



Department of Defense Legacy Resource Management Program

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**Herpetofauna Biodiversity
On
United States Air Force Installations**

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Final Report
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HERPETOFAUNA BIODIVERSITY ON UNITED STATES AIR FORCE INSTALLATIONS



CHRISTOPHER PETERSEN, ROBERT E. LOVICH, AND SARAH STALLINGS



Photo Credit:

Eastern Indigo Snake (*Drymarchon couperi*): J.D. Wilson

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*): Seth Berry

Pickerel Frog (*Lithobates palustris*): Paul Block

Frosted Flatwoods Salamander (*Ambystoma cingulatum*): Ron Cherry

Abstract

The United States Air Force occupies approximately 8.8 million acres of land within the United States. To date, no comprehensive inventory of the amphibian and reptile (herpetofauna) diversity has been conducted on Air Force properties. This study updated the herpetofauna species lists and analyzed those data from 80 Air Force installations within 37 states of the continental United States.

Our analysis has revealed Air Force installations support a total of 442 species (336 confirmed species and 106 potential species). Snakes are the most abundant herpetofauna species type on the installations. Including native and exotic herpetofauna species combined, Avon Park Air Force Range (AFR) has the greatest number of confirmed species (70 species). Eglin Air Force Base (AFB), Arnold AFB, Joint Base (JB) Charleston-Weapons Station, Sheppard AFB, Robins AFB, Shaw AFB-Poinsett Electronic Combat Range, Moody AFB, and Homestead Air Reserve Base (ARB) also all have high herpetofauna biodiversity with each having more than 50 confirmed species.

Our data confirm that Air Force installations are home to six federally-endangered species, ten threatened species, three candidate species, and 17 species currently under review by the United States Fish and Wildlife Service (USFWS). Overall, Cape Canaveral Air Force Station (AFS) has the greatest number of federally-listed (endangered, threatened, and candidate) herpetofauna species confirmed on its installation (nine species) in comparison to all Air Force sites.

Thirty-three species of amphibians and reptiles are confirmed present on Air Force installations in states where they are listed as state endangered or threatened. The Eastern Indigo Snake is the most common state-listed species confirmed present on Air Force installations and is found on nine sites in Florida and Georgia. Additionally, 36 species/subspecies of reptiles and amphibians confirmed on Air Force installations have a NatureServe status of G1/T1–G3/T3 and are considered species at risk. Of these, turtle species are the most common species at risk.

Twenty-six non-native amphibian and reptile species are confirmed on Air Force installations. The American Bullfrog, the Red-eared Slider, and the Mediterranean Gecko are the most common non-native species on Air Force installations. Homestead ARB has the most confirmed non-native species on its property (21 species).

Our analysis has revealed that 18 species of venomous snakes are confirmed on Air Force installations. The Barry M. Goldwater Range of Luke AFB has the greatest number of confirmed venomous snakes (six) in comparison to all other Air Force installations. The Copperhead is confirmed present at more Air Force installations (12) than any other venomous snake species.

Lastly, this analysis confirms that the herpetofauna biodiversity on Air Force installations is greater than that of both the United States (U.S.) Navy and Marine Corps and that approximately half of the total native biodiversity of all herpetofauna species documented in the continental United States inhabit Air Force installations.

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CHAPTER 1

Introduction

1.1 AMPHIBIANS AND REPTILES

Amphibians and reptiles (herpetofauna) account for a considerable portion of contemporary biodiversity and approximately 17,153 species have been described (AmphibiaWeb, 2012; Uetz, 1995a).

Approximately one new species of reptile or amphibian is described by the scientific community every week. Herpetofauna are found in nearly every habitat, occur on every continent except Antarctica (AmphibiaWeb, 2011; Vitt & Caldwell, 2008), and are both ecologically and culturally significant around the globe. Amphibians and reptiles are essential components of the ecosystems they inhabit, maintaining the ecological integrity of their habitats as both predators and prey, often surpassing other vertebrate groups in terms of species abundance or diversity (Ernst & Lovich, 2009; Semlitsch, 2003; Stuart et al., 2008; Klemens, 2000; Vitt & Caldwell, 2008) and serving as indicators of environmental health (Ernst & Lovich, 2009; Hayes et al., 2006; Hayes et al., 2002; Johnson et al., 2007; Pounds et al., 2006).

Herpetofauna are excellent indicator species, meaning populations will start to show signs of distress quickly when their ecosystem is under pressure. This sensitivity to environmental changes has contributed to relatively high extinction rates in herpetofauna. Recent extinction rates of amphibians may be more than 200 times that of historical background rates (McCallum, 2007). There are at least six major causes of recent herpetofauna declines and extinctions: habitat loss; land conversion; collection for commercial trade; introduction of exotic species that prey on, compete with, and parasitize native amphibians; environmental contaminants; climate change; and infectious disease (Collins, 2010; Collins and Crump, 2009; Marks, 2006; Ribeiro et al., 2009).

Management of herpetofauna is necessary not only to protect those species, but also to protect all of the inter-related species in the food web. Managing habitats for herpetofauna can have positive impacts on the entire ecosystem.

1.2 NATURAL RESOURCES MANAGEMENT AND ENDANGERED SPECIES ACT COMPLIANCE ON MILITARY LANDS

The Department of Defense (DoD) manages approximately 25 million acres of land and water, much of which is habitat for a diversity of native flora and fauna (Stein et al., 2008). The primary tool for implementation of natural resource management at Air Force installations is an Integrated Natural Resource Management Plan (INRMP). The Air Force, with the assistance from the U.S. Fish and Wildlife Service (USFWS) and the respective state conservation agencies, is responsible under the Sikes Act (16 U.S.C. 670a-670f, as amended) for carrying out programs and implementing management strategies to conserve and protect biological resources, including herpetofauna, on its lands.

The United States Air Force occupies approximately 8.8 million acres within the United States. The Air Force and other DoD Services strive to provide the most realistic training and testing environments possible for troops in order to maintain military readiness. The Air Force controls entry to its installations as a matter of national security and public safety. As a result, much of the Air Force land provides some of the best remaining natural habitat for America's native species, including amphibians and reptiles. In some cases, DoD lands are some of the only large tracts of habitat left in an area for native species

(Benton et al., 2008) making those prime locations for herpetofauna conservation and management. In fact, American military lands harbor some of the greatest concentrations of endangered and threatened habitats and species in the United States (Stein et al. 2008).

As a federal agency, the Air Force must comply with the Endangered Species Act (ESA) to protect and conserve listed species. The Air Force, and other DoD Services, is in a unique position to secondarily promote and conserve biodiversity while still carrying out its primary mission of training and preparing troops.

1.3 MANAGEMENT OF HERPETOFAUNA ON MILITARY LANDS

The Air Force takes an ecosystem-based approach to natural resources management—which is implemented at installations using an INRMP. While policies do not specifically address herpetofauna on Air Force lands, this management approach and the projects and practices implemented through INRMPs benefit these species both directly and indirectly. In addition, the Air Force has subject matter experts in the fields of wildlife biology and herpetology that conduct inventories; perform research and monitoring; and develop outreach, training, and management plans to meet military mission goals while promoting stewardship and conservation for amphibians and reptiles.

The Department of Defense Partners in Reptile and Amphibian Conservation (DoD PARC) program was formed in 2009 with the mission of sustaining amphibian and reptile populations and habitats through proactive environmental stewardship, conservation, outreach, and partnerships. DoD PARC is a network of experts and professionals within the DoD dedicated to providing a, “framework for the effective management of amphibians and reptiles by the military services and their installations” (<http://www.dodnaturalresources.net/DoD-PARC.html>). DoD PARC has become a leading organization assisting the military Services with their herpetofauna management and conservation by providing education and guidance and by developing partnerships in support of the military mission.

On February 19, 2015, the acting Assistant Secretary of Defense (Energy, Installations and Environment), John Conger, signed a memo formally endorsing the, “The Strategic Plan for Amphibian and Reptile Conservation and Management on Department of Defense Lands” (Lovich et al. 2015). This milestone was accomplished after five years of effort to formalize conservation and management of these important taxa for the benefit of military training and testing. The plan describes strategies and priorities to inform and enhance the DoD’s natural resources management activities, and is intended to help natural resource managers better address the conservation and protection of amphibians and reptiles and their habitats; help commanders comply with the ESA and the National Environmental Policy Act; and help commanders and resource managers achieve mission objectives.

1.4 PURPOSE

This survey updated, compiled, and analyzed herpetofauna species lists for Air Force installations in the continental United States with significant natural resources. The focus of this project was those installations that have a current INRMP. Once completed, the updated species lists can be used by installation biologists to identify data gaps in the herpetofauna biodiversity of a particular site or as a tool to plan for baseline or species-specific surveys. They can also be used by Air Force leadership to investigate the total herpetofauna biodiversity on their lands and also as a tool to identify which installations have ESA or protected species—particularly when investigating the presence or absence of herpetofauna species as they are proposed or petitioned for listing by the U.S. Fish and Wildlife Service. In addition, this information will facilitate data sharing between Air Force installations, regions, and state and federal partners and help foster effective, cooperative conservation initiatives and partnerships.

CHAPTER 2

Methods

2.1 DEVELOPING THE NATIONAL AND REGIONAL HERPETOFAUNA INVENTORY

We used multiple sources to compile and update the Air Force installation herpetofauna species lists used for this study. The following protocol was followed to develop and refine the species lists:

1. A preliminary list of reptile and amphibian species was developed using the Herpetological Database, a Microsoft Access database that produces a county-level species list using data from VertNet (<http://vertnet.org/>), and the National Amphibian Atlas (http://armi.usgs.gov/national_amphibian_atlas.php, amphibian occurrences) for each installation that has an INRMP.
2. The preliminary species list was then compared to the existing installation INRMP species list (if available) and installation species herpetological surveys or species inventories to identify those species that have been confirmed on the installation.
3. The draft species list was then sent to a state wildlife agency biologist/herpetologist or a regional expert to verify that the species on the list could potentially occur on the installation based upon the known species distribution within the state.
4. The pre-final list was sent to each installation's natural resource manager by Air Force Headquarters for review and validation.

We followed protocol for each of the Air Force installations within the continental United States having enough significant natural resources to require an INRMP. In some cases, a major Air Force installation has one or several geographically-distinct parcels under its command. These parcels, if included in the INRMP, were considered separately in this analysis and a herpetofauna list was developed for each. Once installation-level lists were complete, they were compiled into a Microsoft Excel spreadsheet and analyzed together.

We updated the species lists to reflect the most recent federal, state, and NatureServe statuses as of July 2015. Additional information, such as if a particular species is not native, was obtained from a spreadsheet managed by the national PARC organization (Nanjappa & Conrad, 2014).

Subspecies designation (if known) was used during the development of the herpetofauna species lists for each Air Force installation. However, because one goal of this analysis was to investigate species diversity on all Air Force installations, the analysis was conducted on the species level. Subspecies level is only used in this report if the subspecies has a conservation status designation (federal or state) that differs from the full species level. Scientific and common nomenclature was standardized abiding by the Standard English and Scientific Names Committee standards

(http://www.ssarherps.org/pages/comm_names/Index.php) (Crother, 2012).

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CHAPTER 3

Data Analysis

Upon completion of the individual Air Force installation herpetofauna species lists, data was analyzed based on species occurrence (number of confirmed or potential species [unconfirmed species]); federal, state, and NatureServe status; and occurrence of non-native and venomous species. In addition, the Air Force herpetofauna biodiversity was compared to that of all amphibian and reptile species found within the continental United States and to that of the U.S Navy and U.S. Marine Corps (data is not available for the U.S. Army at the time of this analysis).

3.1 DETERMINATION OF OCCURRENCE ON EACH INSTALLATION

Species are considered confirmed present on an installation when there is literature present endorsing that the species occurs on the installation. Literature is often in the form of site-specific survey data or a report produced by a professional herpetologist or contractor, a museum voucher, or data presented in the installation's INRMP. Personal observations from a reliable source, such as an installation natural resource manager or field biologist, are also accepted in some cases following a review of the supporting information. Citations are provided in the herpetofauna lists for every confirmed species.

Species are considered potential when the installation property is within the circumscribed natural or introduced range of that species and the species has been documented in the same county as a particular Air Force installation, but a specimen has not been confirmed within the boundaries of the installation. Thus a potential species is unconfirmed on an installation.

3.2 FEDERAL, STATE, AND NATURESERVE STATUS

3.2.1 Federal Status

Federally-protected species were determined by reviewing the USFWS Web site (<http://www.fws.gov/endangered/species/index.html>), lists, and publications.

Species listed under the ESA are assigned to one of four categories. In order of increasing imperilment, these categories are:

1. Petitioned species/Under review—Species that are currently under review by the USFWS and data is being collected to make an informed decision regarding listing. For the purposes of this study, a species was considered under review when the species did not have a federal status rank, but may warrant future consideration.
2. Candidate species—Species for which the USFWS or the National Oceanic and Atmospheric Administration Fisheries has sufficient information on file regarding biological vulnerability and threats to support a proposal to list as endangered or threatened, but listing is precluded due to lack of funds or other listing actions of higher priority. Candidate species should be considered to be in line for future listing as either threatened or endangered.

3. Proposed species- Candidate species that were found to warrant listing as either threatened or endangered and were officially proposed as such in a Federal Register notice after the completion of a status review and consideration of other protective conservation measures.
4. Threatened species—A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Collection, harassment, hunting, or killing of a threatened species or its parts is prohibited under the ESA and is only permissible under very specific circumstances.
5. Endangered species—A species that is in danger of extinction throughout all or a significant portion of its range (Endangered Species Glossary-Midwest Region, 2013). Collection, harassment, hunting, or killing of an endangered species or its parts is prohibited under the ESA and is only permissible under very specific circumstances.

3.2.2 State Status

State-listed threatened and endangered species were determined and recorded for each Air Force installation. These data were obtained using a spreadsheet updated by PARC annually and verified by state biologists who reviewed the lists for each Air Force installation (Nanjappa & Conrad, 2014). The Air Force strives to conserve or manage state-listed species on its lands and work closely with the respective states to avoid negative impacts to these species to help prevent their decline.

3.2.3 NatureServe Status

NatureServe is an international, non-profit conservation organization that collects information on species and ecosystems, and develops conservation tools and services to help meet local, national, and global conservation needs (NatureServe Network, 2013). The DoD uses NatureServe species rankings as a tool to identify species on their lands that may be in need of conservation or of special management practices.

The NatureServe ranking of a species is important to installation natural resource managers providing them an understanding of the conservation status of a particular species on a global scale. This information is useful when determining if a species is at risk of becoming listed an endangered or threatened at the state or federal level. This ranking is also useful when planning for future surveys and when developing long-term conservation strategies.

NatureServe assigns a conservation status rank to species by scoring the species in ten categories, weighting the scores and combining them into an overall numeric score, which is then converted into a calculated rank. The conservation status is based on three factors: rarity, threats, and trends (Faber-Langendoen et al., 2012). NatureServe assigns rounded global status ranked on a scale of G5 to G1, with G5 standing for secure and G1 standing for critically imperiled (table 1). This scale best reflects the global condition of a species without qualifiers or ranges (NatureServe Explorer, 2013). Species with a rank of G1–G3 are considered species at risk and are identified in this report.

Table 1. NatureServe Conservation Status Rank Definitions

G1	Critically Imperiled—At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled—At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable—At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently Secure—At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure—At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

3.3 NON-NATIVE SPECIES

A species is considered non-native in this analysis when it occurs, or potentially occurs, on an Air Force installation in a state where it is not native. The non-native designations used are from data maintained by members of the PARC organization and are updated annually (Nanjappa & Conrad, 2014). Many species that are non-native become pests or invasive species because they cause harm to or unbalance the native ecosystems.

3.4 VENOMOUS SPECIES

Venomous snakes were included in this analysis due to the potential risk of negative human-wildlife interactions and include Rattlesnakes (*Crotalus spp.* and *Sistrurus spp.*), Cottonmouths (*Agkistrodon piscivorus spp.*), Copperheads (*Agkistrodon contortrix spp.*), and Coralsnakes (*Micrurus spp.* and *Micruroides spp.*). Two species of venomous lizards found in the United States, the Gila Monster (*Heloderma suspectum*) and the Beaded Lizard (*Heloderma horridum*) were also included in the analysis.

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Chapter 4

Results

4.1 AIR FORCE INSTALLATIONS

The herpetofauna species lists were updated and these data were analyzed for 80 Air Force installations (115 unique locations including installation detachments; table 2). The installations are located in 37 states within the continental United States (figure 4-1). Only those installations that have a current INRMP were included in the analysis, since these sites would have significant natural resources to support herpetofauna populations.



Air Force Installations



Figure 4-1. Map of Air Force Installations.

Table 2. Air Force Installations Included in
the 2015 Herpetofauna Inventory Analysis (Sheet 1 of 3)

Installation Name	Installation Detachment	State
611th Air Support Group	Barrow Point Long Range Radar Site (LRRS) Barter Island LRRS 641 Cold Bay LRRS Indian Mountain LRRS King Salmon Airport Kotzebue LRRS Cape Lisburne LRRS Murphy Dome LRRS Cape Newenham LRRS Oliktok LRRS Cape Romanzof LRRS Sparrevohn LRRS Tatalina LRRS Tin City LRRS Yukon Fort Yukon LRRS	Alaska
Altus AFB	Main Base	Oklahoma
Arnold AFB	Main Base	Tennessee
Avon Park AFR	Main Base	Florida
Bangor IAP Air National Guard Base (ANGB)	Main Base	Maine
Barksdale AFB	Main Base	Louisiana
Beale AFB	Main Base	California
Buckley AFB	Main Base	Colorado
Cannon AFB/Melrose AFR	Main Base	New Mexico
Cape Canaveral AFS	Main Base	Florida
Cape Cod AFS	Main Base	Massachusetts
Cavalier AFS	Main Base	North Dakota
Cheyenne Mountain AFS	Main Base	Colorado
Columbus AFB	Main Base	Mississippi
Dare County Range	Main Base	North Carolina
Davis-Monthan AFB	Main Base	Arizona
Dobbins ARB	Main Base	Georgia
Dyess AFB	Main Base	Texas
Edwards AFB	Main Base	California
Eglin AFB	Main Base	Florida
Eielson AFB	Main Base Birch Lake Recreation Area Blair Lake AFR Chena River Research Site	Alaska
Ellsworth AFB	Main Base	South Dakota

Table 2. Air Force Installations Included in
the 2015 Herpetofauna Inventory Analysis (Sheet 2 of 3)

Fairchild AFB	Main Base Clear Lake Recreation Area Cusick Survival Training Site Lookout Pass Survival Training Site	Washington
Francis E. Warren AFB	Main Base	Wyoming
Gila River Air Force Space Surveillance Station	Main Base	Arizona
Goodfellow AFB	Main Base	Texas
Grand Forks AFB	Main Base	North Dakota
Hanscom AFB	Main Base Maynard/Sudbury Geophysics Radar Laboratory Annex Sagamore Hill Solar Weather Observatory Annex	Massachusetts
Hill AFB	Main Base Little Mountain TTR Utah TTR	Utah
Holloman AFB	Main Base	New Mexico
Homestead ARB	Main Base	Florida
Hurlburt Field	Main Base	Florida
Jacksonville ANG	Main Base	Florida
Jefferson Proving Grounds (Indiana Air National Guard)	Main Base	Indiana
Joint Base (JB) Andrews	Main Base	Maryland
JB San Antonio	Camp Bullis Training Annex Lackland AFB Randdolf AFB Seguin Aux Field	Texas
JB Charleston	Weapons Station	South Carolina
JB Elmendorf-Richardson	Main Base	Alaska
JB Langley-Eustis	Langley	Virginia
JB Lewis-McCord	Main Base	Washington
JB McGuire-Dix-Lakehurst	Main Base	New Jersey
Kirtland AFB	Main Base	New Mexico
Laughlin AFB	Main Base	Texas
Little Rock AFB	Main Base	Arkansas
Luke AFB	Main Base Barry M. Goldwater Range–East	Arizona
MacDill AFB	Main Base	Florida
Malmstrom AFB	Main Base	Montana
March ARB	Main Base	California
Maxwell AFB	Main Base	Alabama
McConnell AFB	Main Base	Kansas

Table 2. Air Force Installations Included in
the 2015 Herpetofauna Inventory Analysis (Sheet 3 of 3)

McEntire Joint National Guard Base (JNGB)	Main Base	South Carolina
Minot AFB	Main Base	North Dakota
Moody AFB	Main Base	Georgia
Mountain Home AFB	Main Base Electronic Combat Site Juniper Butte Range Saylor Creek Range Small Arms Range	Idaho
Nellis AFB/ Creech AFB/Nevada TTR	Main Base/Range	Nevada
New Boston AFS	Main Base	New Hampshire
Niagara Fall ARS	Main Base	New York
Offutt AFB	Main Base	Nebraska
Otis ANG	Main Base	Massachusetts
Patrick AFB	Main Base	Florida
Peterson AFB	Main Base	Colorado
Pillar Point AFS	Main Base	California
Pope AFB	Main Base	North Carolina
Robins AFB	Main Base	Georgia
San Diego Air Force Space Surveillance Station	Main Base	California
Schriever AFB	Main Base	Colorado
Scott AFB	Main Base	Illinois
Seymour-Johnson AFB	Main Base Fort Fisher Recreation Area	North Carolina
Shaw AFB/Poinsett Electronic Combat Range	Main Base	South Carolina
Sheppard AFB	Main Base	Texas
Tinker AFB	Main Base	Oklahoma
Travis AFB	Main Base	California
Tyndall AFB	Main Base	Florida
U.S. Air Force Academy	Main Base	Colorado
Vance AFB	Main Base Kegelman Auxiliary Airfield	Oklahoma
Vandenberg AFB	Main Base	California
Warren Grove ANG	Main Base	New Jersey
Westover ARB	Main Base	Massachusetts
Whiteman AFB	Main Base	Missouri
Wright-Patterson AFB	Main Base	Ohio

4.2 CONFIRMED AND POTENTIAL SPECIES

Analysis of the herpetofauna inventory data from all 80 installations shows Air Force installations have 336 confirmed species present and an additional 106 species with the potential to be present (table 3). There are 120 confirmed amphibian species and 216 confirmed reptile species on the Air Force installations evaluated in this report. Of the species types, snakes have the greatest number and percentage of confirmed species (102 species/30 percent) and also the largest number of potential species (34 species; figures 4-2, 4-3).

Table 3. Species Type and Occurance on Air Force Installations (2015)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	69	12	81	85	15
Salamanders	51	23	74	69	31
Lizards	74	27	101	73	27
Snakes	102	34	136	75	25
Turtles	37	10	47	79	21
Crocodiles/ Alligators	3	0	3	100	0
Total	336	106	442	—	—

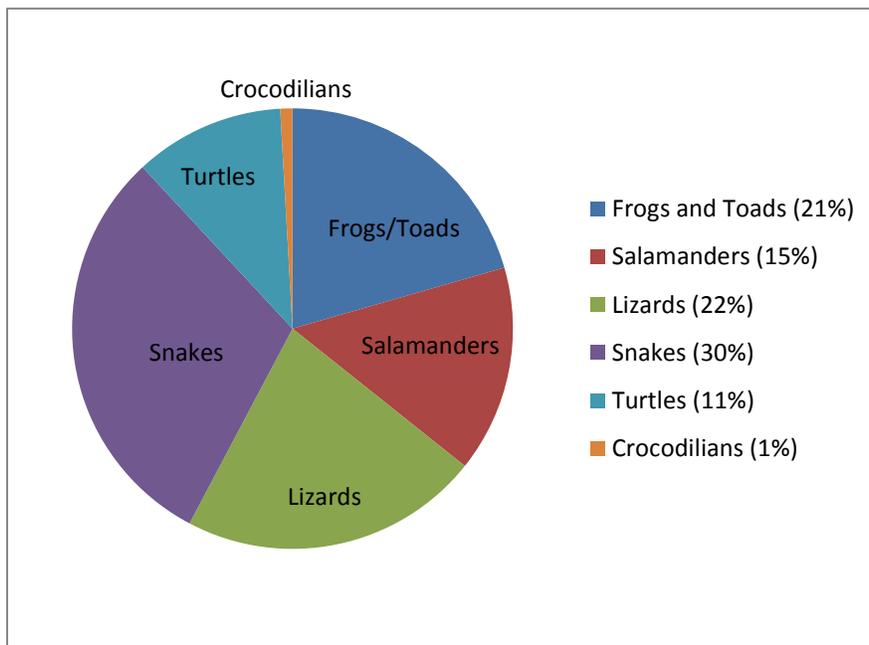


Figure 4-2. Percent of Confirmed Species on Air Force Installations by Species Type

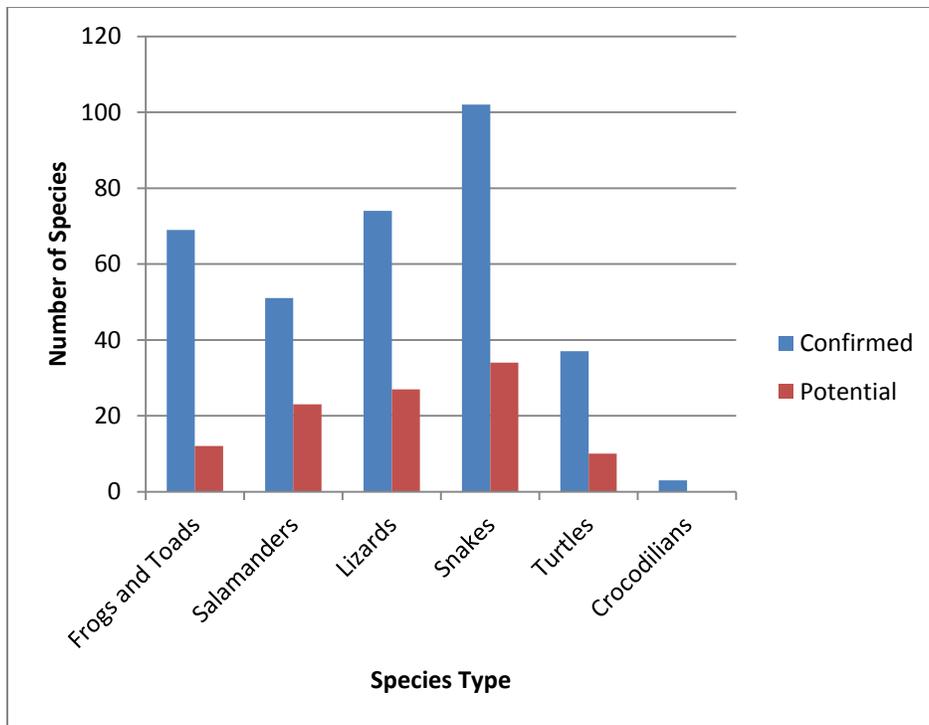


Figure 4-3. Number of Confirmed and Potential Species on Air Force Installations by Species Type

Comparison of the number of confirmed reptiles and amphibian species on each of the Air Force installations has revealed that Avon Park AFR has the greatest number of confirmed species (70 species). Additional installations with high numbers of confirmed herpetofauna species include: Eglin AFB (62 species); Arnold AFB (61 species); Joint Base Charleston-Weapons Station (59 species); Sheppard AFB (57 species); Robins AFB (57 species); Shaw AFB-Poinsett Electronic Combat Range (56 species); Moody AFB (55 species); Homestead ARB (53 species); Tinker AFB (45 species); Barksdale AFB (45 species). Eglin AFB would have the greatest herpetofauna biodiversity of all Air Force installations if all of the species listed as potential were confirmed (118 species).

4.3 FEDERAL, STATE, AND NATURESERVE STATUS

4.3.1 Confirmed Species—Federally Endangered, Threatened, Candidate, Under Review

Six species of reptiles and amphibians confirmed present on Air Force installations are federally listed as endangered by the USFWS (table 4). Of the species types, four are sea turtles, one is a frog, and one is a salamander. The Leatherback Sea Turtle (*Dermochelys coriacea*) is the most common federally-listed endangered species on Air Force lands and is confirmed on six installations located along the Atlantic coast, the Pacific coast, and the Gulf of Mexico.

Table 4. Federally-Listed Endangered Species Confirmed Present on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. See appendix A for Specific Locations.

Common Name	Species Name	Federal Status	No. of Air Force Sites Confirmed Present
Dusky Gopher Frog	<i>Lithobates sevosus</i>	Endangered	1
Green Sea Turtle	<i>Chelonia mydas</i>	Endangered in Florida and /Threatened	5
Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	Endangered	2
Kemp’s Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered	5
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered	6
Reticulated Flatwoods Salamander	<i>Ambystoma bishop</i>	Endangered	2

Ten species of reptiles and amphibians confirmed present on Air Force installations are federally listed as threatened by the USFWS (table 5). Of the species types, three are turtles; two are crocodylians; two are frogs; and one each salamander, lizard, and snake. The American Alligator (*Alligator mississippiensis*) is the most common federally-listed threatened species on Air Force lands and occurs on fourteen installations (figure 4-4). Although this species was delisted in 1987, it is still protected under the ESA as similarity of appearance (threatened) due to their close resemblance to crocodiles. The second most common threatened species is the Eastern Indigo Snake (*Drymarchon couperi*) which occurs on nine Air Force installations (figure 4-5).



Figures 4-4. American Alligator



Figure 4-5. Eastern Indigo Snake

Table 5. Federally-Listed Threatened Species Confirmed Present on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. See appendix A For Specific Locations.

Common Name	Species Name	Federal Status	No. of Air Force Sites Confirmed Present
American Alligator	<i>Alligator mississippiensis</i>	Threatened-Similarity of Appearance	14
American Crocodile	<i>Crocodylus acutus</i>	Threatened	1
Atlantic Saltmarsh Watersnake	<i>Nerodia clarkii taeniata</i>	Threatened	1
Bog Turtle	<i>Glyptemys muhlenbergii</i>	Threatened	1
California Red-legged Frog	<i>Rana draytonii</i>	Threatened	2
California Tiger Salamander	<i>Ambystoma californiense</i>	Threatened/Endangered	1
Desert Tortoise	<i>Gopherus agassizii</i>	Threatened	1
Eastern Indigo Snake	<i>Drymarchon couperi</i>	Threatened	9
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened	5
Oregon Spotted Frog	<i>Rana pretiosa</i>	Threatened	1

Three species of reptiles and amphibians confirmed on Air Force installations are federally listed as candidate species by the USFWS (table 6). Of the species types, one is a turtle, one is a frog, and one is a snake. The Gopher Tortoise (*Gopherus polyphemus*) is the most common candidate species and occurs on eight Air Force installations (Avon Park AFR, Cape Canaveral AFS, Eglin AFB, Hurlburt Field, MacDill AFB, Moody AFB, Patrick AFB, Tyndall AFB; figure 4-6).



Figure 4-6. Gopher Tortoise

Table 6. Federally-Listed Candidate Species Confirmed Present on Air Force Installations (2015).
 Species Arranged Alphabetically by Common Name. See appendix A For Specific Locations.

Common Name	Species Name	Federal Status	No. of Air Force Sites Confirmed Present
Columbia Spotted Frog	<i>Rana luteiventris</i>	Candidate	1
Eastern Massasauga	<i>Sistrurus catenatus</i>	Candidate	1
Gopher Tortoise	<i>Gopherus polyphemus</i>	AL, MS, LA–Federally Threatened Elsewhere–Candidate	8

Seventeen species of reptiles and amphibians are confirmed present on Air Force installations that are currently under review by the USFWS (table 7). Of the species types, five are turtles, five are snakes, three are salamanders, two are frogs/toads, and two are lizards. Our data show that the Spotted Turtle (*Clemmys guttata*) is confirmed on more Air Force installations (seven) than any other species currently under review (figure 4-7).



Figure 4-7. Spotted Turtle

Table 7. Species Currently Under Review by the USFWS and Confirmed Present on Air Force Installations (2015). Species Arranged Alphabetically by Common Name. See appendix A For Specific Locations.

Common Name	Species Name	Federal Status	No. of Air Force Sites Confirmed Present
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	Under Review	4
Blanding's Turtle	<i>Emydoidea blandingii</i>	Under Review	1
Cascade Caverns Salamander	<i>Eurycea latitans</i>	Under Review	1
Desert Massasauga	<i>Sistrurus catenatus edwardsii</i>	Under Review	2
Eastern Diamond-backed Rattlesnake	<i>Crotalus adamanteus</i>	Under Review	5
Florida Pinesnake	<i>Pituophis melanoleucus mugitus</i>	Under Review	1
Florida Scrub Lizard	<i>Sceloporus woodi</i>	Under Review	1
Gopher Frog	<i>Lithobates capito</i>	Under Review	4
Hellbender	<i>Cryptobranchus alleganiensis</i>	Under Review	1
Kirtland's Snake	<i>Clonophis kirtlandii</i>	Under Review	1
Southern Hog-nosed Snake	<i>Heterodon simus</i>	Under Review	2
Spot-tailed Earless Lizard	<i>Holbrookia lacerate</i>	Under Review	1
Spotted Turtle	<i>Clemmys guttata</i>	Under Review	7
Texas Salamander	<i>Eurycea neotenes</i>	Under Review	1
Western Pond Turtle	<i>Actinemys marmorata</i>	Under Review	4
Western Spadefoot	<i>Spea hammondi</i>	Under Review	1
Wood Turtle	<i>Glyptemys insculpta</i>	Under Review	1

Cape Canaveral AFS has the greatest number of federally-listed (endangered, threatened, and candidate) herpetofauna species confirmed present on its installation (nine species) in comparison to all Air Force installations. Eglin and Patrick Air Force Bases are next, each having eight federally-listed species. Avon Park AFR and New Boston AFS have the greatest number of species confirmed that are currently under review by the USFWS (three each).

4.3.2 Potential Species—Federally Endangered, Threatened, Candidate, Under Review

The San Francisco Gartersnake (*Thamnophis sirtalis tetrataenia*) is federally listed as endangered and has the potential to occur (not confirmed) on Pillar Point AFS. Federally-listed threatened species with the

potential to occur on Air Force sites include the Frosted Flatwoods Salamander (*Ambystoma cingulatum*—Jacksonville ANG, Joint Base Charleston-Weapons Station, and Robins AFB), the Giant Gartersnake (*Thamnophis gigas*—Beale AFB), and the Florida Sand Skink (*Plestiodon reynoldsi*—Homestead AFB and Avon Park AFR). There are no additional candidate herpetofauna species with the potential to occur on Air Force sites (excluding those candidate species that have been confirmed [table 6]). Lastly, eight species of herpetofauna under review by the USFWS have the potential to be present on Air Force installations (appendix A). Future surveys may confirm the presence of these species (appendix A).

4.3.3 State Status

4.3.3.1 Confirmed Species—State Threatened and Endangered

The data show 33 species of amphibians and reptiles are confirmed present on Air Force installations in states where they are listed as state endangered or threatened (table 8, figure 4-8). Of the species types, 12 are turtles, 9 are snakes, 5 are frogs/toads, 4 are salamanders, 2 are crocodylians, and 1 is a lizard. Cape Canaveral AFS has the greatest number of state-listed threatened and endangered herpetofauna species (eight species). The Eastern Indigo Snake (*Drymarchon couperi*) is the most common state-listed species confirmed present on Air Force sites and is found on nine installations in Florida and Georgia (Avon Park AFR, Cape Canaveral AFS, Eglin AFB, Homestead ARB, Hurlburt Field, MacDill AFB, Moody AFB, Patrick AFB, and Tyndall AFB) where it is listed as state threatened. The Gopher Tortoise (*Gopherus polyphemus*) is also a common state-listed species on Air Force sites and is confirmed present on eight Air Force installations in Florida and Georgia (Avon Park AFR, Cape Canaveral AFS, Eglin AFB, Hurlburt Field, MacDill AFB, Moody AFB, Patrick AFB, and Tyndall AFB).



Figure 4-8. (Top, left to right) Green Sea Turtle, Kemp's Ridley Sea Turtle, Eastern Massasauga
(Bottom, left to right) Southern Hog-nosed Snake, Rainbow Snake, Timber Rattlesnake.

Table 8. State-Listed Endangered and Threatened Species Confirmed Present on Air Force Installations (2015). Species Arranged Alphabetically by Common Name. See appendix A For Specific Locations.

State Status	Species Name
Endangered and Threatened	Alligator Snapping Turtle (<i>Macrochelys temminckii</i>) American Alligator (<i>Alligator mississippiensis</i>) American Crocodile (<i>Crocodylus acutus</i>) Atlantic Saltmarsh Watersnake (<i>Nerodia clarkii taeniata</i>) Blanding's Turtle (<i>Emydoidea blandingii</i>) Bog Turtle (<i>Glyptemys muhlenbergii</i>) California Tiger Salamander (<i>Ambystoma californiense</i>) Cascade Caverns Salamander (<i>Eurycea latitans</i>) Crawfish Frog (<i>Lithobates areolatus</i>) Eastern Hog-nosed Snake (<i>Heterodon platirhinos</i>) Eastern Indigo Snake (<i>Drymarchon couperi</i>) Eastern Massasauga (<i>Sistrurus catenatus</i>) Gopher Frog (<i>Lithobates capito</i>) Gopher Tortoise (<i>Gopherus polyphemus</i>) Green Sea Turtle (<i>Chelonia mydas</i>) Hawksbill Sea Turtle (<i>Eretmochelys imbricata</i>) Hellbender (<i>Cryptobranchus alleganiensis</i>) Kemp's Ridley Sea Turtle (<i>Lepidochelys kempii</i>) Kirtland's Snake (<i>Clonophis kirtlandii</i>) Leatherback Sea Turtle (<i>Dermochelys coriacea</i>) Loggerhead Sea Turtle (<i>Caretta caretta</i>) Mohave Desert Tortoise (<i>Gopherus agassizii</i>) Northern Leopard Frog (<i>Lithobates pipiens</i>) Oregon Spotted Frog (<i>Rana pretiosa</i>) Pine Barrens Treefrog (<i>Hyla andersonii</i>) Northern Pinesnake (<i>Pituophis m. melanoleucus</i>) Rainbow Snake (<i>Farancia erytrogramma</i>) Reticulated Flatwoods Salamander (<i>Ambystoma bishop</i>) Southern Hog-nosed Snake (<i>Heterodon simus</i>) Spotted Turtle (<i>Clemmys guttata</i>) Texas Horned Lizard (<i>Phrynosoma cornutum</i>) Texas Tortoise (<i>Gopherus berlandieri</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)

4.3.3.2 Potential Species—State Threatened or Endangered

The data show 35 species of amphibians and reptiles have the potential to be present on Air Force installations in states where they are listed as state endangered or threatened (table 9). Of the species types, 11 are snakes, 8 are turtles, 7 are salamanders, 6 are frogs/toads, 2 are lizards, and 1 is a crocodylian. Joint Base Charleston–Weapons Station and McEntire JNGB have the greatest number of state-listed species with the potential to be present on these installations. The following state-listed species have the potential to occur at Joint Base Charleston–Weapons Station: Frosted Flatwoods Salamander, Spotted Turtle, Southern Hog-nosed Snake, Gopher Frog, and Northern Dwarf Siren. Lastly, the following state-listed species have the potential to occur at McEntire JNGB: American Alligator, Spotted Turtle, Southern Hog-nosed Snake, Pine Barrens Treefrog, and Gopher Frog.

The Marbled Salamander (*Ambystoma opacum*) and the Gopher Frog are the most common state-listed species potentially present on Air Force installation (figures 4-9 and 4-10). Marbled Salamanders have the potential to occur on Cape Cod AFS, Hanscom AFB, New Boston AFS, Otis ANGB, and Westover ARB. The Gopher Frog has the potential to occur on Joint Base Charleston–Weapons Station, McEntire JNGB, Pope AFB, Seymour-Johnson AFB–Fort Fisher Recreation Area, and Shaw AFB/Poinsett Electronic Combat Range.



Figure 4-9. Marbled Salamander



Figure 4-10. Gopher Frog

Table 9. State-Listed Endangered and Threatened Species Potentially Present on Air Force Installations (2015). Species Arranged Alphabetically by Common Name. See appendix A for Specific Locations

State Status	Species Name
Endangered and Threatened	American Alligator (<i>Alligator mississippiensis</i>) Atlantic Saltmarsh Watersnake (<i>Nerodia clarkii taeniata</i>) Black-knobbed Map Turtle (<i>Graptemys nigrinoda</i>) Blue-tailed Mole Skink (<i>Plestiodon egregius lividus</i>) Bog Turtle (<i>Glyptemys muhlenbergii</i>) California Tiger Salamander (<i>Ambystoma californiense</i>) Comal Blind Salamander (<i>Eurycea tridentifera</i>) Cope's Gray Treefrog (<i>Hyla chrysoscelis</i>) Copperhead (<i>Agkistrodon contortrix</i>) Crawfish Frog (<i>Lithobates areolatus</i>) Eastern Diamondback (<i>Crotalus adamanteus</i>) Eastern Indigo Snake (<i>Drymarchon couperi</i>) Eastern Massasauga (<i>Sistrurus catenatus</i>) Eastern Mud Salamander (<i>Pseudotriton m. montanus</i>) Eastern Spadefoot (<i>Scaphiopus holbrookii</i>) Florida Sand Skink (<i>Plestiodon reynoldsi</i>) Frosted Flatwoods Salamander (<i>Ambystoma cingulatum</i>) Giant Gartersnake (<i>Thamnophis gigas</i>) Gopher Frog (<i>Lithobates capito</i>) Gopher Tortoise (<i>Gopherus polyphemus</i>) Great Plains Toad (<i>Anaxyrus cognatus</i>) Harlequin Coralsnake (<i>Micrurus fulvius</i>) Kirtland's Snake (<i>Clonophis kirtlandii</i>) Leatherback Sea Turtle (<i>Dermochelys coriacea</i>) Marbled Salamander (<i>Ambystoma opacum</i>) Northern Dwarf Siren (<i>Pseudobranchius striatus</i>) Pine Barrens Treefrog (<i>Hyla andersonii</i>) Reticulated Flatwoods Salamander (<i>Ambystoma bishop</i>) Southern Hog-nosed Snake (<i>Heterodon simus</i>) Spotted Turtle (<i>Clemmys guttata</i>) Texas Tortoise (<i>Gopherus berlandieri</i>) Timber Rattlesnake (<i>Crotalus horridus</i>) Trans-Pecos Black-headed Snake (<i>Tantilla cucullata</i>) Western Pond Turtle (<i>Actinemys marmorata</i>) Wood Turtle (<i>Glyptemys insculpta</i>)

4.3.4 NatureServe Status

4.3.4.1 Confirmed Species—Species at Risk

The data revealed that 36 species/subspecies of reptiles and amphibians confirmed on Air Force installations have a NatureServe status of G1/T1–G3/T3—10 turtles, 9 snakes, 6 frogs/toads, 5 lizards, 5 salamanders, and 1 crocodile (table 10). Eglin AFB has the greatest number of confirmed NatureServe species (nine species). Cape Canaveral AFS and Avon Park ARF also have a high number of NatureServe species compared to all Air Force installations (eight and seven species respectively).

Table 10. NatureServe Species at Risk Confirmed Present on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. See appendix A for Specific Locations.

NatureServe Status	Species Name
G1/T1–Critically Imperiled	Atlantic Saltmarsh Watersnake (<i>Nerodia clarkii taeniata</i>) Dusky Gopher Frog (<i>Lithobates sevosus</i>) Kemp’s Ridley Sea Turtle (<i>Lepidochelys kempii</i>) Texas Salamander (<i>Eurycea neotenes</i>)
G2/T2–Imperiled	American Crocodile (<i>Crocodylus acutus</i>) California Red-legged Frog (<i>Rana draytonii</i>) California Tiger Salamander (<i>Ambystoma californiense</i>) Florida Bog Frog (<i>Lithobates okaloosae</i>) Kirtland's Snake (<i>Clonophis kirtlandii</i>) Leatherback Sea Turtle (<i>Dermochelys coriacea</i>) Oregon Spotted Frog (<i>Rana pretiosa</i>) Reticulated Flatwoods Salamander (<i>Ambystoma bishop</i>) San Bernardino Ring-necked Snake (<i>Diadophis p. modestus</i>) Southern Hog-nosed Snake (<i>Heterodon simus</i>)
G3/T3–Vulnerable	Alligator Snapping Turtle (<i>Macrochelys temminckii</i>) Blainville's Horned Lizard (<i>Phrynosoma (Anota) blainvillii</i>) Bog Turtle (<i>Glyptemys muhlenbergii</i>) California Legless Lizard (<i>Anniella pulchra</i>) Cascade Caverns Salamander (<i>Eurycea latitans</i>) Desert Massasauga (<i>Sistrurus catenatus edwardsii</i>) Eastern Indigo Snake (<i>Drymarchon couperi</i>) Eastern Massasauga (<i>Sistrurus catenatus</i>) Florida Pinesnake (<i>Pituophis melanoleucus mugitus</i>) Florida Scrub Lizard (<i>Sceloporus woodi</i>) Gopher Frog (<i>Lithobates capito</i>) Gopher Tortoise (<i>Gopherus polyphemus</i>) Green Sea Turtle (<i>Chelonia mydas</i>) Hawksbill Sea Turtle (<i>Eretmochelys imbricata</i>) Hellbender (<i>Cryptobranchus alleganiensis</i>) Island Glass Lizard (<i>Ophisaurus compressus</i>) Loggerhead Sea Turtle (<i>Caretta caretta</i>) Short-tailed Kingsnake (<i>Lampropeltis extenuate</i>) Spot-tailed Earless Lizard (<i>Holbrookia lacerate</i>) Western Pond Turtle (<i>Actinemys marmorata</i>) Western Spadefoot (<i>Spea hammondi</i>) Wood Turtle (<i>Glyptemys insculpta</i>) Yuma Fringe-toed Lizard (<i>Uma rufopunctata</i>)

Four species/subspecies have a status of G1/T1–Critically Imperiled: Atlantic Saltmarsh Watersnake (*Nerodia clarkii taeniata*), Dusky Gopher Frog (*Lithobates sevosus*), Kemp’s Ridley Sea Turtle (*Lepidochelys kempii*), and Texas Salamander (*Eurycea neotenes*). Of these species, only the Texas Salamander is not listed as endangered or threatened under the ESA; however it is currently under review by the USFWS.

There are 10 species/subspecies that have a NatureServe status of G2/T2–Imperiled confirmed on Air Force installations. All of the species are protected under the ESA except four: Kirtland’s Snake (*Clonophis kirtlandii*), Southern Hog-nosed Snake (*Heterodon simus*), Florida Bog Frog (*Lithobates okaloosae*), and the San Bernardino Ring-necked Snake (*Diadophis punctatus modestus*). However the Kirtland’s Snake, Southern Hog-nosed Snake, and Florida Bog Frog are currently under review by the USFWS.

Lastly, there are 22 species/subspecies that have a status of G3/T3–Vulnerable confirmed on Air Force installations. Of these species 7 are listed as endangered, threatened, or candidate by the USFWS, 10 are currently under review by the USFWS, and 5 have no federal legal protection under the ESA.

4.3.4.2 Potential Species—Species at Risk



Figure 4-11. Comal Blind Salamander

There are 18 species/subspecies with a NatureServe status of G1/T1–G3/T3 that have the potential to occur on Air Force installations: 7 lizards, 4 snakes, 3 turtles, 3 salamanders, and 1 frog/toad. Of the 18 species, 2 have NatureServe Status of G1–Critically Imperiled—the Comal Blind Salamander [*Eurycea tridentifera*] which has the potential to occur at Joint Base San Antonio and the Rim Rock Crowned Snake [*Tantilla oolitica*] which has the potential to occur at Homestead ARB. Both of these species are currently under review by the USFWS.

There are eight species/subspecies that have a NatureServe status of G2/T2–Imperiled that have the potential to occur on Air Force installations. All of the species are protected under the ESA except four: Bezy’s Night Lizard (*Xantusia bezyi*), Escambia Map Turtle (*Graptemys ernsti*), Amargosa Toad (*Anaxyrus nelson*), and the Colorado Checkered Whiptail (*Aspidoscelis neotesselata*). The Bezy’s Night Lizard and the Escambia Map Turtle are currently under review by the USFWS.



Figure 4-12. Panamint Alligator Lizard

Lastly, there are eight species/subspecies that have a NatureServe status of G3/T3–Vulnerable that have the potential to occur on Air Force installations. None of these species are protected under the ESA, however, the Black-knobbed Map Turtle (*Graptemys nigrinoda*), One-toed Amphiuma (*Amphiuma pholeter*), Panamint Alligator Lizard (*Elgaria panamintina*), and Rio Grande Cooter (*Pseudemys gorzugi*) are all currently under review by the USFWS.

4.3.4.3 Summary of Federal-, State-, and NatureServe-listed Confirmed Species

Analysis of federal-, state- and NatureServe-listed confirmed species on Air Force installations has revealed that turtles and snakes have a high proportion of species/subspecies which are state-listed or considered at risk by NatureServe (figure 4-13). We found these results surprising for turtles, since this species type represents only 11 percent of all herpetofauna biodiversity on Air Force installations (figure 4-2). Also noteworthy is that the number of federally listed snake species is low in comparison to the number of state and NatureServe status snake species, suggesting that more snakes may need federally protection under the ESA in the future.

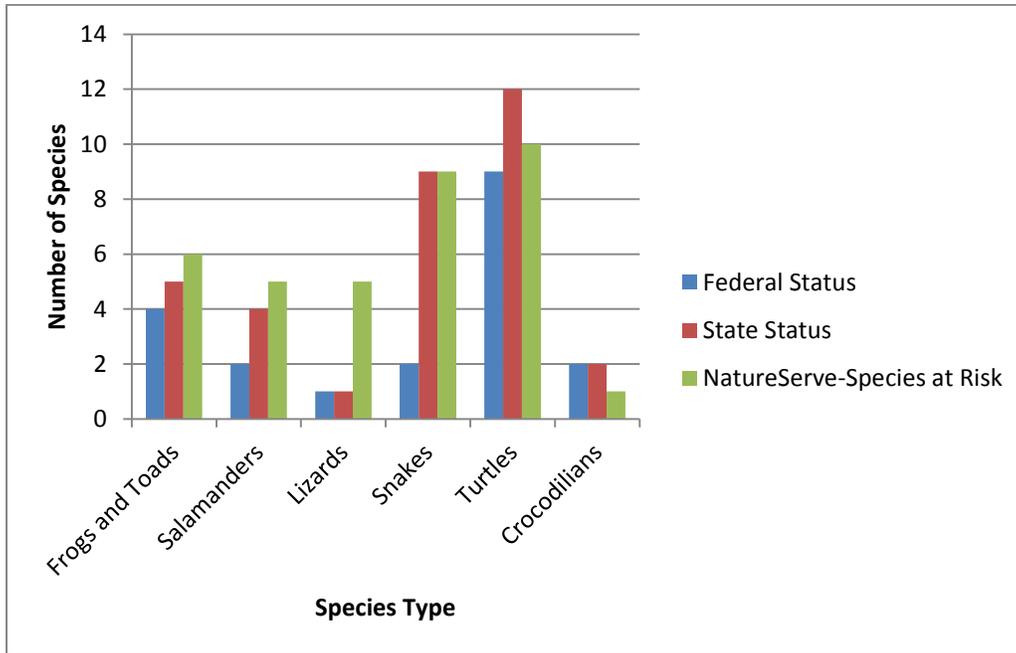


Figure 4-13. Federal-, State- and NatureServe-listed Confirmed Species by Species Type. Does not Include Species under Review.

4.3.5 Non-native Species

Our data verifies that 26 non-native amphibian and reptile species are confirmed on Air Force installations (table 11). Four of the species (the Snapping Turtle [*Chelydra serpentina*], the Pond Turtle [*Trachemys scripta*], the Red-Eared Slider [*Trachemys scripta elegans*], and the American Bullfrog [*Lithobates catesbeianus*]) are native to the United States, but have been transported outside their natural range. The remaining 22 species are not native to the United States and have been transported outside their natural ranges. The American Bullfrog, the Red-eared Slider, and the Mediterranean Gecko (*Hemidactylus turcicus*) are the most common non-native species on Air Force installations (figure 4-14).



Figure 4-14. (Top, left to right) American Bullfrog and Red-eared Slider;
(Bottom) Mediterranean Gecko.



Figure 4-15. Burmese Python captured
on Homestead ARB

The majority of the non-native herpetofauna species are on Air Force installations in the southeastern U.S., with the highest concentration being at those sites in Florida. Homestead ARB has 21 confirmed non-native species on its property. Of particular concern is the confirmed presence of the Burmese Python on Homestead ARB, which can grow to lengths over 10 feet and has been documented to significantly reduce the small mammal population in areas where it is present (Mike Dorcas and J.D. Wilson, 2011; figure 4-15).

Five additional non-native species have the potential to be present at Air Force installations. This includes the Boa Constrictor (*Boa constrictor*), Eastern Spiny Softshell (*Apalone spinifera spinifera*), Rio Grande Leopard Frog (*Lithobates berlandieri*), Spiny Softshell (*Apalone spinifera*), and Texas Horned Lizard (*Phrynosoma cornutum*).

Table 11. Non-Native Species Confirmed and Potential to Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 1 of 4)

Species	Confirmed Location/s	Potential Location/s
African Clawed Frog (<i>Xenopus laevis</i>)	<ul style="list-style-type: none"> • Edwards AFB 	<ul style="list-style-type: none"> • Davis-Monthan AFB • San Diego Air Force Space Surveillance Station
American Bullfrog (<i>Lithobates catesbeianus</i>)	<ul style="list-style-type: none"> • Beale AFB • Edwards AFB • JB Lewis-McCord • Travis AFB • Vandenberg AFB 	<ul style="list-style-type: none"> • Buckley AFB • Cheyenne Mountain AFS • Davis-Monthan AFB • Fairchild AFB • Hill AFB • Luke AFB • March ARB • Nellis AFB/Creech AFB/Nevada TTR • Peterson AFB • Pillar Point AFS • San Diego Air Force Space Surveillance Station • Schriever AFB • U.S. Air Force Academy
Bark Anole (<i>Anolis distichus</i>)	<ul style="list-style-type: none"> • Homestead ARB 	
Black and White Tegu (<i>Tupinambis meriane</i>)	<ul style="list-style-type: none"> • Homestead ARB 	
Boa Constrictor (<i>Boa constrictor</i>)		<ul style="list-style-type: none"> • Cape Canaveral AFS • Patrick AFB
Brahminy Blind Snake (<i>Ramphotyphlops braminus</i>)	<ul style="list-style-type: none"> • Homestead ARB 	
Brown Anole (<i>Anolis sagrei</i>)	<ul style="list-style-type: none"> • Homestead ARB • Avon Park AFR 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • Hurlburt Field AFB • Jacksonville ANG • JB San Antonio • Patrick AFB • Tyndall AFB
Brown Basilisk (<i>Basiliscus vittatus</i>)	<ul style="list-style-type: none"> • Homestead ARB 	
Burmese Python (<i>Python molurus bivittatus</i>)	<ul style="list-style-type: none"> • Homestead ARB 	

Table 11. Non-Native Species Confirmed and Potential to Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 2 of 4)

Cane Toad <i>(Rhinella marina)</i>	<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB 	<ul style="list-style-type: none"> • Tyndall AFB
Coqui <i>(Eleutherodactylus coqui)</i>	<ul style="list-style-type: none"> • Homestead ARB 	
Cuban Treefrog <i>(Osteopilus septentrionalis)</i>	<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Jacksonville ANG • MacDill AFB • Patrick AFB • Tyndall AFB
Eastern Spiny Softshell <i>(Apalone spinifera spinifera)</i>		<ul style="list-style-type: none"> • Joint Base McGuire-Dix-Lakehurst • Warren Grove ANG
Green Iguana <i>(Iguana iguana)</i>	<ul style="list-style-type: none"> • Homestead ARB 	
Greenhouse Frog <i>(Eleutherodactylus planirostris)</i>	<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • Hurlburt Field • Jacksonville ANG • MacDill AFB • Patrick AFB • Tyndall AFB
Indo-pacific Gecko <i>(Hemidactylus garnotti)</i>	<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB 	<ul style="list-style-type: none"> • Jacksonville ANG
Knight Anole <i>(Anolis equestris)</i>	<ul style="list-style-type: none"> • Homestead ARB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Patrick AFB
Mediterranean Gecko <i>(Hemidactylus turcicus)</i>	<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB • JB San Antonio • Nellis AFB/Creech AFB/Nevada TTR • Sheppard AFB • Tinker AFB 	<ul style="list-style-type: none"> • Barksdale AFB • Davis-Monthan AFB • Dobbins ARB • Dyess AFB • Edwards AFB • Eglin AFB • Goodfellow AFB • Hurlburt Field • Jacksonville ANG • JB Charleston–Weapons Station • Laughlin AFB • Luke AFB • Maxwell AFB • Moody AFB

Table 11. Non-Native Species Confirmed and Potential to Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 3 of 4)

Nile Monitor <i>(Varanus niloticus)</i>	<ul style="list-style-type: none"> • Homestead ARB 	
Pond Slider <i>(Trachemys scripta)</i>	<ul style="list-style-type: none"> • Vandenberg AFB 	<ul style="list-style-type: none"> • Cape Cod AFS • Davis-Monthan AFB • Hanscom AFB • JB Lewis-McCord • Luke AFB • Otis ANG • Travis AFB • Westover ARB
Puerto Rican Crested Anole <i>(Anolis cristatellus cristatellus)</i>	<ul style="list-style-type: none"> • Homestead ARB 	
Red-eared Slider <i>(Trachemys scripta elegans)</i>	<ul style="list-style-type: none"> • Arnold AFB • Beale AFB • Dyess AFB • Homestead ARB • JB San Antonio • JB Langley-Eustis 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Jacksonville ANG • Jefferson Proving Grounds • JB Andrews • JB McGuire-Dix-Lakehurst • Kirtland AFB • Niagara Fall ARS • Patrick AFB • Pillar Point AFS • Pope AFB • San Diego Air Force Space Surveillance Station • Seymour-Johnson AFB • Tyndall AFB • Warren Grove ANG
Reef Gecko <i>(Sphaerodactylus notatus)</i>	<ul style="list-style-type: none"> • Homestead ARB 	
Rio Grande Leopard Frog <i>(Lithobates berlandieri)</i>		<ul style="list-style-type: none"> • Luke AFB
Rough-tailed Gecko <i>(Cyrtopodion scabrum)</i>	<ul style="list-style-type: none"> • Luke AFB–Barry M. Goldwater Range–East 	
Snapping Turtle <i>(Chelydra serpentina)</i>	<ul style="list-style-type: none"> • Edwards AFB 	<ul style="list-style-type: none"> • Luke AFB
Spectacled Caiman <i>(Caiman crocodilus)</i>	<ul style="list-style-type: none"> • Homestead ARB 	

Table 11. Non-Native Species Confirmed and Potential to Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 4 of 4)

Spiny Softshell (<i>Apalone spinifera</i>)		<ul style="list-style-type: none"> • Davis-Monthan AFB • Luke AFB • Vandenberg AFB
Texas Horned Lizard (<i>Phrynosoma cornutum</i>)		<ul style="list-style-type: none"> • Eglin AFB • Jacksonville ANG
Tropical House Gecko (<i>Hemidactylus mabouia</i>)	<ul style="list-style-type: none"> • Homestead ARB 	
West African Red-headed Agama (<i>Agama agama africana</i>)	<ul style="list-style-type: none"> • Homestead ARB 	

4.3.6 Venomous Species

Data show that 18 species of venomous snakes are confirmed on Air Force installations within the United States: 2 species in the genus *Agkistrodon* (Copperhead and Cottonmouth), 2 species in the genus *Micrurus* (Coralsnake), 1 species in the genus *Micruroides* (Sonoran Coralsnakes), 11 species in the genus *Crotalus*, and 2 in the genus *Sistrurus* (Rattlesnakes). In addition, there is the potential for an additional two species of rattlesnake species to occur on Air Force lands: the Panamint Rattlesnake (*Crotalus stephensi*) at Edwards AFB and Nellis AFB–Nevada Test and Training Range (TTR) and the Rock Rattlesnake (*Crotalus lepidus*) at Laughlin AFB and Holloman AFB (table 12).

The Barry M. Goldwater Range of Luke AFB has the greatest number of confirmed venomous snakes (seven) as compared to all Air Force installations. Moody AFB, Kirkland AFB, Joint Base Charleston-Weapons Station, and Avon Park also have high venomous snake diversity with four to five confirmed venomous snake species each respectively.



Figure 4-16. Copperhead

The Copperhead (*Agkistrodon contortrix*) and Cottonmouth (*Agkistrodon piscivorus*) are confirmed present at more Air Force installations (11) than all other venomous snake species (figure 4-16) The Speckled Rattlesnake (*Crotalus mitchellii*), Red Diamond Rattlesnake (*Crotalus ruber*), and Tiger Rattlesnake (*Crotalus tigris*) are each only confirmed present at one Air Force installation (table 6). Pictures of a portion of the venomous snake species found on Air Force installations are in figure 4-17.



Figure 4-17. Venomous Snakes Confirmed on Air Force Installations (Black-tailed Rattlesnake, Cottonmouth, Mohave Rattlesnake, Massasauga, Sonoran Coralsnake, Sidewinder, Timber Rattlesnake, Western Rattlesnake.

The venomous Gila Monster (*Heloderma suspectum*) lizard is confirmed present on three Air Force installations (Davis-Monthan AFB, Gila River Air Force Space Surveillance Station, and Luke AFB–Barry M. Goldwater Range). It has the potential to occur at the main base of Luke AFB and also at the Nellis AFB–Nevada TTR.

Table 12. Venomous Snake Species Confirmed and Potential on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 1 of 5)

Species	Confirmed Location/s	Potential Location/s
<p>Black-tailed Rattlesnake (<i>Crotalus molossus</i>)</p>	<ul style="list-style-type: none"> • Kirtland AFB • Luke AFB–Barry M. Goldwater Range-East 	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station • Holloman AFB • JB San Antonio • Laughlin AFB • Luke AFB–Main Base
<p>Copperhead (<i>Agkistrodon contortrix</i>)</p>	<ul style="list-style-type: none"> • Arnold AFB • Barksdale AFB • Columbus AFB • Dare County Range • Jefferson Proving Grounds • JB Charleston–Weapons Station • JB San Antonio • Little Rock AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Tinker AFB 	<ul style="list-style-type: none"> • Dobbins ARB • Dyess AFB • Eglin AFB • Goodfellow AFB • Hurlburt Field • JB Andrews • Laughlin AFB • Maxwell AFB • McEntire Joint NGB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Sheppard AFB • Westover ARB • Whiteman AFB
<p>Cottonmouth (<i>Agkistrodon piscivorus</i>)</p>	<ul style="list-style-type: none"> • Avon Park AFR • Barksdale AFB • Columbus AFB • Dare County Range • Hurlburt Field • Joint Base Charleston–Weapons Station • Little Rock AFB • Moody AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Sheppard AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Dare County Range • Dobbins ARB • Eglin AFB • Goodfellow AFB • Homestead ARB • Jacksonville ANG • JB San Antonio • MacDill AFB • Maxwell AFB • McEntire Joint NGB • Patrick AFB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area

Table 12. Venomous Snake Species Confirmed and Potential on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 2 of 5)

<p>Eastern Diamond-backed Rattlesnake <i>(Crotalus adamanteus)</i></p>	<ul style="list-style-type: none"> • Avon Park AFR • Eglin AFB • Hurlburt Field • Joint Base Charleston–Weapons Station • MacDill AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Homestead ARB • Jacksonville ANG • Moody AFB • Patrick AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Tyndall AFB
<p>Harlequin Coralsnake <i>(Micrurus fulvius)</i></p>	<ul style="list-style-type: none"> • Avon Park AFR • Joint Base Charleston–Weapons Station • Moody AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • Homestead ARB • Hurlburt Field • Jacksonville ANG • MacDill AFB • McEntire Joint NGB • Patrick AFB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Shaw AFB/Poinsett Electronic Combat Range • Tyndall AFB
<p>Massasauga <i>(Sistrurus catenatus)</i></p>	<ul style="list-style-type: none"> • Holloman AFB • Kirtland AFB • Wright-Patterson AFB 	<ul style="list-style-type: none"> • Cheyenne Mountain AFS • Goodfellow AFB • McConnell AFB • Offutt AFB • Peterson AFB • Schriever AFB • Sheppard AFB • U.S. Air Force Academy
<p>Mohave Rattlesnake <i>(Crotalus scutulatus)</i></p>	<ul style="list-style-type: none"> • Davis-Monthan AFB • Edwards AFB • Luke AFB–Barry M. Goldwater Range-East • Nellis AFB/Creech AFB/Nevada TTR 	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station • Holloman AFB • Luke AFB
<p>Panamint Rattlesnake <i>(Crotalus stephensi)</i></p>		<ul style="list-style-type: none"> • Edwards AFB • Nellis AFB/Creech AFB/Nevada TTR

Table 12. Venomous Snake Species Confirmed and Potential on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 3 of 5)

<p>Prairie Rattlesnake <i>(Crotalus viridis)</i></p>	<ul style="list-style-type: none"> • Cannon AFB/Melrose AFR • Ellsworth AFB • Fairchild AFB • Holloman AFB • Kirtland AFB • Malmstrom AFB • U.S. Air Force Academy 	<ul style="list-style-type: none"> • Buckley AFB • Cheyenne Mountain AFS • Dyess AFB • Fairchild AFB–Clear Lake Rec. Area • Francis E. Warren AFB • Gila River Air Force Space Surveillance Station • Goodfellow AFB • Peterson AFB • Schriever AFB • Sheppard AFB
<p>Pygmy Rattlesnake <i>(Sistrurus miliarius)</i></p>	<ul style="list-style-type: none"> • Avon Park AFR • Eglin AFB • Hurlburt Field • MacDill AFB • Moody AFB 	<ul style="list-style-type: none"> • Barksdale AFB • Cape Canaveral AFS • Dare County Range • Dobbins ARB • Homestead ARB • Jacksonville ANG • Joint Base Charleston–Weapons Station • Maxwell AFB • McEntire JNGB • Patrick AFB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Shaw AFB/Poinsett Electronic Combat Range • Tyndall AFB
<p>Red Diamond Rattlesnake <i>(Crotalus ruber)</i></p>	<ul style="list-style-type: none"> • March ARB 	
<p>Rock Rattlesnake <i>(Crotalus lepidus)</i></p>		<ul style="list-style-type: none"> • Holloman AFB • Laughlin AFB
<p>Sidewinder <i>(Crotalus cerastes)</i></p>	<ul style="list-style-type: none"> • Edwards AFB • Luke AFB–Barry M. Goldwater Range-East • Nellis AFB/Creech AFB/Nevada TTR 	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station • Luke AFB–Main Base

Table 12. Venomous Snake Species Confirmed and Potential on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 4 of 5)

<p>Sonoran Coralsnake <i>(Micruroides euryxanthus)</i></p>	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station • Luke AFB–Barry M. Goldwater Range-East 	<ul style="list-style-type: none"> • Davis-Monthan AFB
<p>Speckled Rattlesnake <i>(Crotalus mitchellii)</i></p>	<ul style="list-style-type: none"> • Luke AFB–Barry M. Goldwater Range-East 	<ul style="list-style-type: none"> • Edwards AFB • Luke AFB • Nellis AFB/Creech AFB/Nevada TTR
<p>Texas Coralsnake <i>(Micrurus tener)</i></p>	<ul style="list-style-type: none"> • JB San Antonio • Laughlin AFB 	<ul style="list-style-type: none"> • Barksdale AFB
<p>Tiger Rattlesnake <i>(Crotalus tigris)</i></p>	<ul style="list-style-type: none"> • Luke AFB–Barry M. Goldwater Range-East 	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station • Luke AFB–Main Base
<p>Timber Rattlesnake <i>(Crotalus horridus)</i></p>	<ul style="list-style-type: none"> • Columbus AFB • Dare County Range • JB McGuire-Dix-Lakehurst • Moody AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Warren Grove ANG 	<ul style="list-style-type: none"> • Barksdale AFB • Dobbins ARB • Eglin AFB • Jacksonville ANG • Joint Base Charleston–Weapons Station • Joint Base San Antonio • Little Rock AFB • Maxwell AFB • McEntire Joint NGB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Whiteman AFB

Table 12. Venomous Snake Species Confirmed and Potential on Air Force Installations (2015).
Species Arranged Alphabetically by Common Name. (Sheet 5 of 5)

<p>Western Diamond-backed Rattlesnake (<i>Crotalus atrox</i>)</p>	<ul style="list-style-type: none"> • Altus AFB • Davis-Monthan AFB • Dyess AFB • Goodfellow AFB • Holloman AFB • JB San Antonio • Kirtland AFB • Laughlin AFB • Luke AFB–Main Base and Barry M. Goldwater Range-East • Sheppard AFB 	<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station
<p>Western Rattlesnake (<i>Crotalus oreganus</i>)</p>	<ul style="list-style-type: none"> • Beale AFB • Hill AFB (Little Mountain TTR; Utah TTR) • March ARB • Mountain Home AFB • Nellis AFB/Creech AFB/Nevada TTR • San Diego Air Force Space Surveillance Station • Travis AFB • Vandenberg AFB 	<ul style="list-style-type: none"> • Hill AFB

4.3.7 Comparison of Herpetofauna Biodiversity on Air Force Installations to United States Biodiversity

The herpetofauna species confirmed on the 80 Air Force installations evaluated in this report represent 52 percent of the total native biodiversity of all herpetofauna species documented in the continental United States (table 13). Of the species types, Air Force installations have the greatest percentage of crocodylians (100 percent), followed by snakes (68 percent), frogs/toads and turtles (65 percent), lizards (50 percent) and salamanders (28 percent) in comparison to all U.S. herpetofauna species.

Table 13. Comparison of Air Force Herpetofauna Biodiversity to Native U.S. Biodiversity (2015).

Species Type	Number of Confirmed Herpetofauna Species on Air Force Installations	Number of Herpetofauna Species Within the United States	Percent of Air Force Herpetofauna Biodiversity to U.S Biodiversity
Frogs and Toads	65	100	65
Salamanders	51	182	28
Lizards	60	121	50
Snakes	100	146	68
Turtles	37	57	65
Crocodiles/Alligators	2	2	100
Total	315	608	52

4.3.7 Comparison of Herpetofauna Biodiversity on Air Force Installations to Navy and Marine Corps Installations

The same methodology used in this report was used to analyze herpetofauna data on Navy and Marine Corps installations in 2014 (Legacy Projects: 12-423 and 13-641). In comparison to these data, Air Force installations have more confirmed species (336) than both the Navy (265) and Marine Corps (177) (table 14, figure 4-18). This is likely the result of the greater number of installations and acres managed by the Air Force (approximately 9 million acres) compared with the other two military Services (approximately 2 million acres each) and also their geographic locations. Air Force installations are more common in the interior of the United States whereas Navy and Marine Corps installations are more common along coastal regions of the United States.

Snakes are the most abundant herpetofauna species type found on Air Force, Navy, and Marine Corps installations even though they represent the second greatest abundant species type in the United States. Snake species also have the greatest number of potential species on all three military Service installations.

Both the Air Force and Navy have approximately 100 species that are potential to occur on their installations whereas the Marine Corps has approximately 60 potential species (table 8). The percent of potential species to confirmed species for all three military Services ranges from 32–38 percent, suggesting that a third of all herpetofauna biodiversity on these military lands has not been verified through survey efforts.

Table 14. Comparison of the Herpetofauna Biodiversity on Air Force Installations to Navy and Marine Corps Installations (2015).

Species Type	Number of Confirmed Species on Air Force Installations	Number of Potential Species on Air Force Installations	Number of Confirmed Species on Navy Installations	Number of Potential Species on Navy Installations	Number of Confirmed Species on Marine Corps Installations	Number of Potential Species on Marine Corps Installations
Frogs and Toads	69	12	59	15	37	13
Salamanders	51	23	44	24	29	11
Lizards	74	27	54	22	35	11
Snakes	102	34	76	28	54	18
Turtles	37	10	30	12	21	4
Crocodiles/Alligators	3	0	2	0	1	0
Total	336	106	265	101	177	57

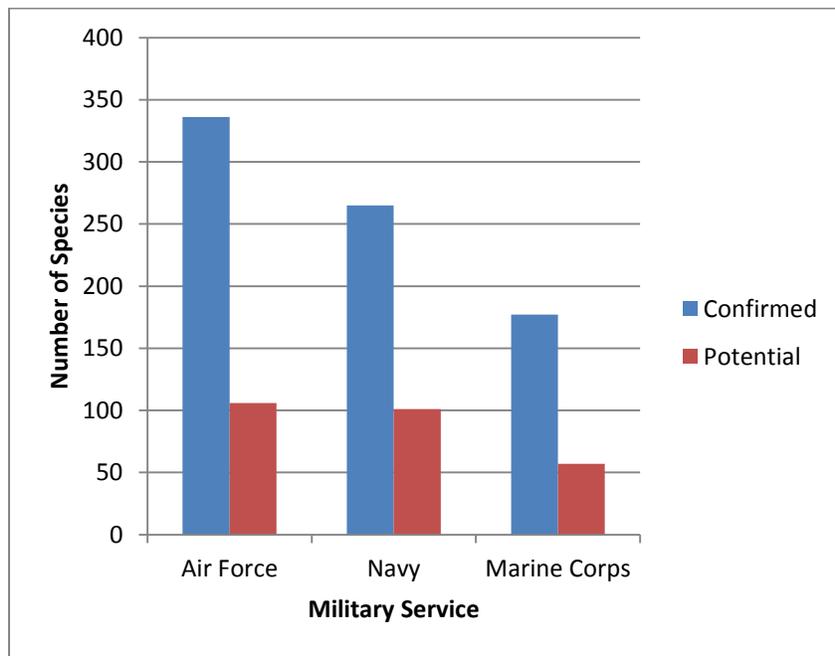


Figure 4-18. Confirmed and Potential Species by Military Service

CHAPTER 5

Summary and Conclusions

5.1 HERPETOFAUNA BIODIVERSITY ON AIR FORCE INSTALLATIONS

This project updated and analyzed the herpetofauna species lists for 80 Air Force installations in 37 states. The analysis revealed that the Air Force has an extensive diversity of amphibian and reptile species on its lands. In total, Air Force installations support 442 species (336 confirmed species and 106 potential species). Those installations with the greatest herpetofauna biodiversity are located in Florida, Georgia, South Carolina, Tennessee, and Texas. Avon Park AFR has the greatest number of confirmed herpetofauna species (70 species).

Twenty herpetofauna species listed as federally endangered, threatened, or candidate by the USFWS are confirmed present on Air Force installations. In addition, there are 17 species confirmed present on Air Force installations currently under review by the USFWS. Sea turtle species represent the majority of the federally-endangered species, the American Alligator is the most common federally-listed threatened species, and the Gopher Tortoise is the most common candidate species confirmed present on Air Force sites. Cape Canaveral AFS has the greatest number of federally-listed (endangered, threatened, and candidate) herpetofauna species confirmed on its installation (nine species) in comparison to all Air Force installations.

Our analysis verified that 33 species of amphibians and reptiles are confirmed present on Air Force installations in states where they are listed as state-endangered or –threatened. Turtles represent the most common state-listed species type. The Eastern Indigo Snake is the most common state-listed species (also federally threatened) confirmed present on Air Force installations and is found on nine installations in Florida and Georgia.

Thirty-six species/subspecies of reptiles and amphibians confirmed on Air Force installations have a NatureServe status of G1/T1–G3/T3 and are considered species at risk. Of these species, turtles are the most common species at risk. Eglin AFB has the greatest number of confirmed NatureServe species.

In comparison to all herpetofauna biodiversity on Air Force installation, non-native herpetofauna species are not common on Air Force installations. Twenty-six non-native amphibian and reptile species are confirmed present on Air Force installations. The American Bullfrog, the Red-eared Slider, and the Mediterranean Gecko are the most common non-native species. Homestead ARB has the most confirmed non-native species on its property (21 species).

Our analysis has revealed that 18 species of venomous snakes are confirmed on Air Force installations. The Barry M. Goldwater Range of Luke AFB has the greatest number of confirmed venomous snakes (six) in comparison to all other Air Force installations. The Copperhead is confirmed present at more Air Force installations than any other venomous snake species.

Lastly, our analysis demonstrates the herpetofauna biodiversity on Air Force installations is greater than that of both the U.S. Navy and Marine Corps and that Air Force installations have approximately half of the total native biodiversity of all herpetofauna species documented in the continental United States.

5.2 GENERAL RECOMMENDATIONS FOR AIR FORCE INSTALLATIONS

The following recommendations are suggested to help with the understanding of herpetofauna biodiversity, conservation, and management on Air Force managed lands. These recommendations are applicable to all Air Force installations.

1. No data on the presence or absence of herpetofauna was discovered in the INRMPs for the installations listed below. If these data are available, please provide them to DoD PARC for inclusion into the herpetofauna spreadsheet (Altus AFB; Bangor IAP ANGB; Buckley AFB; Cape Cod AFS; Cavalier AFS; Cheyenne Mountain AFS; Hanscom AFB; Hill AFB; Jacksonville ANG; Laughlin AFB; Maxwell ARB; McEntire JNGB; Offutt AFB; Otis ANG; Peterson AFB; Schriever AFB; Seymour-Johnson AFB; Seymour-Johnson AFB (main base and Fort Fisher Recreational Area).
2. Herpetofauna inventories/surveys are recommended at Air Force installations where the number of potential (unconfirmed) species is greater than 80 percent of the total herpetofauna biodiversity. We recommend surveys be conducted for the following installations: Cape Canaveral AFS; Dobbins ARB; Gila River Air Force Space Surveillance Station; Goodfellow AFB; Hurlburt Field; JB Andrews; MacDill AFB; McConnell AFB; Niagara Falls ARS; Patrick AFB; Pillar Point AFS; Pope AFB; San Diego Air Force Space Surveillance Station; Tyndall AFB; Vance AFB; and Westover ARB. A detailed inventory of the amphibians and reptiles on these installations would greatly improve the overall knowledge of the herpetofauna biodiversity on Air Force lands.
3. Maintain the herpetofauna species spreadsheet developed for this report up to date. This may be accomplished through regular data calls or by asking for voluntary updates from installation natural resource managers. DoD PARC members can conduct or assist with the task.
4. Conduct general herpetofauna surveys and monitoring every five to seven years to document the presence or absence of species and document general population trends.
5. Monitor for the occurrence of invasive herpetofauna species and occurrence of amphibian and reptiles diseases.
6. Those installations with venomous snakes should educate military and civilian personnel of the potential dangers of these species. Educational posters, pamphlets, and brochures are recommended. DoD PARC members can conduct or assist with the task.

CHAPTER 6

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List of Acronyms and Abbreviations

AFB	air force base
AFR	air force range
AFS	air force station
ANG	air national guard
ARB	air reserve base
DoD	Department of Defense
ESA	Endangered Species Act
INRMP	Integrated Natural Resource Management Plan
JB	joint base
JNGB	joint national guard base
LRRS	long range radar site
PARC	Partners in Reptile and Amphibian Conservation
TTR	test and training range
U.S.	United States
USFWS	U.S. Fish and Wildlife Service

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Appendix A. Conservation Status Summary (2015). Arranged by alphabetical order by common name.

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Alligator Snapping Turtle <i>(Macrochelys temminckii)</i>	Under Review	Threatened–GA State Species of Special Concern–FL	G3 -Vulnerable	<ul style="list-style-type: none"> • Barksdale AFB • Little Rock AFB • Moody AFB • Tyndall AFB 	<ul style="list-style-type: none"> • Eglin AFB • Hurlburt Field • Maxwell AFB
Amargosa Toad <i>(Anaxyrus nelson)</i>	None	Not Listed–NV	G2 - Imperiled		<ul style="list-style-type: none"> • Nellis AFB/Creech AFB/Nevada TTR
American Alligator <i>(Alligator mississippiensis)</i>	Threatened-Similarity of Appearance	Threatened–NC, SC Federally-designated Threatened due to Similarity of Appearance–FL	G5–Secure	<ul style="list-style-type: none"> • Avon Park AFR • Barksdale AFB • Cape Canaveral AFS • Dare County Range • Eglin AFB • Homestead ARB • Hurlburt Field • JB Charleston–Weapons Station • MacDill AFB • Moody AFB • Patrick AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Tyndall AFB 	<ul style="list-style-type: none"> • Jacksonville ANG • Maxwell AFB • McEntire JNGB
American Crocodile <i>(Crocodylus acutus)</i>	Threatened	Federally-designated Threatened–FL	G2–Imperiled	<ul style="list-style-type: none"> • Homestead ARB 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Atlantic Saltmarsh Watersnake (<i>Nerodia clarkii taeniata</i>)	Threatened	Federally-designated Threatened-FL	T1-Critically Imperiled	<ul style="list-style-type: none"> • Cape Canaveral AFS 	<ul style="list-style-type: none"> • Patrick AFB
Bezy's Night Lizard (<i>Xantusia bezyi</i>)	Under Review	Not Listed-AZ	G2-Imperiled		<ul style="list-style-type: none"> • Gila River Air Force Space Surveillance Station
Black-knobbed Map Turtle (<i>Graptemys nigrinoda</i>)	Under Review	Endangered-MS Not Listed AL	G3-Vulnerable		<ul style="list-style-type: none"> • Columbus AFB • Maxwell AFB
Blainville's Horned Lizard (<i>Phrynosoma (Anota) blainvillii</i>)	None	Not Listed CA	G3-Vulnerable	<ul style="list-style-type: none"> • Travis AFB • Vandenberg AFB 	<ul style="list-style-type: none"> • Pillar Point AFS • San Diego Air Force Space Surveillance Station
Blanding's Turtle (<i>Emydoidea blandingii</i>)	Under Review	Endangered-NH	G4-Apparently Secure	<ul style="list-style-type: none"> • New Boston AFS 	<ul style="list-style-type: none"> • Cape Cod AFS • Hanscom AFB • Offutt AFB • Otis ANG • Westover ARB
Bog Turtle (<i>Glyptemys muhlentexas bergii</i>)	Threatened	Endangered-NJ	G3-Vulnerable	<ul style="list-style-type: none"> • JB McGuire-Dix-Lakehurst (MDL) 	<ul style="list-style-type: none"> • Warren Grove ANG
California Legless Lizard (<i>Anniella pulchra</i>)	None	Not Listed-CA	G3-Vulnerable	<ul style="list-style-type: none"> • Vandenberg AFB 	
California Red-legged Frog (<i>Rana draytonii</i>)	Threatened	Not Listed-CA	G2-Imperiled	<ul style="list-style-type: none"> • Pillar Point AFS • Vandenberg AFB 	<ul style="list-style-type: none"> • Beale AFB • Travis AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
California Tiger Salamander <i>(Ambystoma californiense)</i>	Threatened/Endangered	Threatened–CA	G2–Imperiled	<ul style="list-style-type: none"> Travis AFB 	<ul style="list-style-type: none"> Pillar Point AFS Vandenberg AFB (Endangered)
Cascade Caverns Salamander <i>(Eurycea latitans)</i>	Under Review	Threatened–TX	G3–Vulnerable	<ul style="list-style-type: none"> JB Antonio–Camp Bullis Training Annex 	
Colorado Checkered Whiptail <i>(Aspidoscelis neotesselata)</i>	None	State Special Concern–CO	G2–Imperiled		<ul style="list-style-type: none"> Cheyenne Mountain AFS Peterson AFB Schriever AFB U.S. Air Force Academy
Columbia Spotted Frog <i>(Rana luteiventris)</i>	Candidate		G4–Apparently Secure	<ul style="list-style-type: none"> Fairchild AFB–Main Base 	<ul style="list-style-type: none"> Fairchild AFB–Clear Lake Recreation Area Hill AFB–Main Base, Utah TTR
Comal Blind Salamander <i>(Eurycea tridentifera)</i>	Under Review	Threatened–TX	G1–Critically Imperiled		<ul style="list-style-type: none"> JB Antonio–Lackland AFB/Randdolf AFB/Camp Bullis Training Annex/Seguin Aux Field

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
<p>Cope's Gray Treefrog <i>(Hyla chrysoscelis)</i></p>	<p>None</p>	<p>Endangered–NJ</p>	<p>G5–Secure</p>	<ul style="list-style-type: none"> • Arnold AFB • Barksdale AFB • Dare County Range • Jefferson Proving Grounds • JB Charleston–Weapons Station • JB Langley–Eustis • Moody AFB • Robins AFB • Tinker AFB • Wright-Patterson AFB 	<ul style="list-style-type: none"> • Altus AFB • Cavalier AFS • Columbus AFB • Dobbins ARB • Eglin AFB • Grand Forks AFB • Hurlburt Field • Jacksonville ANG • JB Andrews • JB Antonio • JB McGuire-Dix-Lakehurst • Maxwell AFB • McEntire JNGB • Offutt AFB • Pope AFB • Seymour-Johnson AFB • Seymour-Johnson AFB • Shaw AFB/Poinsett Electronic Combat Range • Sheppard AFB • Tyndall AFB • Warren Grove ANG • Whiteman AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Copperhead (<i>Agkistrodon contortrix</i>)	None	Endangered–IA, MA	G5–Secure	<ul style="list-style-type: none"> • Arnold AFB • Barksdale AFB • Columbus AFB • Dare County Range • JB Charleston • Moody AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Little Rock AFB • JB Antonio • Tinker AFB • Jefferson Proving Grounds 	<ul style="list-style-type: none"> • Dobbins ARB • Eglin AFB • Goodfellow AFB • Hurlburt Field • JB Andrews • Laughlin AFB • Maxwell AFB • McEntire JNGB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Sheppard AFB • Westover ARB • Whiteman AFB • Dyess AFB
Crawfish Frog (<i>Lithobates areolatus</i>)	None	Endangered–IN	G4–Apparently Secure	<ul style="list-style-type: none"> • Jefferson Proving Grounds 	<ul style="list-style-type: none"> • Columbus AFB
Desert Massasauga (<i>Sistrurus catenatus edwardsii</i>)	Under Review	None	T3–Vulnerable	<ul style="list-style-type: none"> • Holloman AFB • Kirtland AFB 	
Desert Tortoise (<i>Gopherus agassizii</i>)	Threatened	Threatened–CA Protected in NV	G4–Apparently Secure	<ul style="list-style-type: none"> • Edwards AFB • Nellis AFB/Creech AFB/Nevada TTR 	
Dusky Gopher Frog (<i>Lithobates sevosus</i>)	Endangered	None	G1–Critically Imperiled	<ul style="list-style-type: none"> • Arnold AFB 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Eastern Diamond-backed Rattlesnake <i>(Crotalus adamanteus)</i>	Under Review	Not Listed–FL, GA Endangered–NC	G4–Apparently Secure	<ul style="list-style-type: none"> • Avon Park AFR • Eglin AFB • Hurlburt Field • JB Charleston • MacDill AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Homestead ARB • Jacksonville ANG • Moody AFB • Patrick AFB • Seymour-Johnson AFB • Tyndall AFB
Eastern Hog-nosed Snake <i>(Heterodon platirhinos)</i>	None	Endangered–NH	G5–Secure	<ul style="list-style-type: none"> • New Boston AFS 	
Eastern Indigo Snake <i>(Drymarchon couperi)</i>	Threatened	Threatened–GA Federally-designated Threatened–FL	G3–Vulnerable	<ul style="list-style-type: none"> • Avon Park AFR • Cape Canaveral AFS • Eglin AFB • Homestead ARB • Hurlburt Field • MacDill AFB • Moody AFB • Patrick AFB • Tyndall AFB 	<ul style="list-style-type: none"> • Jacksonville ANG
Eastern Massasauga <i>(Sistrurus catenatus)</i>	Candidate	Endangered–OH Threatened–NE	G3–Vulnerable	<ul style="list-style-type: none"> • Wright-Patterson–Historic Record 	<ul style="list-style-type: none"> • Cheyenne Mountain AFS • Goodfellow AFB • Offutt AFB • Peterson AFB • Schriever AFB • Sheppard AFB • U.S. Air Force Academy

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Eastern Mud Salamander <i>(Pseudotriton montanus montanus)</i>	None	Endangered–PA Threatened–NJ, OH	T5–Secure		<ul style="list-style-type: none"> • JB Langley-Eustis • JB McGuire-Dix-Lakehurst • Pope AFB • Warren Grove ANG
Eastern Spadefoot <i>(Scaphiopus holbrookii)</i>	None	Endangered–CT, OH, PA Threatened–MA, RI	G5–Secure	<ul style="list-style-type: none"> • Arnold AFB • Avon Park AFR • Dare County Range • Moody AFB • Shaw AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Cape Cod AFS • Columbus AFB • Dobbins ARB • Eglin AFB • Hanscom AFB • Homestead ARB • Hurlburt Field • Jacksonville ANG • Jefferson Proving Grounds • JB Andrews • JB Charleston • JB McGuire-Dix-Lakehurst • MacDill AFB • Maxwell AFB • McEntire JNGB • Patrick AFB • Pope AFB • Robins AFB • Seymour-Johnson AFB • Tyndall AFB • Warren Grove ANG • Westover ARB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Escambia Map Turtle (<i>Graptemys ernsti</i>)	Under Review	Not Listed–FL	G2–Imperiled		<ul style="list-style-type: none"> • Eglin AFB • Hurlburt Field
Florida Bog Frog (<i>Lithobates okaloosae</i>)	None	State Species of Special Concern–FL	G2–Imperiled	<ul style="list-style-type: none"> • Eglin AFB 	<ul style="list-style-type: none"> • Hurlburt Field
Florida Pinesnake (<i>Pituophis melanoleucus mugitus</i>)	Under Review	State Species of Special Concern–FL	T3–Vulnerable	<ul style="list-style-type: none"> • Avon Park AFR 	<ul style="list-style-type: none"> • Eglin AFB • Hurlburt Field • Tyndall AFB
Florida Sand Skink (<i>Plestiodon reynoldsi</i>)	Threatened	Federally-designated Threatened–FL	G2–Imperiled		<ul style="list-style-type: none"> • Avon Park AFR • Homestead ARB
Florida Scrub Lizard (<i>Sceloporus woodi</i>)	Under Review	Not Listed–FL	G3–Vulnerable	<ul style="list-style-type: none"> • Avon Park AFR 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Homestead ARB • Patrick AFB
Frosted Flatwoods Salamander (<i>Ambystoma cingulatum</i>)	Threatened	Endangered–SC Threatened–GA Federally-designated Threatened–FL	G2–Imperiled		<ul style="list-style-type: none"> • Jacksonville ANG • JB Charleston • Robins AFB
Giant Gartersnake (<i>Thamnophis gigas</i>)	Threatened	Threatened–CA	G2–Imperiled		<ul style="list-style-type: none"> • Beale AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
<p align="center">Gopher Frog <i>(Lithobates capito)</i></p>	<p align="center">Under Review</p>	<p align="center">Endangered–SC Threatened–NC State Species of Special Concern–FL</p>	<p align="center">G3–Vulnerable</p>	<ul style="list-style-type: none"> • Avon Park AFR • Eglin AFB • MacDill AFB • Shaw AFB/Poinsett Electronic Combat Range 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Hurlburt Field • Jacksonville ANG • JB Charleston–Weapons Station • McEntire Joint NGB • Patrick AFB • Pope AFB • Seymour-Johnson AFB–Fort Fisher Rec. Area • Tyndall AFB
<p align="center">Gopher Tortoise <i>(Gopherus polyphemus)</i></p>	<p align="center">AL, MS, LA–Federally Threatened Elsewhere–Candidate</p>	<p align="center">Threatened–GA State-designated Threatened–FL</p>	<p align="center">G3–Vulnerable</p>	<ul style="list-style-type: none"> • Avon Park AFR • Cape Canaveral AFS • Eglin AFB • Hurlburt Field • MacDill AFB • Moody AFB • Patrick AFB • Tyndall AFB 	<ul style="list-style-type: none"> • Jacksonville ANG

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
<p align="center">Great Plains Toad <i>(Anaxyrus cognatus)</i></p>	<p align="center">None</p>	<p align="center">Threatened–NE</p>	<p align="center">G5–Secure</p>	<ul style="list-style-type: none"> • Ellsworth AFB • Holloman AFB • Kirtland AFB • Luke AFB–Main Base/BMG Range East • Minot AFB • Sheppard AFB • Vance AFB–Main Base and Kegelman Auxiliary Airfield 	<ul style="list-style-type: none"> • Buckley AFB • Cannon AFB/Melrose AFR • Davis-Monthan • Grand Forks AFB • Malmstrom AFB • McConnell AFB • Nellis AFB/Creech AFB/Nevada TTR • Offutt AFB • Tinker AFB
<p align="center">Green Sea Turtle <i>(Chelonia mydas)</i></p>	<p align="center">Endangered in Florida and /Threatened</p>	<p align="center">Federally-designated Endangered–FL</p>	<p align="center">G3–Vulnerable</p>	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • MacDill AFB • Patrick AFB • Tyndall AFB 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Harlequin Coralsnake <i>(Micrurus fulvius)</i>	None	Endangered-NC	G5-Secure	<ul style="list-style-type: none"> • Avon Park AFR • Joint Base Charleston • Moody AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • Homestead ARB • Hurlburt Field • Jacksonville ANG • MacDill AFB • McEntire JNGB • Patrick AFB • Pope AFB • Seymour-Johnson AFB Fort Fisher Rec. Area • Shaw AFB/Poinsett Electronic Combat Range • Tyndall AFB
Hawksbill Sea Turtle <i>(Eretmochelys imbricata)</i>	Endangered	Federally-designated Endangered-FL	G3-Vulnerable	<ul style="list-style-type: none"> • Cape Canaveral AFS • Patrick AFB 	
Hellbender <i>(Cryptobranchus alleganiensis)</i>	Under Review	Endangered-OH	G3-Vulnerable	<ul style="list-style-type: none"> • Wright-Patterson-Historic Record 	
Island Glass Lizard <i>(Ophisaurus compressus)</i>	None	Not Listed-FL	G3-Vulnerable	<ul style="list-style-type: none"> • Avon Park AFR 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Homestead ARB • Jacksonville ANG • JB Charleston • MacDill AFB • Moody AFB • Patrick AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Kemp's Ridley Sea Turtle <i>(Lepidochelys kempii)</i>	Endangered	Federally-designated Endangered-FL	G1-Critically Imperiled	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • MacDill AFB • Patrick AFB • Tyndall AFB 	
Kirtland's Snake <i>(Clonophis kirtlandii)</i>	Under Review	Endangered-IN Threatened-OH	G2-Imperiled	<ul style="list-style-type: none"> • Jefferson Proving Grounds 	<ul style="list-style-type: none"> • Wright-Patterson
Leatherback Sea Turtle <i>(Dermochelys coriacea)</i>	Endangered	Federally-designated Endangered-FL Not Listed-CA	G2-Imperiled	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • MacDill AFB • Patrick AFB • Tyndall AFB • Vandenberg AFB 	
Loggerhead Sea Turtle <i>(Caretta caretta)</i>	Threatened	Federally-designated Threatened-FL	G3-Vulnerable	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • MacDill AFB • Patrick AFB • Tyndall AFB 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Marbled Salamander <i>(Ambystoma opacum)</i>	None	Endangered–NH Threatened–MA	G5–Secure	Confirmed on many Air Force installations, however none in states where listed as endangered or threatened	<ul style="list-style-type: none"> • Cape Cod AFS • Hanscom AFB • Maxwell AFB • New Boston AFS • Otis ABG • Westover ARB
Mimic Glass Lizard <i>(Ophisaurus mimicus)</i>	None	Not Listed–FL	G3–Vulnerable		<ul style="list-style-type: none"> • Eglin AFB • Jacksonville ANG • JB Charleston • Moody AFB • Seymour-Johnson AFB • Tyndall AFB
Mohave Fringe-toed Lizard <i>(Uma scoparia)</i>	None	Not Listed–CA	G3–Vulnerable		<ul style="list-style-type: none"> • Edwards AFB
Northern Dwarf Siren <i>(Pseudobranchus striatus)</i>	None	Threatened–SC	G5–Secure	<ul style="list-style-type: none"> • Moody AFB 	<ul style="list-style-type: none"> • Cape Canaveral AFS • Eglin AFB • Jacksonville ANG • JB Charleston • Patrick AFB • Tyndall AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Northern Leopard Frog (<i>Lithobates pipiens</i>)	None	Endangered–WA	G5–Secure	<ul style="list-style-type: none"> Fairchild AFB 	<ul style="list-style-type: none"> Hill AFB–Little Mountain TTR; Main Base–Utah TTR
Northern Pinesnake (<i>Pituophis m. melanoleucus</i>)	None	Threatened–NJ, TN	G4–Apparently Secure	<ul style="list-style-type: none"> Arnold AFB JB McGuire-Dix-Lakehurst Warren Grove ANG 	
One-toed Amphiuma (<i>Amphiuma pholeter</i>)	Under Review	Not Listed–FL	G3– Vulnerable		<ul style="list-style-type: none"> Eglin AFB Tyndall AFB
Panamint Alligator Lizard (<i>Elgaria panamintina</i>)	Under Review	Not Listed–NV	G3–Vulnerable		<ul style="list-style-type: none"> Nellis AFB/Creech AFB/Nevada TTR
Pine Barrens Treefrog (<i>Hyla andersonii</i>)	None	Endangered–NJ Threatened–SC State Species of Concern–FL	G4–Apparently Secure	<ul style="list-style-type: none"> JB McGuire-Dix-Lakehurst Warren Grove ANG Eglin AFB Hurlburt AFB 	<ul style="list-style-type: none"> McEntire JNGB Pope AFB Seymour-Johnson AFB
Rainbow Snake (<i>Farancia erythrogramma</i>)	None	Endangered-MS	G4–Apparently Secure	<ul style="list-style-type: none"> Columbus AFB 	
Reticulated Flatwoods Salamander (<i>Ambystoma bishop</i>)	Endangered	Federally-designated Endangered–FL	G2–Imperiled	<ul style="list-style-type: none"> Eglin AFB Hurlburt Field 	<ul style="list-style-type: none"> Tyndall AFB
Rim Rock Crowned Snake (<i>Tantilla oolitica</i>)	Under Review	State-designated Threatened–FL	G1–Critically Imperiled		<ul style="list-style-type: none"> Homestead ARB
Rio Grande Cooter (<i>Pseudemys gorzugi</i>)	Under Review	Not Listed–TX	G3–Vulnerable		<ul style="list-style-type: none"> Laughlin AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
San Bernardino Ring-necked Snake <i>(Diadophis punctatus modestus)</i>	None	Not Listed–CA	T2–Imperiled	<ul style="list-style-type: none"> March AFB 	
San Francisco Gartersnake <i>(Thamnophis sirtalis tetrataenia)</i>	Endangered	Endangered–CA	T2–Imperiled		<ul style="list-style-type: none"> Pillar Point AFS
Short-tailed Kingsnake <i>(Lampropeltis extenuate)</i>	None	State-designated Threatened–FL	G3–Vulnerable	<ul style="list-style-type: none"> Avon Park AFR 	<ul style="list-style-type: none"> MacDill AFB Tyndall AFB
Sonoran Desert Tortoise <i>(Gopherus morafkai)</i>	Candidate		G4–Apparently Secure	<ul style="list-style-type: none"> Davis-Monthan Luke AFB-Main Base 	<ul style="list-style-type: none"> Luke AFB–Barry M. Goldwater Range-East
Southern California Legless Lizard <i>(Anniella stebbinsi)</i>	None	Not Listed–CA	G3–Vulnerable		<ul style="list-style-type: none"> March ARB San Diego Air Force Space Surveillance Station

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Southern Hog-nosed Snake <i>(Heterodon simus)</i>	Under Review	Threatened–GA, SC Not Listed–FL	G2–Imperiled	<ul style="list-style-type: none"> Moody AFB Shaw AFB/Poinsett Electronic Combat Range 	<ul style="list-style-type: none"> Cape Canaveral AFS Eglin AFB Hurlburt Field Jacksonville ANG JB Charleston–Weapons Station MacDill AFB McEntire JNGB Patrick AFB Pope AFB Robins AFB Seymour-Johnson AFB–Fort Fisher Rec. Area Tyndall AFB
Spot-tailed Earless Lizard <i>(Holbrookia lacerate)</i>	Under Review	Not Listed–TX	G3–Vulnerable	<ul style="list-style-type: none"> Laughlin AFB 	<ul style="list-style-type: none"> Goodfellow AFB Joint Base Antonio - Lackland AFB/Randdolf AFB/Camp Bullis Training Annex/Seguin Aux Field
Spotted Frog <i>(Rana pretiosa)</i>	Threatened	Endangered–WA	G2–Imperiled	<ul style="list-style-type: none"> JB Lewis-McCord 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Spotted Turtle <i>(Clemmys guttata)</i>	Under Review	Threatened–ME, NH, OH, SC Not Listed–NJ	G5–Secure	<ul style="list-style-type: none"> • Dare County Range • JB Langley-Eustis–Fort Eustis • JB McGuire-Dix-Lakehurst (MDL) • New Boston AFS • Warren Grove ANG • Westover ARB • Wright-Patterson AFB 	<ul style="list-style-type: none"> • Bangor IAP ANG • Cape Cod AFS • Hanscom AFB • Jacksonville ANG • JB Andrews • JB Charleston–Weapons Station • McEntire JNGB • Moody AFB • Niagara Fall ARS • Otis ANG • Pope AFB • Robins AFB • Seymour-Johnson AFB – Fort Fisher Rec Area • Shaw AFB/Poinsett Electronic Combat Range
Texas Horned Lizard <i>(Phrynosoma cornutum)</i>	None	Threatened–TX	G4–Apparently Secure	<ul style="list-style-type: none"> • Dyess AFB • Goodfellow AFB • JB Antonio • Laughlin AFB • Sheppard AFB 	
Texas Salamander <i>(Eurycea neotenes)</i>	Under Review	Not Listed–TX	G1–Critically Imperiled	<ul style="list-style-type: none"> • JB Antonio–Camp Bullis Training Annex 	<ul style="list-style-type: none"> • Laughlin AFB
Texas Tortoise <i>(Gopherus berlandieri)</i>	None	Threatened–TX	G4–Apparently Secure	<ul style="list-style-type: none"> • JB Antonio–Camp Bullis Training Annex 	

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
Timber Rattlesnake <i>(Crotalus horridus)</i>	None	Endangered–NJ	G4–Apparently Secure	<ul style="list-style-type: none"> • JB McGuire-Dix-Lakehurst • Warren Grove ANG 	
Timber Rattlesnake <i>(Crotalus horridus)</i>	None	Endangered–CT, IN, MA, NH, NJ, OH, VT, VA Threatened–IL, MN, NY, TX	G4–Apparently Secure	<ul style="list-style-type: none"> • Columbus AFB • Dare County Range • JB McGuire-Dix-Lakehurst • Moody AFB • Robins AFB • Shaw AFB/Poinsett Electronic Combat Range • Warren Grove ANG 	<ul style="list-style-type: none"> • Barksdale AFB • Dobbins ARB • Eglin AFB • Jacksonville ANG • JB Antonio • JB Charleston • Little Rock AFB • Maxwell AFB • McEntire JNGB • Pope AFB • Seymour-Johnson AFB – Fort Fisher Rec Area • Whiteman AFB
Trans-Pecos Black-headed Snake <i>(Tantilla cucullata)</i>	None	Threatened–TX	G3–Vulnerable		<ul style="list-style-type: none"> • Laughlin AFB
Western Pond Turtle <i>(Actinemys marmorata)</i>	Under Review	Not Listed–CA Endangered–WA	G3–Vulnerable	<ul style="list-style-type: none"> • Beale AFB • Edwards AFB • Travis AFB • Vandenberg AFB 	<ul style="list-style-type: none"> • Joint Base Lewis-McCord • March ARB • Pillar Point AFS
Western Spadefoot <i>(Spea hammondi)</i>	Under Review	Not Listed–CA	G3–Vulnerable	<ul style="list-style-type: none"> • Vandenberg AFB 	<ul style="list-style-type: none"> • Beale AFB • March ARB • Travis AFB

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location/s
<p align="center">Wood Turtle <i>(Glyptemys insculpta)</i></p>	<p align="center">Under Review</p>	<p align="center">Threatened–NJ</p>	<p align="center">G3–Vulnerable</p>	<ul style="list-style-type: none"> • New Boston AFS 	<ul style="list-style-type: none"> • Bangor IAP ANG • Cape Cod AFS • Hanscom AFB • JB Andrews • JB McGuire-Dix-Lakehurst • Otis ANG • Warren Grove ANG • Westover ARB
<p>Yuma Fringe-toed Lizard <i>(Uma rufopunctata)</i></p>	<p align="center">None</p>	<p align="center">Not Listed–AZ</p>	<p align="center">G3–Vulnerable</p>	<ul style="list-style-type: none"> • Luke AFB–Barry M. Goldwater Range-East 	