with appropriate state and federal regulatory agencies, when required. The NRM ensures Laughlin AFB is fully compliant with the goals, objectives, and management guidelines stated in the INRMP. The five Environmental Program Managers are devoted to managing a variety of environmental management activities including, but not limited to: air and water quality, wastewater production, and hazardous waste management.

Environmental surveys, reports, and monitoring being conducted on Laughlin AFB are often accomplished on a contractual basis with independent consultants. As funding allows, the Natural Resources Management Program may require outside services to meet the goals outlined in the INRMP.

9.3 Annual Coordination Requirements

As required by AFI 32-7064, the INRMP must be reviewed annually and revised every five years. It is anticipated that if updates are required, they will mostly involve the incorporation of new and additional data to the natural resources database, which may result in some minor changes in maps and figures used in the INRMP.

For annual reviews, a letter report describing any required changes for the INRMP will be prepared. The letter report will be submitted to the 47 FTW/CC for review and approval. The letter report will be added to **Appendix D**. Copies of the report will be submitted to the following regulatory agencies following approval:

- USFWS; and
- TPWD.

Additionally, copies of any required amendment will be sent to any interested agencies or any other regulatory agencies potentially impacted by the update.

Every five years, the INRMP will be revised to include new data collected over the past five years and to accommodate any changes identified during annual reviews. Those changes will be incorporated into the body of the INRMP. New projects and project budgets will be projected and provided in the implementation section of the INRMP at that time. The five-year revision should involve coordination and discussions between regulatory agencies and the natural resources management staff to ensure that all parties are comfortable with the new INRMP. According to the Sikes Act, the following entities will review and provide signatory approval of the revised INRMP:

- 47 FTW Commander;
- USFWS, Regional Director, Southwest Region; and
- TPWD, Executive Director.

The revision to the INRMP may require an environmental assessment if the NRM determines that significant changes in natural resources management warrant formal NEPA analysis.

9.4 Monitoring INRMP Implementation

The completion of projects proposed by the INRMP for the five years following INRMP approval will be tracked by the NRM. This tracking could be accomplished in a spreadsheet. As part of the annual review for the INRMP, the NRM in coordination with the Environmental Management Section Chief, should prepare an annual report describing the accomplishments of that year's projects, as well as reasonable explanations as to why projects were not completed. If necessary, an updated list of management goals and objectives would be prepared as part of the update. The annual report should also include a discussion of problems and issues encountered in the implementation of the INRMP, if necessary. The CFT Chair will inform the 47 FTW Commander of the results of the annual review by submitting the report to the ESOHC through the CFT. As previously discussed, the proposed changes to the INRMP will be approved by the 47 FTW Commander, or designee, and provided to the USFWS and TPWD for their files.

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Appendix A – Surface Drainage Map

Appendix B – Environmental Restoration Program Map

Appendix C – 5-year Work Plan

Appendix D – Annual Review Documentation