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Herpetofauna Biodiversity

On

Department of the Navy Shore Installations

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HERPETOFAUNA BIODIVERSITY ON DEPARTMENT OF THE NAVY SHORE INSTALLATIONS



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Photo Credit:

Eastern Red-back Salamander (*Plethodon cinereus*) and Eastern Box Turtle (*Terrapene carolina*): Paul Block.

Eastern Diamond-Backed Rattlesnake (*Crotalus adamanteus*): Carmen Lombardo

ABSTRACT

Accurate and comprehensive biotic inventories are essential for effective management and conservation of natural resources and the formation of natural resource policies at any particular site. The U.S. Navy owns and leases approximately two million acres within the United States. To date, no comprehensive investigation of the amphibian and reptile (herpetofauna) diversity has been conducted on Navy lands.

This study analyzed data from 54 major Navy installations (including 131 distinct parcels) within six Navy regions (Mid-Atlantic, Washington, Southeast, Midwest, Northwest, and Southwest) in the continental United States. The area of Navy land covered in this analysis was 1,787,215 acres. Each Navy region was looked at individually and then in comparison with the other regions across the United States.

Species types (frogs, toads, salamanders, alligators, snakes, lizards, and turtles) confirmed or potential at each Navy installation varied greatly among the naval regions and generally followed that of species diversity found within the United States. The data showed that there are a total of 265 confirmed species and an additional 101 potential species on Navy lands (366 species among all of the installations analyzed). Compared to the total number of herpetofauna species in the United States (approximately 617 species), species diversity is generally high on Navy installations within the continental United States. Commander, Navy Region Southeast has the greatest herpetofauna diversity than any other Navy region. Because most Navy installations are typically coastal, herpetofauna species on Navy lands are characteristic of the coastal habitats. As such, those species predominantly not present on Navy lands (like salamanders), are found in montane, or interior locations of the United States.

The data presented in this report and the resulting herpetofuna species lists for the Navy sites evaluated can be used by natural resource managers at respective installations to identify data gaps and also by senior Navy leadership for an overall view of herpetofauna diversity on Navy lands.

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CHAPTER 1

Introduction

1.1 AMPHIBIANS AND REPTILES

Amphibians and reptiles (also called herpetofauna) account for a considerable portion of contemporary biodiversity and approximately 17,153 species have been described by scientists (AmphibiaWeb, 2012; Uetz, 1995a). Furthermore, approximately one new species of reptile or amphibian is discovered by the scientific community every week (Uetz, 1995b), indicating that the full extent of their ecological contribution is still largely unknown. We do know, however, that amphibians and reptiles are found in nearly every habitat, occurring on every continent except Antarctica (AmphibiaWeb, 2011; Vitt & Caldwell, 2008), and that they 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; Semitsch, 2003; *Threatened Amphibians of the World*, 2008; *Turtle Conservation*, 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 can be considered indicator species, meaning that 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 rate (McCallum, 2007). There are at least 6 major causes of recent herpetofauna declines and extinctions: habitat loss; land conversion; collecting for commercial trade; introduced/exotic species that prey on, compete with, and parasitize native amphibians; environmental contaminants; climate change; and infectious disease (Collins, 2010; Collins & Crump, 2009; Marks, 2006; Ribeiro, Santos, Sillero, Carretero, & Llorente, 2009).

Conservation and habitat management for herpetofauna are necessary not only to protect those species, but also to protect all of the inter-related species in the food web and the ecological benefits of herpetofauna. Managing habitats for herpetofauna can have positive impacts on the entire ecosystem, including human benefits.

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

The Department of Defense (DoD) manages approximately 28 million acres of land and water, much of which provides food and shelter for the diversity of native flora and fauna (Stein, Scott, & Benton, 2008). The primary tool for implementation of natural resource management at Navy installations, as well as all other DoD, facilities is an Integrated Natural Resource Management Plan (INRMP). The Navy, 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 on its lands.

The U.S. Navy owns and leases approximately two million acres within the United States. The Navy and other DoD Services strive to provide the most natural and realistic training and testing environments for troops possible in order to maintain military readiness. The Navy also protects entry to its installations as a matter of national security. As a result, much of the Navy's land provides some of the best remaining natural habitat for 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, Ripley, and Powledge, eds. 2008) making them prime locations for herpetofauna conservation and management. Even though the DoD manages land that is only about an eighth of the acreage managed by the U.S. Forest Service (USFS) (which manages more than 193 million acres), the DoD has about the same number of species listed under the Endangered Species Act (ESA) on their land as the USFS (Stein et al., 2008).

As a federal agency, the Navy must comply with federal laws that protect and conserve ESA-listed species. The Navy is in a unique position to promote and conserve biodiversity while still carrying out its mission of training and preparing troops. The Navy takes an ecosystem approach to natural resources management. Ecosystems are complex units in which changes to any species or habitat type influences the others (*Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers*, 2008).

1.3 MANAGEMENT OF HERPETOFAUNA ON MILITARY LANDS

No Navy guidance documents or directives discuss the management of herpetofauna specifically, however, the projects and practices implemented using INRMPs benefit these species. In addition, the Navy has subject matter experts in the field 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) 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 subgroup of the national Partners in Amphibian and Reptile Conservation (PARC) organization that is also dedicated to the conservation of herpetofauna and their habitats. 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>). The DoD PARC group has become a leader for the military Services for herpetofauna management and conservation by providing education and guidance and by developing partnerships in support of the military mission.

1.4 STUDY PURPOSE

The purpose of this study was to conduct an analysis of herpetofauna inventories on Navy installations and associated properties in the continental United States that have significant natural resources, so as to require an INRMP. This included looking at species with conservation needs (federally-, state-, and NatureServe-listed species), nonnative species, and venomous species on a regional and national scale. To date, no comprehensive investigation into herpetofauna found on Navy lands has been conducted. Results can be used by natural resource managers at the various installations to identify survey or research gaps and also by senior Navy leadership for an overall view of herpetofauna diversity on Navy lands. In addition, these data will facilitate data sharing between Navy 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

Multiple sources were used to compile and update the Navy 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, an Access database that produces a county-level species list using data from Herpnet2 (<http://herpnet.org/>, reptile occurrences), and the National Amphibian Atlas (http://armi.usgs.gov/national_amphibian_atlas.php, amphibian occurrences) for each installation that has an INRMP. All lists were reviewed by the DoD PARC.
2. The preliminary 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.
3. The draft 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.
4. The pre-final list was sent to each installation's natural resource manager for review and validation before becoming final.

This process was followed for each of the Navy installations within the continental United States with significant natural resources to require an INRMP. In many cases, a major Navy installation has one or many geographically-separate 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 and analyzed according to the six Commander, Navy Installations Command (CNIC) regions in the continental United States using Microsoft Excel (Figure 3-1. Commander Navy Installations Command Regions.

The lists were updated to reflect the most recent federal, state, and NatureServe statuses as of October 2013. Additional information, such as if a particular species is not native, was obtained from a spreadsheet managed by PARC (Nanjappa & Conrad, 2014).

Subspecies designation was used, if known, during the development of the herpetofauna species lists for each of the Navy installations. However, because one goal of this analysis was to compare species diversity from one Navy region to another, 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 et al., 2012).

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CHAPTER 3

Data Analysis

Upon completion of the individual Navy installation herpetofauna species lists, data were 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 by CNR. In addition, we compared each CNR herpetofauna biodiversity to that of all herpetofauna found within the states that make up a particular Navy region. Lastly, we compared the herpetofauna biodiversity within each CNR to each other and summarized all herpetofauna biodiversity within all CNR combined within the continental United States.

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 natural or introduced range of that species and the species is been documented in the same county as a particular military 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

The Navy has a legal obligation to comply with federal laws that protect listed species. Federally-protected species were determined by reviewing the U.S Fish and Wildlife Service (USFWS) Web site (<http://www.fws.gov/endangered/species/index.html>), lists, and publications (U.S. Fish and Wildlife Service). The Navy, as a federal agency, has a legal obligation to comply with all federal laws associated with the protection and recovery of listed species. This can be particularly challenging for herpetofauna, which are usually small, difficult to locate, and difficult to identify by species.

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

1. Candidate species—Species for which the USFWS or the National Oceanic and Atmospheric Administration (NOAA) 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.

2. 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, even if accidental, is prohibited under the ESA.
3. 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, even if accidental, is prohibited under the ESA.
4. 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.

3.2.2 State Status

State-listed threatened and endangered species were determined and recorded for each Navy installation. These data were obtained using a spreadsheet updated by PARC annually and verified by state biologists who reviewed the lists for each installation (Nanjappa & Conrad, 2014). Navy documentation states that shore command personnel shall be aware of and comply with additional environmental requirements imposed by state governments (OPNAVINST 5090.1D). As a result, the Navy 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 present their decline. In addition, OPNAV M-5090.1, Environmental Readiness Program Manual, supports inventories of wildlife species (including state-listed species) that may be present on Navy lands.

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 Navy 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 because it gives 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 as 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 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 or unbalance the native ecosystems.

3.4 VENOMOUS SPECIES

Venomous snakes in the United States include rattlesnakes (*Crotalus spp.* and *Sistrurus spp.*), Cottonmouths (*Agkistrodon piscivorus spp.*), Copperheads (*Agkistrodon contortrix spp.*), and Coral Snakes (*Micrurus spp.* and *Micruroides spp.*). There are also two species of venomous lizards in the United States, the Gila Monster (*Heloderma suspectum*) and the Beaded Lizard (*Heloderma horridum*).

Venomous snakes were included in this analysis due to the potential risk of negative human-wildlife interactions. Navy installations with confirmed venomous species should educate their military and civilian members of the potential dangers of these animals. This is particularly true for military personnel that conduct training in natural environments where venomous snakes are present. Likewise, amphibians of many species have toxic skin secretions to avoid predation. Interaction with any amphibian or reptile should be discouraged to avoid undue and costly consequences.

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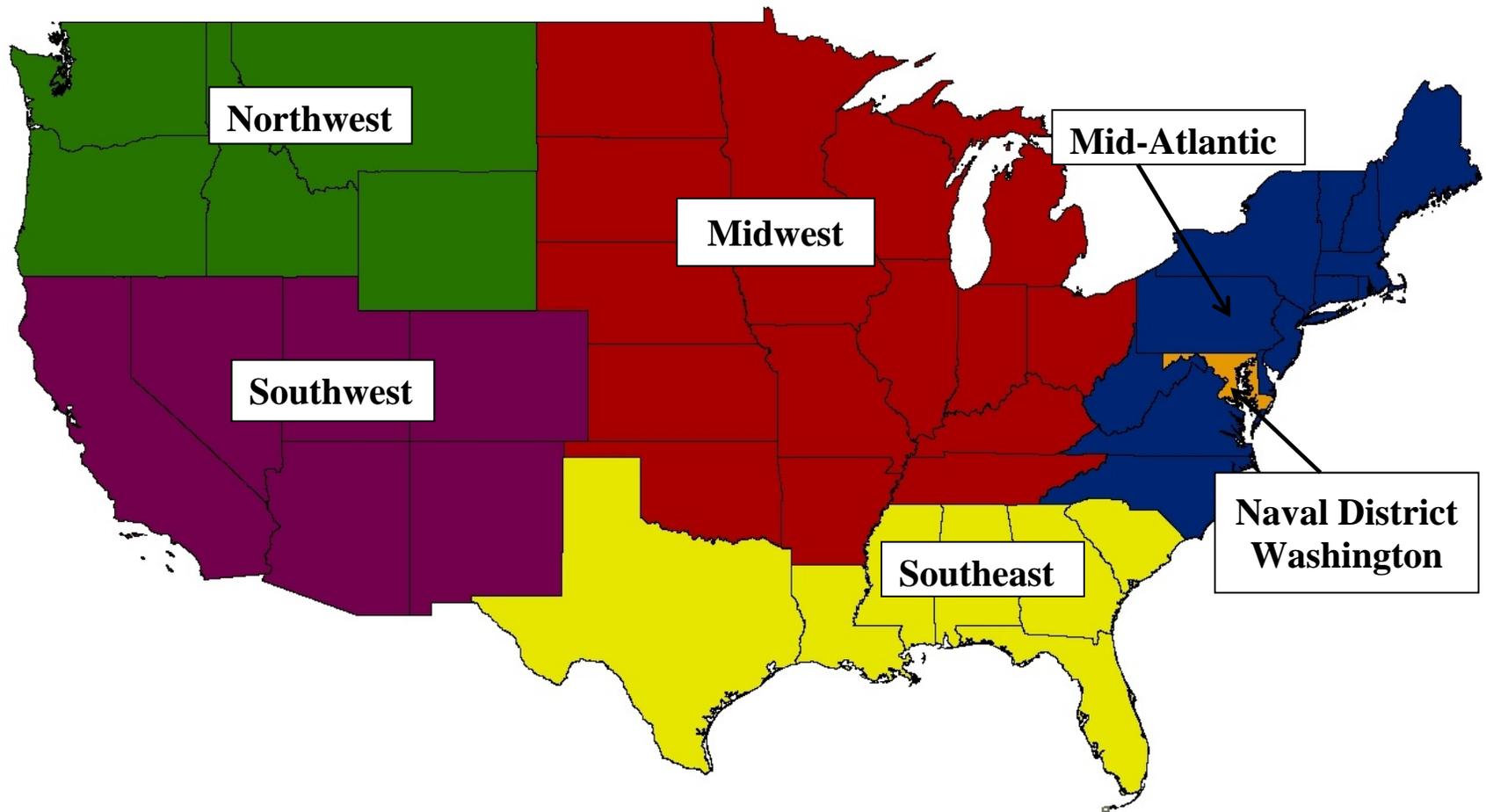


FIGURE 3-1. COMMANDER NAVY INSTALLATIONS COMMAND REGIONS.

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CHAPTER 4

Results

The results of this analysis are presented first by individual Commander Navy Regions and then all Navy regions combined.

4.1 COMMANDER, NAVY REGION MID-ATLANTIC

Commander, Navy Region (CNR) Mid-Atlantic encompasses naval installations on the east coast of the United States from North Carolina to Maine (less CNR Naval District Washington) (Figure 4-1).

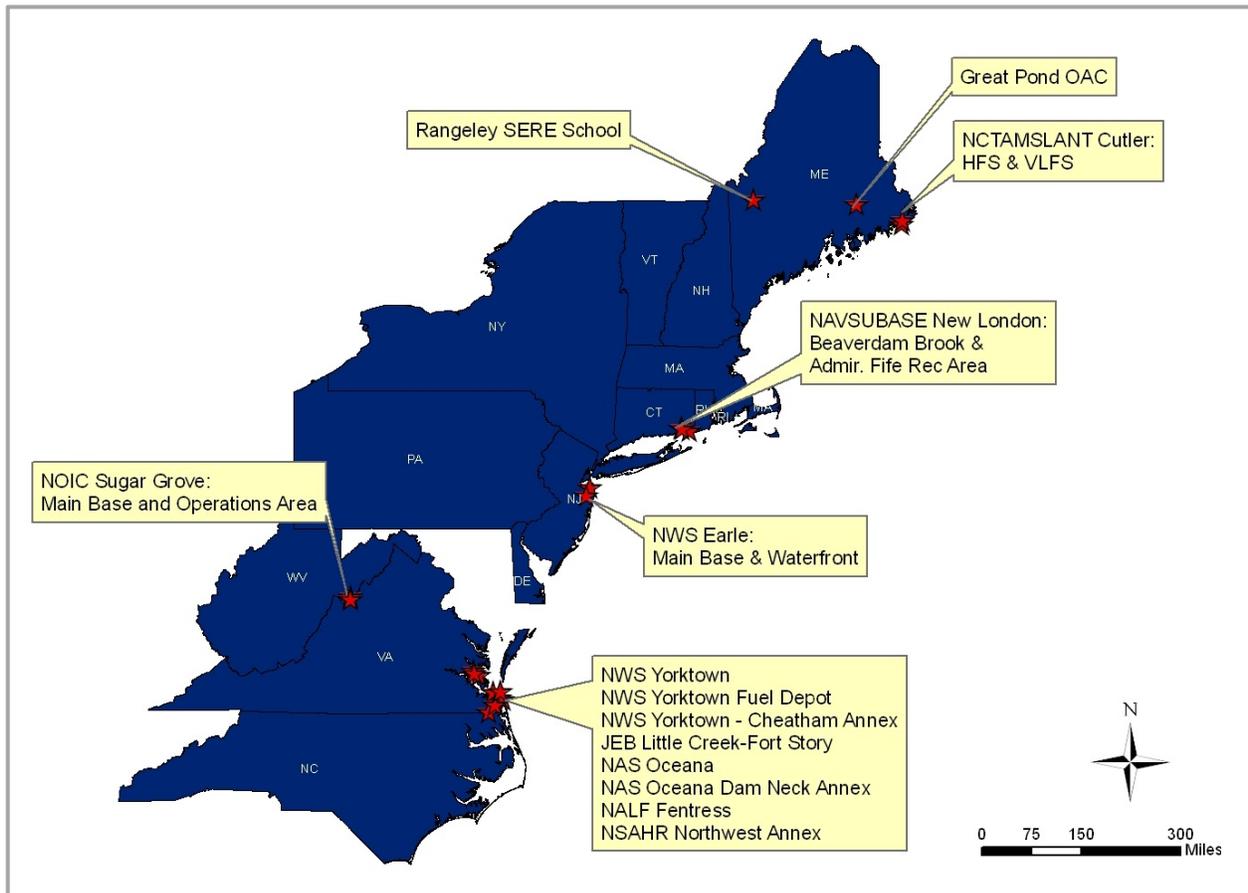


FIGURE 4-1. COMMANDER NAVY REGION MID-ATLANTIC

Of the 16 major installations in this region, 11 installations (21 distinct parcels) were included in the inventory of herpetofauna (table 2).

TABLE 2. COMMANDER, NAVY REGION MID-ATLANTIC INSTALLATIONS AND PARCELS INCLUDED IN THE HERPETOFAUNA INVENTORY ANALYSIS

Installation Name	Parcel Name	Acres*
Great Pond Outdoor Adventure Center	Main Base	397
JEB Little Creek-Fort Story	Fort Story	1,445
	Little Creek	2,805
NALF Fentress	Main Base	2,741
NAS Oceana	Main Base	5,700
	Dam Neck Annex	1,915
NAVSUBASE New London	Main Base	687
	Admiral Fife Recreational Area	36
	Beaver Dam Brook Wetland	2
NCTAMSLANT DET Cutler	High Frequency Site	128
	Very Low Frequency Site	2,805
NIOC Sugar Grove	Main Base	117
	Operations Area	477
NSA Hampton Roads Northwest Annex	Main Base	3,798
NWS Earle	Main Base	11,146
	Waterfront	105
	Chapel Hill	600
NWS Yorktown	Main Base	10,637
	Cheatham Annex	2,366
	Yorktown Fuel Depot	111
SERE School	Main Base	12,466
11 Navy Installations	21 Parcels	60,484 acres
*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP		

4.1.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of CNR Mid-Atlantic showed 84 species (74 percent) are confirmed present and an additional 30 species (26 percent) have the potential to be present on Navy installations in this region (table 3). There are 43 confirmed amphibian species and 41 confirmed reptile species on the Navy installations in this region. Of the species types, frogs and toads have the greatest number of species confirmed (26 species), whereas, lizard species have the least (six species). Salamander species have the largest number of potential species (14 species). More than half of the potential salamander species occurring at NIOC Sugar Grove remain unconfirmed.

TABLE 3. SPECIES TYPE AND OCCURANCE IN CNR MID-ATLANTIC (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	26	3	29	90%	10%
Salamanders	17	14	31	55%	45%
Lizards	6	3	9	67%	33%
Snakes	23	3	26	89%	11%
Turtles	12	7	19	63%	37%
Total	84	30	114	74%	26%

4.1.1 Federal Status

4.1.1.1 Confirmed Species—Federally Threatened or Endangered

Three confirmed sea turtle species (the Kemp's Ridley Sea Turtle [*Lepidochelys kempii*], the Loggerhead Sea Turtle [*Caretta caretta*], and the Green Sea Turtle [*Chelonia mydas*]) present on installations or detachments in CNR Mid-Atlantic are federally listed as threatened or endangered by the U.S. Fish and Wildlife Service (table 4). All three species are confirmed on JEB Little Creek-Fort Story. The Loggerhead Sea Turtle (*Caretta caretta*) is also confirmed on NAS Oceana (Dam Neck Annex), and the Green Sea Turtle (*Chelonia mydas*) and the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) are potentially present at this site.



FIGURE 4-2. KEMP'S RIDLEY SEA TURTLE (PHOTO BY SETH BERRY)

4.1.1.2 Potential Species—Federally Threatened or Endangered

Two federally-endangered or -threatened species have the potential to occur on installations within CNR Mid-Atlantic region. Both the Leatherback Sea Turtle (*Dermochelys coriacea*) and the Bog Turtle (*Glyptemys muhlenbergii*) are federally endangered and potentially present at NWS Earle.

4.1.2 State Status

Naval installations within the states of Virginia and New Jersey have confirmed or potential state-listed threatened and endangered species on their properties. In Virginia, the agency responsible for managing state-listed species is the Virginia Department of Game and Inland Fisheries (VDGIF). In New Jersey, this state wildlife agency is the New Jersey Department of Environmental Protection (NJDEP). No confirmed or potential state-listed threatened or endangered species are known to exist on the remaining installations in CNR Mid-Atlantic.

4.1.2.1 Confirmed Species—State Threatened or Endangered

The Timber Rattlesnake (*Crotalus horridus*), confirmed at NALF Fentress and NSA Hampton Roads Northwest Annex, and the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), confirmed at JEB Little Creek-Fort Story and NAS Oceana Dam Neck Annex, are state endangered in Virginia. The Pine Barrens Treefrog (*Hyla andersonii*) is considered threatened in the state of New Jersey, where it is also known to be present at NWS Earle.



FIGURE 4-3. TIMBER RATTLESNAKE (PHOTO BY TAMMY CONKLE)

Three species listed as threatened in Virginia are known to occur on naval installations in the state. The Loggerhead Sea Turtle (*Caretta caretta*) and the Green Sea Turtle (*Chelonia mydas*) are both known to occur at multiple installations in Virginia. The Mabee's Salamander (*Ambystoma mabeei*) is known to be present on the main base of NWS Yorktown.



FIGURE 4-4. MABEE'S SALAMANDER (PHOTO BY CHRIS PETERSEN)

4.1.2.2 Potential Species—State Threatened or Endangered

The Eastern Tiger Salamander (*Ambystoma tigrinum malvortium*), the Eastern Chicken Turtle (*Deirochelys reticularia reticularia*), the Barking Treefrog (*Hyla gratiosa*), and the Eastern Glass Lizard (*Ophisaurus ventralis*) are listed as endangered or threatened in Virginia and may occur on multiple Navy installations (table 4). The Wood Turtle (*Glyptemys insculpta*) is listed as threatened in the state of New Jersey where it may be present at NWS Earle. Three additional state endangered species may occur at NWS Earle: the Leatherback Sea Turtle (*Dermochelys coriacea*), the Red Cornsnake (*Pantherophis guttata*), and the Bog Turtle (*Glyptemys muhlenbergii*).



FIGURE 4-5. EASTERN CHICKEN TURTLE (PHOTO BY J. D. KLEOPFER)

4.1.3 NatureServe Status

4.1.3.1 Confirmed Species—Species at Risk

Two species of sea turtles (the Loggerhead Sea Turtle [*Caretta caretta*] and the Green Sea Turtle [*Chelonia mydas*]) known to occur in CNR Mid-Atlantic have a NatureServe status of G3-Vulnerable. The Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), which also has a confirmed presence in the region, has the lowest NatureServe status of G1-Critically Imperiled.

4.1.3.2 Potential Species—Species at Risk

Other species that have the potential to occur on CNR Mid-Atlantic installations include the Leatherback Sea Turtle (*Dermochelys coriacea*) and the Shenandoah Mountain Salamander (*Plethodon virginia*) which each have a NatureServe status of G2-Imperiled, and the Wood Turtle (*Glyptemys insculpta*) and the Bog Turtle (*Glyptemys muhlenbergii*) with a NatureServe status of G3-Vulnerable.



FIGURE 4-6. WOOD TURTLE (PHOTO BY DAVE MCNAUGHTON)

TABLE 4. CONSERVATION STATUS SUMMARY (2013; SHEET 1 OF 2)

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location
Loggerhead Sea Turtle <i>(Caretta caretta)</i>	Threatened	VA–Threatened	G3–Vulnerable	<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek • NAS Oceana (Dam Neck Annex) 	<ul style="list-style-type: none"> • NWS Yorktown (main base, Cheatham Annex, Yorktown Fuel Depot)
Green Sea Turtle <i>(Chelonia mydas)</i>	Threatened	VA–Threatened	G3–Vulnerable	<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek 	<ul style="list-style-type: none"> • NAS Oceana (Dam Neck Annex)
Kemp’s Ridley Sea Turtle <i>(Lepidochelys kempii)</i>	Endangered	VA–Endangered	G1–Critically Imperiled	<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek 	<ul style="list-style-type: none"> • NAS Oceana (Dam Neck Annex)
Eastern Tiger Salamander <i>(Ambystoma tigrinum malvortium)</i>		VA–Endangered	G5–Secure		<ul style="list-style-type: none"> • NWS Yorktown (main base, Cheatham Annex, Yorktown Fuel Depot)
Leatherback Sea Turtle <i>(Dermochelys coriacea)</i>	Endangered	NJ–Endangered	G2–Imperiled		<ul style="list-style-type: none"> • NWS Earle (waterfront)
Bog Turtle <i>(Glyptemys muhlenbergii)</i>	Threatened	NJ–Endangered	G3–Vulnerable		<ul style="list-style-type: none"> • NWS Earle (main base)
Eastern Chicken Turtle <i>(Deirochelys reticularia reticularia)</i>		VA–Endangered	G5–Secure		<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek • NAS Oceana (main base, Dam Neck Annex)
Timber Rattlesnake <i>(Crotalus horridus)</i>		VA–Endangered	G4–Apparently Secure	<ul style="list-style-type: none"> • NSAHR Northwest Annex • NALF Fentress 	
Pine Barrens Treefrog <i>(Hyla andersonii)</i>		NJ–Threatened	G4–Apparently Secure	<ul style="list-style-type: none"> • NWS Earle (main base) 	

TABLE 4. CONSERVATION STATUS SUMMARY (2013; SHEET 2 OF 2)

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location/s	Potential Location
Red Cornsnake <i>(Pantherophis guttata)</i>		NJ–Endangered	G5–Secure		<ul style="list-style-type: none"> • NWS Earle (main base)
Mabee’s Salamander <i>(Ambystoma mabeei)</i>		VA–Threatened	G4– Apparently Secure	<ul style="list-style-type: none"> • NWS Yorktown (main base) 	
Barking Treefrog <i>(Hyla gratiosa)</i>		VA–Threatened	G5–Secure		<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek • NAS Oceana (main base, Dam Neck Annex)
Eastern Glass Lizard <i>(Ophisaurus ventralis)</i>		VA–Threatened	G5–Secure		<ul style="list-style-type: none"> • JEB Fort Story • JEB Little Creek • NAS Oceana (main base, Dam Neck Annex)
Wood Turtle <i>(Glyptemys insculpta)</i>		NJ–Threatened	G3– Vulnerable		<ul style="list-style-type: none"> • NWS Earle (main base)
Shenandoah Mountain Salamander <i>(Plethodon virginia)</i>		None	G2–Imperiled		<ul style="list-style-type: none"> • NOIC Sugar Grove (Operations Area)

4.1.5 Non-native Species

The presence of the Red-eared Slider (*Trachemys scripta elegans*) has been confirmed on many Virginia installations. The species may also be present at NWS Earle in New Jersey. The Eastern Spiny Softshell Turtle (*Apalone spinifera spinifera*) is not native to New Jersey, but has the potential to be present at NWS Earle.



FIGURE 4-7. EASTERN SPINY SOFTSHELL

4.1.6 Venomous Species

Three species of venomous snakes have been confirmed on Navy installations within the Mid-Atlantic region (Copperheads [*Agkistrodon contortrix*], Cottonmouths [*Agkistrodon piscivorus*], and the Timber Rattlesnake [*Crotalus horridus*]). Copperheads (*Agkistrodon contortrix*) are confirmed on NAS Oceana, NALF Fentress, NWS Yorktown (main base, Cheatham Annex and Yorktown Fuels), NSAHR Northwest Annex, and JEB Little Creek-Fort Story (Fort Story). Cottonmouths (*Agkistrodon piscivorus*) are confirmed on NAS Oceana (main base and Dam Neck Annex), NALF Fentress, and JEB Little Creek-Fort Story (Fort Story). Lastly, Timber Rattlesnakes (*Crotalus horridus*) are confirmed on NALF Fentress and NSAHR Northwest Annex. The population of Timber Rattlesnakes (*Crotalus horridus*) at NSAHR Northwest Annex has been the subject of a radio telemetry study for the last 18 years.



FIGURE 4-8. COPPERHEAD (PHOTO BY ALAN SAVITZKY)



FIGURE 4-9. COTTONMOUTH (PICTURE BY CHRIS PETERSEN)

4.1.7 Comparison of Herpetofauna Biodiversity on Navy Sites in the CNR Mid-Atlantic to Regional Biodiversity

Commander, Navy Region Mid-Atlantic installations evaluated in this report have 60 percent of the total biodiversity of herpetofauna (confirmed and potential) of all species documented in the 14 states of this region (table 5). Of the species types, Navy sites have the greatest percentage of frogs and toads on their lands (83 percent) in comparison to all species within this region, whereas the salamanders represented the least percentage (40 percent). This is because of high endemism on Appalachian Peaks, whereas most Navy installations do not include higher elevation habitats as a result of their aquatic mission. Lizard, snake, and turtle biodiversity on Navy installations in this region was 65 percent or greater in comparison to all species in this region.

TABLE 5. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013)

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Mid-Atlantic	Number of Herpetofauna Species Within the States Comprising CNR Mid-Atlantic	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Frogs and Toads	29	35	83%
Salamanders	31	78	40%
Lizards	9	12	75%
Snakes	26	40	65%
Turtles	19	25	76%
Total	114	190	60%

4.2 COMMANDER, NAVY REGION NAVAL DISTRICT WASHINGTON

CNR Naval District Washington is a unique region completely encompassed within the CNR Mid-Atlantic region. This region contains more than 4,000 square miles including the District of Columbia and cities within Maryland and Virginia.

Seven installations within Naval District Washington (a total of nine geographic parcels) were included in the inventory of herpetofauna (figure 4-10, table 6).

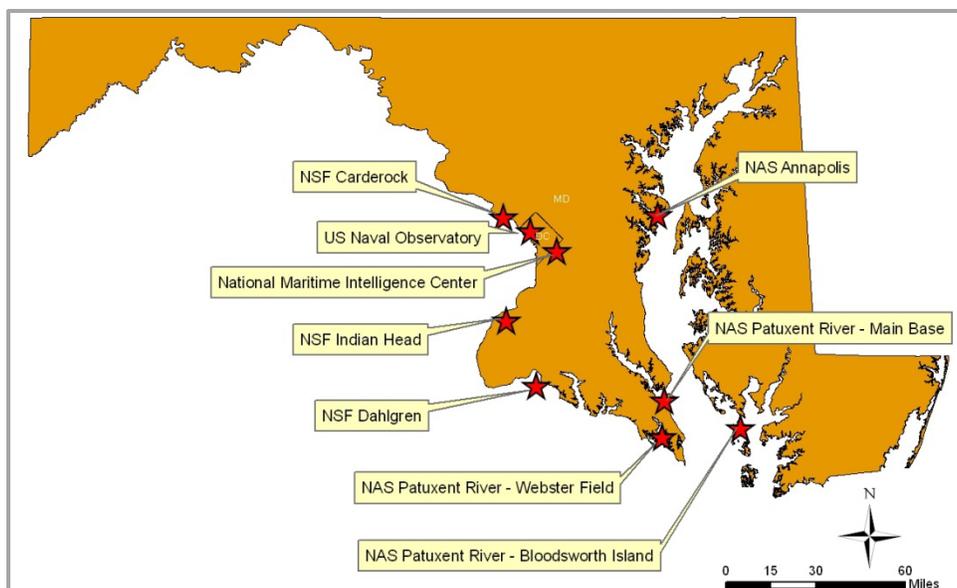


FIGURE 4-10. COMMANDER NAVY REGION NAVAL DISTRICT WASHINGTON.

Table 6. CNR WASHINGTON INSTALLATIONS AND PARCELS INCLUDED IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013)

Installation Name	Parcel Name	Acres*
NAS Patuxent River	Main Base	6398
	Webster Field	968
	Bloodsworth Island Bombing Range	6013
Naval Support Facility Dahlgren	Mainside & Pumpkin Neck	4319
NSA Annapolis	Main Base	269
NSF Carderock	Main Base	184
NSF Indian Head	Main Base & Stump Neck	3,314
U.S. Navy Observatory	Main Base	72
NSF Suitland	Main Base	42
7 Installations	9 Distinct Parcels	21,579 acres

*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP

4.2.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of the Naval District Washington region indicated 61 species (85 percent) are confirmed present and 12 species (16 percent) have the potential to occur on Navy installations in this region (table 7). There are 25 confirmed amphibian species and 35 confirmed reptile species in this region. Of the species types, snakes make up the largest number of confirmed species (18 species) whereas lizards (5 species) have the least. Both lizards and frogs/toads have zero potential species. Salamanders have the largest number of potentially occurring species (7 species).

TABLE 7. SPECIES TYPE AND OCCURRENCE IN CNR NAVAL DISTRICT WASHINGTON
(2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	16	0	16	100%	0%
Salamanders	9	7	16	56%	44%
Lizards	5	0	5	100%	0%
Snakes	18	3	21	86%	14%
Turtles	13	2	15	87%	13%
Total	61	12	73	85%	15%

4.2.1 Federal Status

4.2.1.1 Confirmed Species—Federally Threatened or Endangered

Of the 61 species that are known to exist on installations within CNR Naval District Washington, two species, the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) and the Leatherback Sea Turtle (*Dermochelys coriacea*), are listed as federally endangered (table 8). Both species occur at NAS Patuxent River. The Loggerhead Sea Turtle (*Caretta caretta*) is listed as threatened and is also present at NAS Patuxent River (main base, Webster Field, and Bloodsworth Bombing Range).

4.2.2 State Status

4.2.2.1 Confirmed Species—State Threatened or Endangered

Four species known to occur on installations or detachments in Maryland are listed as endangered by the Maryland Department of Natural Resources. The Leatherback Sea Turtle (*Dermochelys coriacea*) is confirmed at the Bloodsworth Island Bombing Range and the Eastern Narrow-mouthed Toad (*Gastrophryne carolinensis*) is confirmed at Patuxent River main base. The Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) is confirmed as present at both Patuxent River main base and Bloodsworth Bombing Range.



FIGURE 4-11. EASTERN NARROW-MOUTHED TOAD (PHOTO BY PAUL BLOCK)

The Common Rainbow Snake (*Farancia erytrogramma erytrogramma*) is listed as an endangered species in Maryland, where it has the potential to occur at NSF Indian Head. The last reported record of this species on the installation was in 1937. The natural resource manager of the installation has more recently found this species south of the installation property, but recent surveys on NSF Indian Head have yet to document one on the installation. Lastly, the Loggerhead Sea Turtle (*Caretta caretta*), is listed as threatened in Maryland, where it is confirmed to be present at NAS Patuxent River's main base and detachment sites.



FIGURE 4-12. COMMON RAINBOW SNAKE (PHOTO BY SETH BERRY)

4.2.2.2 Potential Species—State Threatened or Endangered

The Eastern Tiger Salamander (*Ambystoma tigrinum malvortium*) is listed as state endangered in Virginia and potentially occurs on NSF Dahlgren. An amphibian and reptile survey is currently planned for this installation in 2014.



FIGURE 4-13. EASTERN TIGER SALAMANDER

4.2.3 NatureServe Status—Confirmed and Potential

One herpetofauna species known to occur in the Naval District Washington region (Kemp's Ridley Sea Turtle [*Lepidochelys kempii*]) is ranked G1-Critically Imperiled by NatureServe. The Leatherback Sea Turtle (*Dermochelys coriacea*) and the Loggerhead Sea Turtle (*Caretta caretta*), also confirmed present, are listed as G2-Imperiled and G3-Vulnerable. The Wood Turtle (*Glyptemys insculpta*) is potentially present at NSF Carderock and has a NatureServe status of G3-Vulnerable.

TABLE 8. CONSERVATION STATUS SUMMARY (2013)

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location	Potential Location
Kemp's Ridley Sea Turtle (<i>Lepidochelys kempii</i>)	Endangered	MD–Endangered	G1–Critically Imperiled	• NAS Patuxent River (main base, Bloodsworth Bombing Range)	
Leatherback Sea Turtle (<i>Dermochelys coriacea</i>)	Endangered	MD–Endangered	G2–Imperiled	• NAS Patuxent River (Bloodsworth Bombing Range)	
Loggerhead Sea Turtle (<i>Caretta caretta</i>)	Threatened	MD–Threatened	G3–Vulnerable	• NAS Patuxent River (main base, Webster Field, Bloodsworth Bombing Range)	
Eastern Tiger Salamander (<i>Ambystoma tigrinum malvortium</i>)		VA–Endangered	G5–Secure		• NSF Dahlgren
Eastern Narrow-mouthed Toad (<i>Gastrophryne carolinensis</i>)		MD–Endangered	G5–Secure	• NAS Patuxent River (main base)	
Common Rainbow Snake (<i>Farancia erythrogramma erythrogramma</i>)		MD–Endangered	G4–Apparently Secure		• NSF Indian Head
Wood Turtle (<i>Glyptemys insculpta</i>)			G3–Vulnerable		• NSF Carderock

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4.2.5 Non-native Species

The Red-eared Slider (*Trachemys scripta elegans*) is confirmed to be present on at least two installations in Maryland, NAS Patuxent River, and NSF Indian Head, and potentially occurs on several other installations and detachments in the region. The Red-eared Slider is not native to Maryland and is considered an invasive species (U.S. Geological Survey).



FIGURE 4-14. RED-EARED SLIDER (PHOTO BY PAUL BLOCK)

4.2.6 Venomous Species

One species of venomous snake, the Copperhead (*Agkistrodon contortrix*), has been confirmed on Navy installations within the Naval District Washington region. The Copperhead is confirmed at NAS Patuxent River (main base and Webster field) and NSF Indian Head. The Copperhead may also be present at Bloodsworth Island Bombing Range, NSF Carderock, Naval Support Facility Dahlgren, and NSA Annapolis.



FIGURE 4-15. COPPERHEAD (PHOTO BY SETH BERRY)

4.2.7 Comparison of Herpetofauna Biodiversity on Navy Sites in the CNR Naval District Washington to Regional Biodiversity

Commander, Navy Region Naval District Washington installations evaluated in this report have 52 percent of the total biodiversity of herpetofauna (confirmed and potential) of all species documented in Virginia, Maryland, and the District of Columbia (table 9). Of the species types, Navy sites have the greatest percentage of snakes on their lands (75 percent) in comparison to all herpetofauna species within this region, whereas the salamanders represented the least percentage (31 percent). Lizard, frog, and toad and turtle biodiversity on Navy installations in this region were 50 percent or greater in comparison to all herpetofauna species present in the District of Columbia, Maryland, and Virginia.

TABLE 9. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013).

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Naval District Washington	Number of Herpetofauna Species Within the States Comprising CNR Naval District Washington	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Frogs and Toads	16	26	57%
Salamanders	16	52	31%
Lizards	5	10	50%
Snakes	21	28	75%
Turtles	15	22	68%
Total	72	138	52%

4.3 COMMANDER, NAVY REGION SOUTHEAST

Commander, Navy Region Southeast includes installations in Alabama, Florida, Georgia, Mississippi, Louisiana, and Texas, and Guantanamo Bay, Cuba. This study only considered installations within the continental United States (figure 4-16); therefore, Guantanamo Bay was not included in this analysis.

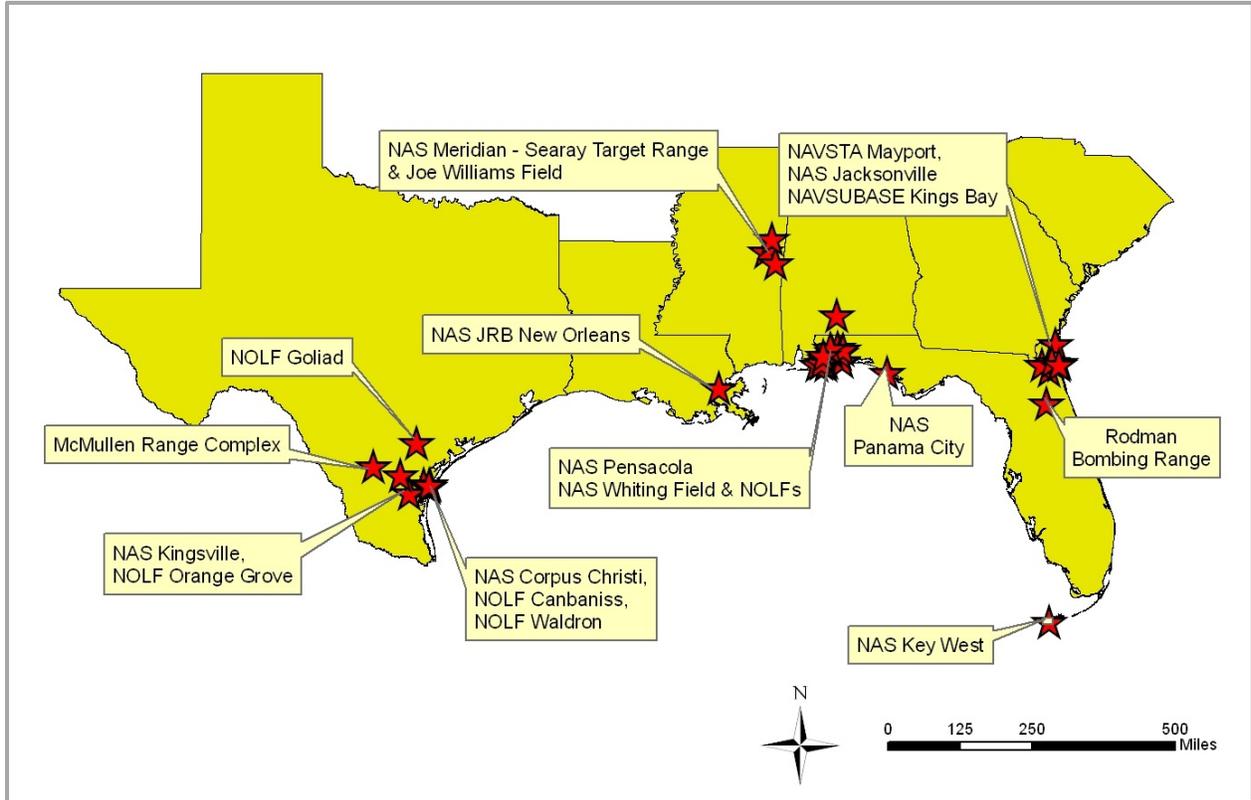


FIGURE 4-16. COMMANDER NAVY REGION SOUTHEAST.

Eleven installations, encompassing 35 distinct parcels, were included in the herpetofauna inventory in CNR Southeast (table 10).

TABLE 10. CNR SOUTHEAST INSTALLATIONS AND PARCELS INCLUDED IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013).

Installation Name	Parcel Name	Acres*
NAS Corpus Christi	Main Base	2,630
	NOLF Canbaniss	953
	NOLF Goliad	1,136
	NOLF Waldron	903
	Peary Place Transmitter Site	44
NAS Jacksonville	Main Base	3,881
	OLF Whitehouse	1,931
	Rodman Bombing Target Range	2,693
NAS JRB NOLA	Main Base	5,210
NAS Key West	Main Base	4,787
NAS Kingsville	Main Base	3,346
	McMullen Range Complex	7,825
	NALF Orange Grove	1,380
NAS Meridian	Joe Williams Field	8,065
	McCain Field	1,463
	Searay Target Range	2,889
NAS Pensacola	Saufley Field NETPDTC	895
	Center for Information Dominance, Corry Station	674
	Main Base	5,809
	NOLF Bronson Field	1,098
NAS Whiting Field	Main Base	4,774
	NOLF Evergreen	444
	NOLF Harold	573
	NOLF Pace	207
	NOLF Santa Rosa	738
	NOLF Site 8-A	640
	NOLF Spencer	640
	NOLF Wolf	422
	NOLF Holley	698
Naval Station Mayport	Greenfield Plantation	35
	Main Base	3,230
	Naval Fuel Depot	181
	Ribault Bay Village Housing	129
NAVSUBASE Kings Bay	Main Base	16,616
NSA Panama City	Main Base	678
11 Installations	35 Distinct Parcels	87,617 acres

*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP

4.3.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of CNR Southeast showed that 148 species (66 percent) are confirmed present and an additional 77 species (34 percent) have the potential to be present on Navy installations within the region (table 11). There are 55 confirmed amphibian species and 93 confirmed reptile species in this region. This is the only Navy region where native crocodylians are confirmed present on Navy lands. Snakes are the most common confirmed reptile species type (45 species) and frogs/toads are the most common amphibian species type (36 species) in this region. In addition to the 45 confirmed snake species, there is the potential for another 30 snake species making this species type the most numerous for this region and all other Navy regions.

TABLE 11. SPECIES TYPE AND OCCURRENCE IN CNR SOUTHEAST (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Alligator and Crocodile	2	0	2	100%	0
Frogs and Toads	36	12	48	75%	25%
Salamanders	19	13	32	59%	41%
Lizards	23	11	34	68%	32%
Snakes	45	30	75	60%	40%
Turtles	23	11	34	68%	32%
Total	148	77	225	66%	34%

4.3.2 Federal Status

4.3.2.1 Confirmed Species—Under Review

Five confirmed species in CNR Southeast have been petitioned for listing and are under review by the USFWS (table 12). The Alligator Snapping Turtle (*Macrochelys temminckii*) is confirmed present at multiple installations in Florida and Louisiana, and potentially occurs on installations in Mississippi and Alabama. The Eastern Diamond-backed Rattlesnake (*Crotalus adamanteus*) is confirmed on eight installations and potential at an additional fourteen locations throughout the region. The Southern Hognose snake (*Heterodon simus*) is confirmed present at NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) and potential at parcels of NAS Jacksonville and NAS Whiting Field. The Black-spotted Newt (*Notophthalmus meridionalis*) is confirmed at NAS Kingsville (McMullen Range Complex) and potential at five other installations in Texas. Lastly, the Gopher Frog (*Lithobates capito*) is confirmed at NAS Pensacola (Saufley Field) and NAS Whiting Field (OLF Holley) and has the potential to be present at numerous sites in Florida and Georgia.



FIGURE 4-17. EASTERN DIAMOND-BACKED RATTLESNAKE (PHOTO BY MARTY KORENEK)



FIGURE 4-18. GOPHER FROG (PHOTO BY J.D.WILSON)

4.3.2.2 Confirmed Species—Federally Threatened

The Gopher Tortoise (*Gopherus polyphemus*) is federally threatened in Alabama where it has the potential to occur on two NAS Whiting Field NOLFs, Evergreen and Wolf, while it is considered a candidate species under ESA in the remainder of its range in the United States. The Gopher Tortoise (*Gopherus polyphemus*) is confirmed on seven Navy installations in Florida and Georgia, and has the potential to occur on 12 additional installations in Florida.



FIGURE 4-19. GOPHER TORTOISE (PHOTO BY CAITLIN SNYDER)

In CNR Southeast, three additional confirmed species are federally listed as threatened by the USFWS. The Loggerhead Sea Turtle (*Caretta caretta*) is confirmed at four sites in Florida and one in Georgia, as well as potential at naval sites in Texas and Louisiana. The American Alligator (*Alligator mississippiensis*) is confirmed on nine installations in Florida, Georgia, Texas, and Louisiana and potential on 11 additional installations in the region. The threatened American Crocodile (*Crocodylus acutus*) is confirmed present on one installation (NAS Key West).

4.3.2.3 Confirmed Species—Federally Endangered

Five confirmed herpetofauna species in the region are listed by the USFWS as endangered. The Reticulated Flatwoods Salamander (*Ambystoma bishopi*) is confirmed present on NAS Whiting Field (NOLF Holley) and potential at NAS Pensacola (main base and NOLF Bronson Field) and NAS Whiting Field (main base and NOLF Site 8-A). Four species of sea turtles, the Green Sea Turtle (*Chelonia mydas*), the Leatherback Sea Turtle (*Dermochelys coriacea*), Hawksbill Sea Turtle (*Eretmochelys imbricata*), and the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), are confirmed at NAVSUBASE Kings Bay and potential at multiple installations throughout the region.



FIGURE 4-20. GREEN SEA TURTLES (PHOTO BY JOHN BURGE)

4.3.2.4 Potential Species—Under Review

The Florida Pinesnake (*Pituophis melanoleucus mugitus*) has the potential to be present at parcels associated with NAS Whiting Field, NSA Panama City, and NAVSUBASE Kings Bay. This subspecies is currently under review by the U.S. Fish and Wildlife Service.

4.3.2.5 Potential Species—Federal Candidate

Two species that have the potential to occur on Navy sites in the region are listed as candidate species under ESA by the USFWS. The Black Pinesnake (*Pituophis melanoleucus longingi*) potentially occurs at NAS Meridian (Joe Williams Field, McCain Field, and Searay Target Range) and the Striped Newt (*Notophthalmus perstriatus*) potentially occurs at NAS Jacksonville (Rodman Bombing Target Range) and main base of NAVSUBASE Kings Bay.

4.3.2.6 Potential Species—Federally Threatened

Three federally threatened herpetofauna species potentially occur on Navy installations in CNR Southeast. The Frosted Flatwoods Salamander (*Ambystoma cingulatum*) potentially occurs on NAS Jacksonville (main base and OLF Whitehouse), NS Mayport (main base, Greenfield Plantation, Naval Fuel Depot, and Ribault Bay Village Housing), and NAVSUBASE Kings Bay. The threatened Eastern Indigo Snake (*Drymarchon couperi*) potentially occurs at multiple parcels on NAS Jacksonville, NAS Whiting Field, NS Mayport, and NAVSUBASE Kings Bay. The Olive Ridley Sea Turtle (*Lepidochelys olivacea*) is also threatened and potentially occurs at NAS Key West.



FIGURE 4-21. FROSTED FLATWOODS SALAMANDER

4.3.2.7 Potential Species—Federally Endangered

One federally-endangered herpetofauna species, the Alabama Red-bellied Cooter (*Pseudemys alabamensis*) potentially occurs at two NAS Whiting Field NOLFs, Evergreen and Wolf.

4.3.3 State Status

4.3.3.1 Confirmed Species—State Endangered

Four species of sea turtles are confirmed present on installations in states where they are listed as state endangered. The Loggerhead Sea Turtle (*Caretta caretta*), the Leatherback Sea Turtle (*Dermochelys coriacea*), the Hawksbill Sea Turtle (*Eretmochelys imbricata*), and the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) are state endangered in Georgia. All four species of sea turtles are confirmed present at NAVSUBASE Kings Bay.

4.3.3.2 Confirmed Species—State Threatened

There are twelve confirmed herpetofauna species in CNR Southeast that are state threatened in the states of Texas, Georgia, and Florida (table 12). Texas state-threatened species confirmed on Navy sites included the Black-spotted Newt (*Notophthalmus meridionalis*), the Reticulate Collared Lizard (*Crotaphytus reticulatus*), the Texas Horned Lizard (*Phrynosoma cornutum*), the Texas Indigo Snake (*Drymarchon corais erebennus*), the Texas Tortoise (*Gopherus berlandieri*), and the American Alligator (*Alligator mississippiensis*).

Georgia state-threatened species confirmed on Navy sites only included the Green Sea Turtle (*Chelonia mydas*), whereas Florida state-threatened species confirmed on Navy sites include the Striped Mud Turtle (*Kinosternon baurii*), the Peninsula Ribbonsnake (*Thamnophis sauritus sackenii*), and the Florida Brownsnake (*Storeria victa*). The Gopher Tortoise (*Gopherus polyphemus*) is state threatened in Georgia and Florida where it is confirmed at NAS Jacksonville, NAS Whiting Field (OLF Holley), NS Mayport, NAVSUBASE Kings Bay, and NAS Pensacola (main base, Saufley Field NETPDTC, and NOLF Bronson Field).

4.3.3.3 Potential Species—State Endangered

Only one potential species occurs in CNR Southeast that is state endangered. The Black Pinesnake (*Pituophis melanoleucus longingi*) potentially occurs at NAS Meridian (Joe Williams Field, McCain Field, and Searay Target Range) in Mississippi where it is state endangered.

4.3.3.4 Potential Species—State Threatened

Nine herpetofauna species in CNR Southeast have the potential to be present on Navy installations and are state threatened. In Texas, four reptiles, the Scarletsnake (*Cemophora coccinea*), the Timber Rattlesnake (*Crotalus horridus*), the Cat-eyed Snake (*Leptodeira septentrionalis*), the Speckled Racer (*Drymobius margaritiferus*), and one amphibian, the Sheep Frog (*Hypopachus variolosus*) are state threatened and potentially present on several Navy sites in this state.

The Key Ring-necked snake (*Diadophis punctatus acricus*) is state threatened in Florida and has the potential to occur at NAS Key West.

The Frosted Flatwoods Salamander (*Ambystoma cingulatum*), the Striped Newt (*Notophthalmus perstriatus*), and the Eastern Indigo Snake (*Drymarchon couperi*) are state threatened in Georgia where they are potentially present at NAVSUBASE Kings Bay.



FIGURE 4-22. EASTERN INDIGO SNAKE (PHOTO BY J.D. WILSON)

4.3.4 NatureServe Status

4.3.4.1 Confirmed Species—Species at Risk

Seventeen confirmed species in CNR Southeast are considered species at risk according to their NatureServe status (table 12). Three species, the Black-spotted Newt (*Notophthalmus meridionalis*), the Peninsula Ribbonsnake (*Thamnophis sauritus sackenii*), and the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), have a NatureServe status of G1 or T1-Critically Imperiled. (A T-rank is given to sub-species or varieties and is determined using the same rules as G-ranks.) Species with a NatureServe status of G2-Imperiled are the Southern Hog-nosed Snake (*Heterodon simus*), the Florida Bog Frog (*Lithobates okaloosae*), the Escambia Map Turtle (*Graptemys ernsti*), the Leatherback Sea Turtle (*Dermochelys*

coriacea), the American Crocodile (*Crocodylus acutus*) and the Reticulated Flatwoods Salamander (*Ambystoma bishopi*). Three species of sea turtles confirmed in CNR Southeast have a NatureServe status of G3-Vulnerable: the Loggerhead Sea Turtle (*Caretta caretta*), the Green Sea Turtle (*Chelonia mydas*), and the Hawksbill Sea Turtle (*Eretmochelys imbricata*). Five additional confirmed species have a status of G3-Vulnerable—the Reticulate Collared Lizard (*Crotaphytus reticulatus*), the Mimic Glass Lizard (*Ophisaurus mimicus*), the Gopher Tortoise (*Gopherus polyphemus*), the Alligator Snapping Turtle (*Macrochelys temminckii*), and the Gopher Frog (*Lithobates capito*).

4.3.4.2 Potential Species—Species at Risk

Fourteen species that potentially occur on installations in CNR Southeast are considered species at risk by NatureServe (table 12). The Alabama Red-bellied Cooter (*Pseudemys alabamensis*) and the Key Ring-necked Snake (*Diadophis punctatus acricus*) are the only potential species in the region with a status of G1 or T1-Critically Imperiled. Three species—the Frosted Flatwoods Salamander (*Ambystoma cingulatum*), the Striped Newt (*Notophthalmus perstriatus*), and the Black Pinesnake (*Pituophis melanoleucus longingi*)—have a status of G2 or T2-Imperiled. There are nine potential species with a status of G3 or T3-Vulnerable in this region—the One-toed Amphiuma (*Amphiuma pholeter*), the Olive Ridley Sea Turtle (*Lepidochelys olivacea*), the Black-knobbed Map Turtle (*Graptemys nigrinoda*), the Eastern Indigo Snake (*Drymarchon couperi*), the Massasauga (*Sistrurus catenatus*), the Florida Pinesnake (*Pituophis melanoleucus mugitus*), the Southern Earless Lizard (*Holbrookia lacerata subcaudalis*), the Island Glass Lizard (*Ophisaurus compressus*), and the Florida Scrub Lizard (*Sceloporus woodi*).

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TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 1 OF 11)

Species	Federal Status	State Status where Confirmed/Potential	NatureServe Status	Confirmed Location	Potential Location
Alligator Snapping Turtle <i>(Macrochelys temminckii)</i>	Under Review		G3–Vulnerable	<ul style="list-style-type: none"> • NAS JRB NOLA • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • NAS Whiting Field (main base) 	<ul style="list-style-type: none"> • NAS Meridian (Joe Williams Field, McCain Field, Searay Target Range) • NAS Whiting Field (NOLF Evergreen, NOLF Site 8-A)
Eastern Diamond-backed Rattlesnake <i>(Crotalus adamanteus)</i>	Under Review		G4–Apparently Secure	<ul style="list-style-type: none"> • NAS Jacksonville (main base) • NAS Key West (main base) • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • NAS Whiting Field (OLF Holley) • Naval Station Mayport (Naval Fuel Depot) • NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Jacksonville (OLF Whitehouse, Rodman Bombing Target Range) • NAS Whiting Field (main base, NOLF Evergreen, NOLF Harold, NOLF Pace, NOLF Santa Rosa, NOLF Site 8-A, NOLF Spencer, NOLF Wolf) • Naval Station Mayport (main base, Ribault Bay Village Housing) • NSA Panama City (main base)
Black-spotted Newt <i>(Notophthalmus meridionalis)</i>	Under Review	TX–Threatened	G1–Critically Imperiled	<ul style="list-style-type: none"> • NAS Kingsville (McMullen Range Complex) 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss, NOLF Goliad), NAS Kingsville (main base, NOLF Orange Grove)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 2 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Gopher Tortoise (<i>Gopherus polyphemus</i>)	AL-Federally threatened Elsewhere-Candidate	FL-Threatened GA-Threatened	G3-Vulnerable	<ul style="list-style-type: none"> • NAS Jacksonville (main base) • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • NAS Whiting Field (OLF Holley) • Naval Station Mayport (main base) • NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Jacksonville (OLF Whitehouse, Rodman Bombing Target Range) • NAS Whiting Field (main base, NOLF Evergreen, NOLF Harold, NOLF Pace, NOLF Santa Rosa, NOLF Site 8-A, NOLF Spencer, NOLF Wolf) • Naval Station Mayport (main base, Greenfield Plantation, Ribault Bay Village Housing, Naval Fuel Depot) • NSA Panama City (main base)
American Alligator (<i>Alligator mississippiensis</i>)	Threatened	TX-Threatened	G5-Secure	<ul style="list-style-type: none"> • NAS Jacksonville (main base), NAS JRB NOLA (main base), NAS Kingsville (McMullen Range Complex), NAS Pensacola (main base, Saufley Field, NOLF Bronson Field), Naval Station Mayport (main base, Naval Fuel Depot), NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base) • NAS Jacksonville (OLF Whitehouse, Rodman Bombing Target Range) • NAS Kingsville (main base, NOLF Orange Grove) • NAS Meridian (Joe Williams Field, McCain Field, Searay Target Range) • NAS Whiting Field (NOLF Site 8-A) • Naval Station Mayport (Greenville Plantation, Ribault Bay Village Housing)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 3 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Loggerhead Sea Turtle <i>(Caretta caretta)</i>	Threatened	GA- Endangered LA- Threatened TX- Threatened	G3- Vulnerable	<ul style="list-style-type: none"> NAS Key West (main base), NAS Pensacola (main base, NOLF Bronson Field), Naval Station Mayport (main base), NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> NAS Corpus Christi (main base, NOLF Canbaniss) NAS JRB NOLA NAS Pensacola (Saufley Field) Naval Station Mayport (Greenville Plantation, Ribault Bay Village Housing, Naval Fuel Depot) NSA Panama City (main base)
American Crocodile <i>(Crocodylus acutus)</i>	Threatened		G2- Imperiled	<ul style="list-style-type: none"> NAS Key West (main base) 	
Reticulated Flatwoods Salamander <i>(Ambystoma bishopi)</i>	Endangered		G2- Imperiled	<ul style="list-style-type: none"> NAS Whiting Field (NOLF Holley) 	<ul style="list-style-type: none"> NAS Pensacola (main base, NOLF Bronson Field) NAS Whiting Field (main base, NOLF Site 8-A)
Green Sea Turtle <i>(Chelonia mydas)</i>	Threatened	GA- Threatened TX- Threatened LA- Threatened	G3- Vulnerable	<ul style="list-style-type: none"> Naval Station Mayport (main base) NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> NAS Corpus Christi (main base, NOLF Canbaniss) NAS Jacksonville (main base) NAS JRB NOLA (main base) NAS Key West (main base) NS Mayport (Greenville Plantation, Ribault Bay Village Housing, Naval Fuel Depot) NSA Panama City (main base)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 4 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Leatherback Sea Turtle <i>(Dermochelys coriacea)</i>	Endangered	GA– Endangered LA– Endangered TX– Endangered	G2– Imperiled	<ul style="list-style-type: none"> • Naval Station Mayport (main base) • NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss) • NAS Jacksonville (main base) • NAS JRB NOLA (main base) • NAS Key West (main base) • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • Naval Station Mayport (Greenville Plantation, Ribault Bay Village Housing, Naval Fuel Depot)
Hawksbill Sea Turtle <i>(Eretmochelys imbricata)</i>	Endangered	GA– Endangered LA– Endangered TX– Endangered	G3– Vulnerable	<ul style="list-style-type: none"> • NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss) • NAS Jacksonville (main base) • NAS JRB NOLA (main base) • NAS Key West (main base) • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • Naval Station Mayport (main base, Greenville Plantation, Ribault Bay Village Housing, Naval Fuel Depot)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 5 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Kemp's Ridley Sea Turtle <i>(Lepidochelys kempii)</i>	Endangered	TX– Endangered LA– Endangered GA– Endangered	G1–Critically Imperiled	<ul style="list-style-type: none"> • NAVSUBASE Kings Bay 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss) • NAS Jacksonville (main base) • NAS JRB NOLA (main base) • NAS Key West (main base) • Naval Station Mayport (main base, Greenville Plantation, Ribault Bay Village Housing, Naval Fuel Depot) NSA Panama City (main base)
Southern Earless Lizard <i>(Holbrookia lacerata subcaudalis)</i>			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss, NOLF Goliad, NOLF Waldron, Peary Place Transmitter Site) • NAS Kingsville (McMullen Range Complex, NALF Orange Grove)
Florida Pinesnake <i>(Pituophis melanoleucus mugitus)</i>	Under Review		T3– Vulnerable		<ul style="list-style-type: none"> • NAS Whiting Field (main base, NOLF Holley, NOLF Harold, NOLF Pace, NOLF Santa Rosa, NOLF Spencer) • NSA Panama City (main base) • NAVSUBASE Kings Bay

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 6 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Black Pinesnake (<i>Pituophis melanoleucus longingi</i>)	Candidate	MS– Endangered	T2–Imperiled		<ul style="list-style-type: none"> • NAS Meridian (Joe Williams Field, McCain Field, and Searay Target Range)
Frosted Flatwoods Salamander (<i>Ambystoma cingulatum</i>)	Threatened	GA– Threatened	G2– Imperiled		<ul style="list-style-type: none"> • NAS Jacksonville (main base and OLF Whitehouse) • Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) • NAVSUBASE Kings Bay
Eastern Indigo Snake (<i>Drymarchon couperi</i>)	Threatened	GA– Threatened	G3– Vulnerable		<ul style="list-style-type: none"> • NAS Jacksonville (main base, OLF Whitehouse, Rodman Bombing Target Range) • NAS Whiting Field (main base, NOLF Harold, NOLF Pace, NOLF Santa Rosa, OLF Holley) • Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) • NAVSUBASE Kings Bay
Key Ring-necked Snake (<i>Diadophis punctatus acricus</i>)		FL– Threatened	T1–Critically Imperiled		<ul style="list-style-type: none"> • NAS Key West

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 7 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Olive Ridley Sea Turtle <i>(Lepidochelys olivacea)</i>	Threatened		G3– Vulnerable		<ul style="list-style-type: none"> • NAS Key West
Alabama Red-bellied Cooter <i>(Pseudemys alabamensis)</i>	Endangered		G1–Critically Imperiled		<ul style="list-style-type: none"> • NAS Whiting Field (NOLF Evergreen, NOLF Wolf)
Striped Mud Turtle <i>(Kinosternon baurii)</i>		FL– Threatened (lower keys population only)	G5–Secure	<ul style="list-style-type: none"> • NAS Jacksonville (main base) 	<ul style="list-style-type: none"> • NAS Jacksonville (OLF Whitehouse, Rodman Bombing Target Range) • NAS Key West, Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) • NAVSUBASE Kings Bay
Florida Brownsnake <i>(Storeria victa)</i>		FL– Threatened	G5–Secure	<ul style="list-style-type: none"> • NAS Key West (main base) 	
Peninsula Ribbonsnake <i>(Thamnophis sauritus sackerii)</i>		FL– Threatened (lower keys population only)	T1–Critically Imperiled	<ul style="list-style-type: none"> • NAS Key West (main base) 	
Timber Rattlesnake <i>(Crotalus horridus)</i>		TX– Threatened	G4– Apparently Secure		<ul style="list-style-type: none"> • NAS Corpus Christi (NOLF Goliad)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 8 OF 11)

Species	Federal Status	State Status where Confirmed / Potential	NatureServe Status	Confirmed Location	Potential Location
Reticulate Collared Lizard (<i>Crotaphytus reticulatus</i>)		TX–Threatened	G3–Vulnerable	NAS Kingsville (McMullen Range Complex)	
Scarletsnake (<i>Cemophora coccinea</i>)		TX–Threatened	G5–Secure		<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss, NOLF Waldron, Peary Place Transmitter Site) • NAS Kingsville (main base)
Texas Horned Lizard (<i>Phrynosoma cornutum</i>)		TX–Threatened	G4–Apparently Secure	<ul style="list-style-type: none"> • NAS Kingsville (main base, NALF Orange Grove, McMullen Range Complex) 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss, NOLF Goliad, NOLF Waldron, Peary Place Transmitter Site)
Texas Indigo Snake (<i>Drymarchon melanurus erebennus</i>)		TX–Threatened	T4–Apparently Secure	<ul style="list-style-type: none"> • NAS Kingsville (main base, NALF Orange Grove, McMullen Range Complex) 	<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Goliad, NOLF Waldron)
Texas Tortoise (<i>Gopherus berlandieri</i>)		TX–Threatened	G4–parently Secure	<ul style="list-style-type: none"> • NAS Corpus Christi (main base) • NAS Kingsville (main base, NALF Orange Grove, McMullen Range Complex) 	<ul style="list-style-type: none"> • NAS Corpus Christi (NOLF Canbaniss, NOLF Goliad)
Sheep Frog (<i>Hypopachus variolosus</i>)		TX–Threatened	G5–Secure		<ul style="list-style-type: none"> • NAS Corpus Christi (main base, NOLF Canbaniss, NOLF Goliad) • NAS Kingsville (main base, NALF Orange Grove)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 9 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Cat-eyed Snake (<i>Leptodeira septentrionalis</i>)		TX– Threatened	G5–Secure		<ul style="list-style-type: none"> • NAS Corpus Christi (NOLF Waldron) • NAS Kingsville (main base)
Speckled Racer (<i>Drymobius margaritiferus</i>)		TX– Threatened	G5–Secure		<ul style="list-style-type: none"> • NAS Corpus Christi (NOLF Canbaniss)
Southern Hog-nosed Snake (<i>Heterodon simus</i>)	Under Review	GA– Threatened	G2– Imperiled	<ul style="list-style-type: none"> • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) 	<ul style="list-style-type: none"> • NAS Jacksonville (OLF Whitehouse, Rodman Bombing Target Range) • NAS Whiting Field (main base, NOLF Harold, NOLF Pace, NOLF Santa Rosa, NOLF Site 8-A, NOLF Wolf, OLF Holley) • Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) • NAVSUBASE Kings Bay
Striped Newt (<i>Notophthalmus perstriatus</i>)	Candidate	GA– Threatened	G2– Imperiled		<ul style="list-style-type: none"> • NAS Jacksonville (Rodman Bombing Target Range) • NAVSUBASE Kings Bay
Florida Bog Frog (<i>Lithobates okaloosae</i>)			G2– Imperiled	<ul style="list-style-type: none"> • NAS Pensacola (Saufley Field) 	<ul style="list-style-type: none"> • NAS Whiting Field (OLF Holley)

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 10 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
Escambia Map Turtle <i>(Graptemys ernsti)</i>			G2– Imperiled	<ul style="list-style-type: none"> NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) 	<ul style="list-style-type: none"> NAS Whiting Field (NOLF Evergreen)
Mimic Glass Lizard <i>(Ophisaurus mimicus)</i>			G3– Vulnerable	<ul style="list-style-type: none"> NAS Pensacola (Saufley Field) NAS Whiting Field (OLF Holley) 	<ul style="list-style-type: none"> NAS Jacksonville (main base, OLF Whitehouse) NAS Pensacola (main base, NOLF Bronson Field) NAS Whiting Field (main base, NOLF Site 8-A, NOLF Wolf) Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) NAVSUBASE Kings Bay
Gopher Frog <i>(Lithobathes capito)</i>	Under Review		G3– Vulnerable	<ul style="list-style-type: none"> NAS Pensacola (Saufley Field) NAS Whiting Field (OLF Holley) 	<ul style="list-style-type: none"> NAS Jacksonville (main base, OLF Whitehouse, Rodman Bombing Target Range) NAS Pensacola (main base, NOLF Bronson Field) NAS Whiting Field (main base, NOLF Evergreen, NOLF Harold, NOLF Pace, NOLF Santa Rosa, NOLF Site 8-A) Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) NAVSUBASE Kings Bay

TABLE 12. CONSERVATION STATUS SUMMARY (2013; SHEET 11 OF 11)

Species	Federal Status	State Status where Confirmed/ Potential	NatureServe Status	Confirmed Location	Potential Location
One-toed Amphiuma <i>(Amphiuma pholeter)</i> ,			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Pensacola (main base, Saufley Field, NOLF Bronson Field) • NAS Whiting Field (main base, NOLF Site 8-A, NOLF Wolf, OLF Holley)
Black-knobbed Map Turtle <i>(Graptemys nigrinoda)</i>			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Whiting Field (NOLF Evergreen, NOLF Wolf)
Massasauga <i>(Sistrurus catenatus)</i>			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Corpus Christi (NOLF Goliad) • NAS Kingsville (main base, NOLF Orange Grove)
Florida Scrub Lizard <i>(Sceloporus woodi)</i> .			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Jacksonville (Rodman Bombing Target Range)
Island Glass Lizard <i>(Ophisaurus compressus)</i>			G3– Vulnerable		<ul style="list-style-type: none"> • NAS Jacksonville (main base, OLF Whitehouse, Rodman Bombing Target Range) • Naval Station Mayport (main base, Greenfield Plantation, Naval Fuel Depot, Ribault Bay Village Housing) • NAVSUBASE Kings Bay

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4.3.5 Confirmed Non-native Species

Commander, Navy Region Southeast has two confirmed non-native species on its installations. Both species are thought to have been introduced through the pet trade. The Brown Anole (*Anolis sagrei*) is confirmed at NAS Jacksonville and NS Mayport (main base and Naval Fuel Depot) and potentially occurs at multiple installations in the region. The Mediterranean Gecko (*Hemidactylus turcicus*) is confirmed at NAS Corpus Christi, NAS Jacksonville, NAS JRB NOLA, NAS Kingsville (main base and McMullen Range), NAS Pensacola (Saufly Field NETPDTC), and NS Mayport (Naval Fuel Depot). The Mediterranean Gecko (*Hemidactylus turcicus*) is also potential at installations in Texas, Florida, Alabama, and Georgia.



FIGURE 4-23. BROWN ANOLE

4.3.6 Potential Non-native Species

The Texas Horned Lizard (*Phrynosoma cornutum*), which is not native to Alabama, Florida, and Georgia, is potentially present at NAS Jacksonville (main base, OLF Whitehouse and Rodman Bombing Target Range), NAS Pensacola (main base, Saufley Field NETPDTC and NOLF Bronson Field), NAS Whiting Field (NOLF Site 8-A and NOLF Wolf), and NS Mayport (main base, Greenfield Plantation, Naval Fuel Depot, and Ribault Bay Village Housing). The Greenhouse Frog (*Eleutherodactylus planirostris*) may be present at NSA Panama City, NAS JRB NOLA, NAS Key West, NAVSUBASE Kings Bay, NAS Whiting Field (NOLF Wolf), NAS Jacksonville (main base, OLF Whitehouse and Rodman Bombing Target Range), and NS Mayport (main base, Greenfield Plantation Naval Fuel Depot and Ribault Bay Village Housing). The Indo-pacific Gecko (*Hemidactylus garnotti*) and the Cuban Treefrog (*Osteopilus septentrionalis*) are potentially present at NSA Panama City, NAS Jacksonville (main base, OLF Whitehouse, and Rodman Bombing Target Range), and NS Mayport (main base, Greenfield Plantation, Naval Fuel Depot, and Ribault Bay Village Housing). The Cuban Treefrog (*Osteopilus septentrionalis*) is also potentially present at NAS Key West. The Southern Dwarf Siren (*Pseudobranchius axanthus*) is potentially present at NAS Jacksonville (Rodman Bombing Target Range). The Brahminy Blind Snake (*Ramphotyphlops braminus*) is not native to Florida, but is potentially present at NAS Key West, NAS Pensacola (main base and NOLF Bronson Field) and NAS Whiting Field (NOLF Site 8-A). Lastly, the Cane Toad (*Rhinella marina*) is also potentially present at NAS Key West.

4.3.7 Venomous Species

Nine venomous snake species are confirmed or have the potential to be present on CNR Southeast naval installations. The Copperhead (*Agkistrodon contortrix*) is confirmed at NAS Meridian (Joe Williams Field, McCain Field and Searay Target Range) and at NAS Pensacola (main base and NOLF Bronson Field), and potential at installations in Florida, Texas, Alabama, and Louisiana. The Cottonmouth

(*Agkistrodon piscivorus*) is confirmed at multiple installations in Florida, Mississippi, and Georgia and is potential at multiple installations within the region. The Eastern Diamond-back Rattlesnake (*Crotalus adamanteus*) is confirmed on seven installations and parcels and potential on an additional fourteen in Florida, Georgia, and Alabama. The Western Diamond-back Rattlesnake (*Crotalus atrox*) is confirmed at NAS Kingsville (main base, McMullen Range, and NALF Orange Grove) and NAS Corpus Christi (main base and Peary Place Transmitter Site) and is potential at other NAS Corpus Christi NOLFs. The Timber Rattlesnake (*Crotalus horridus*) is confirmed at NAS JRB NOLA, NAVSUBASE Kings Bay, and NAS Meridian (Joe Williams Field, McCain Field, and Sea Ray Target Range) and is potential at multiple installations in Texas, Florida, Alabama, and Louisiana. The Massasauga (*Sistrurus catenatus*) has the potential to occur at NAS Corpus Christi (NOLF Goliad) and NAS Kingsville (main base and NALF Orange Grove). The Pygmy Rattlesnake (*Sistrurus miliarius*) is confirmed at NAS Pensacola, (main base, Saufley Field NETPDTC, NOLF Bronson Field), Naval Station Mayport (main base), NAVSUBASE Kings Bay (main base), and NAS Panama City (main base). This species has potential occurrence on numerous other installations in Alabama, Florida, Louisiana, and Mississippi. The Harlequin Coralsnake (*Micrurus fulvius*) is confirmed at NAVSUBASE Kings Bay and NAS Whiting Field (OLF Holley) and is potential at multiple installations in Florida and Alabama. Lastly, the Texas Coralsnake (*Micrurus tener*) is confirmed at the main bases of NAS Corpus Christi and NAS Kingsville, and has the potential to be present at ranges and detachments of the two installations.



FIGURE 4-24. MASSASAUGA (PHOTO BY JEFFREY DAVIS)

4.3.8 Comparison of Herpetofauna Biodiversity of CNR Southeast to Regional Biodiversity

Comparison of the herpetofauna biodiversity on Navy installations in CNR Southeast are compared to that of the herpetofauna diversity within the six states that make up this Navy region. Commander, Navy Region Southeast installations evaluated in this report have 42 percent of the total biodiversity of

herpetofauna (confirmed and potential) of all species documented in Alabama, Florida, Georgia, Louisiana, Mississippi, and Texas (table 13). Of the species types, Navy sites have the greatest percentage of crocodylians (alligators and crocodiles) on their lands (100 percent) whereas the salamanders represented the least percentage (23 percent). Lizards, snakes, frog and toad, and turtle biodiversity on Navy installations was 40 percent or greater than all herpetofauna biodiversity within the six states of this Navy region.

TABLE 13. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013)

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Southeast	Number of Herpetofauna Species Within the States Comprising CNR Southeast	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Alligator and Crocodile	2	2	100%
Frogs and Toads	36	61	59%
Salamanders	19	82	23%
Lizards	23	57	40%
Snakes	45	96	47%
Turtles	23	51	45%
Total	148	349	42%

4.4 COMMANDER, NAVY REGION MIDWEST

Commander, Navy Region Midwest encompasses 16 states and contains three major Navy installations (Figure). Naval Station Great Lakes is the Navy’s only boot camp training more than 37,000 new sailors each year. Naval Support Activity Crane is a multi-mission product support center, and is also the Navy’s third largest naval installation in the world covering approximately 62,000 acres (table 14). Naval Support Activity Midsouth is the Navy’s Human Resources Center of Excellence for Sailors and their families. All three of the major installations in this region are included in the inventory of herpetofauna.

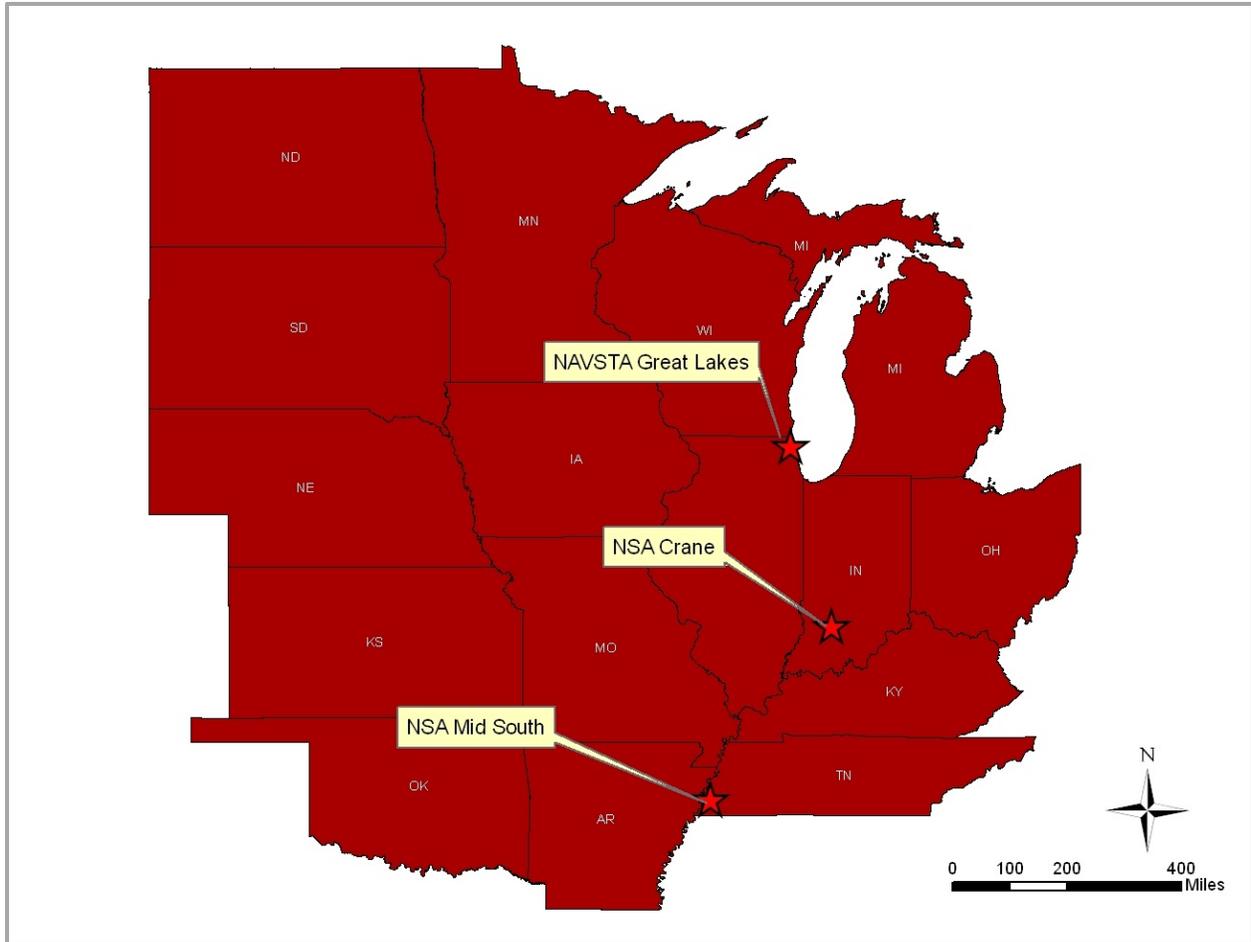


FIGURE 4-25. COMMANDER NAVY REGION MIDWEST

TABLE 14. CNR MIDWEST INSTALLATIONS AND PARCELS INCLUDED IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013).

Installation Name	Parcel Name	Acres*
NSA Crane	Main Base	62,433
NSA Mid-South Memphis	Main Base	1,600
NAVSTA Great Lakes	Main Base	1147
3 Installations	3 Distinct Parcels	65,108 acres

*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP

4.4.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of the CNR Midwest region showed 57 species (62 percent) are confirmed present and 35 species (38 percent) have the potential to be present on Navy installations in this region (table 15). Of the confirmed species in the CNR Midwest region, 28 species are amphibians and 29 species are reptiles. Of the species types, snakes make up the largest number of confirmed species

in this region whereas lizards represented the least number of confirmed species. In fact, there are only three confirmed species of lizards in this region, with the potential for an additional three species. Snake species have the largest number of potential species (12 species).

TABLE 15. SPECIES TYPE AND OCCURRENCE IN CNR MIDWEST (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	17	6	23	74%	26%
Salamanders	11	9	20	55%	45%
Lizards	3	3	6	50%	50%
Snakes	18	12	30	60%	40%
Turtles	8	5	13	62%	38%
Total	57	35	92	62%	38%

4.4.2 Federal Status

Navy installations within CNR Midwest did not have any federally-listed herpetofauna species confirmed or potential on the installations considered in this analysis.

4.4.3 State Status

4.4.3.1 Confirmed Species—State Threatened or Endangered

The Timber Rattlesnake (*Crotalus horridus*) is endangered in the state of Indiana where it is confirmed at NSA Crane.



FIGURE 4-26. TIMBER RATTLESNAKE (PHOTO BY CHRIS PETERSEN)

4.4.3.2 Potential Species—State Threatened or Endangered

There are five state-endangered or -threatened species that may be present on Navy installations in CNR Midwest. The Blanding's Turtle (*Emydoidea blandingii*) and the Yellow Mud Turtle (*Kinosternon flavescens*) are both endangered in the state of Illinois where they may be present at NAVSTA Great Lakes. The Mudpuppy (*Necturus maculosus*), which may be present at NAVSTA Great Lakes, NSA Crane, and NSA Midsouth Memphis is listed as threatened in Illinois and a species of special concern in Indiana. This species does not have a state conservation status in Tennessee. The Mudpuppy (*Necturus maculosus*) was surveyed for at NAVSTA Great Lakes in 2011–2012 and is not confirmed present.



FIGURE 4-27. CRAWFISH FROG (PHOTO BY J.D. WILSON)

Kirkland's Snake (*Clonophis kirtlandii*) is endangered in Indiana and may occur at NSA Crane. This species is also potential to occur at NASTA Great Lakes where it is listed at state threatened. Lastly, the Crawfish Frog (*Lithobates areolatus*) is endangered in Indiana and may be present at NSA Crane and NSA Midsouth Memphis. This species does not have a state conservation status in Tennessee.

4.4.4 NatureServe Status

One herpetofauna species in CNR Midwest is considered a species at risk based on its NatureServe status. The Kirkland's Snake (*Clonophis kirtlandii*), which may be present at both NSA Crane and NAVSTA Great Lakes, has a NatureServe status of G2-Imperilled (table 16).



FIGURE 4-28. KIRTLANDS SNAKE

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TABLE 16. CONSERVATION STATUS SUMMARY (2013)

Species	Federal Status	State Status where Confirmed or Potential	NatureServe Status	Confirmed Location	Potential Location
Timber Rattlesnake <i>(Crotalus horridus)</i>		IN–Endangered	G4–Apparently Secure	NSA Crane	
Blanding's Turtle <i>(Emydoidea blandingii)</i>		IL–Endangered	G4–Apparently Secure		<ul style="list-style-type: none"> • NAVSTA Great Lakes
Yellow Mud Turtle <i>(Kinosternon flavescens)</i>		IL–Endangered	G5–Secure		<ul style="list-style-type: none"> • NAVSTA Great Lakes
Kirkland's Snake <i>(Clonophis kirtlandii)</i>		IN–Endangered IL–Threatened	G2–Imperilled		<ul style="list-style-type: none"> • NAVSTA Great Lakes, NSA Crane
Crawfish Frog <i>(Lithobates areolatus)</i>		IN–Endangered TN–No Status	G4–Apparently Secure		<ul style="list-style-type: none"> • NSA Crane • NSA Midsouth Memphis
Mudpuppy <i>(Necturus maculosus)</i>		IL–Threatened IN–Special Concern TN–No Status	G5–Secure		<ul style="list-style-type: none"> • NAVSTA Great Lakes • NSA Crane • NSA Midsouth Memphis

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4.4.5 Non-native Species

There are no known non-native herpetofauna species on the three Navy installations in CNR Midwest considered in this analysis.

4.4.6 Venomous Species

Three species of venomous snakes are confirmed on installations in the CNR Midwest region. The Copperhead (*Agkistrodon contortrix*) and the Western Cottonmouth (*Agkistrodon piscivorus leucostoma*) are both confirmed on NSA Midsouth Memphis. On NSA Crane, the Timber Rattlesnake (*Crotalus horridus*) and the Northern Copperhead (*Agkistrodon contortrix contortrix*, a sub-species of the Copperhead), are confirmed to be present.



FIGURE 4-29. COTTONMOUTH (PHOTO BY CHRIS PETERSEN)

4.4.7 Comparison of Herpetofauna Biodiversity on Navy Sites in the CNR Midwest to Regional Biodiversity

Commander, Navy Region Midwest installations evaluated in this report have 40 percent of the total biodiversity of herpetofauna (confirmed and potential) of all species documented in the 16 states of this region (table 17). Of the species types, Navy sites have the greatest percentage of frogs/toads and turtles (52 percent) on their lands in comparison to all herpetofauna species within this region. Lizard species represented the least percentage (23 percent). The low percentages of herpetofauna on the three Navy installations in this region are not surprising given the large expanse of this 16 state region.

TABLE 17. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013)

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Midwest	Number of Herpetofauna Species Within the States Comprising CNR Midwest	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Frogs and Toads	23	44	52%
Salamanders	20	70	29%
Lizards	6	26	23%
Snakes	30	64	47%
Turtles	13	25	52%
Total	92	229	40%

4.5 COMMANDER NAVY REGION NORTHWEST

Commander, Navy Region Northwest (figure 4-30) encompasses a six-state area of Washington, Oregon, Idaho, Alaska, Montana, and Wyoming. The area around the Puget Sound in the Washington State has the highest concentration of Navy installations in this region. The major Northwest region installations are Naval Air Station Whidbey Island, Naval Station Everett, Naval Base Kitsap, and Naval Magazine Indian Island.

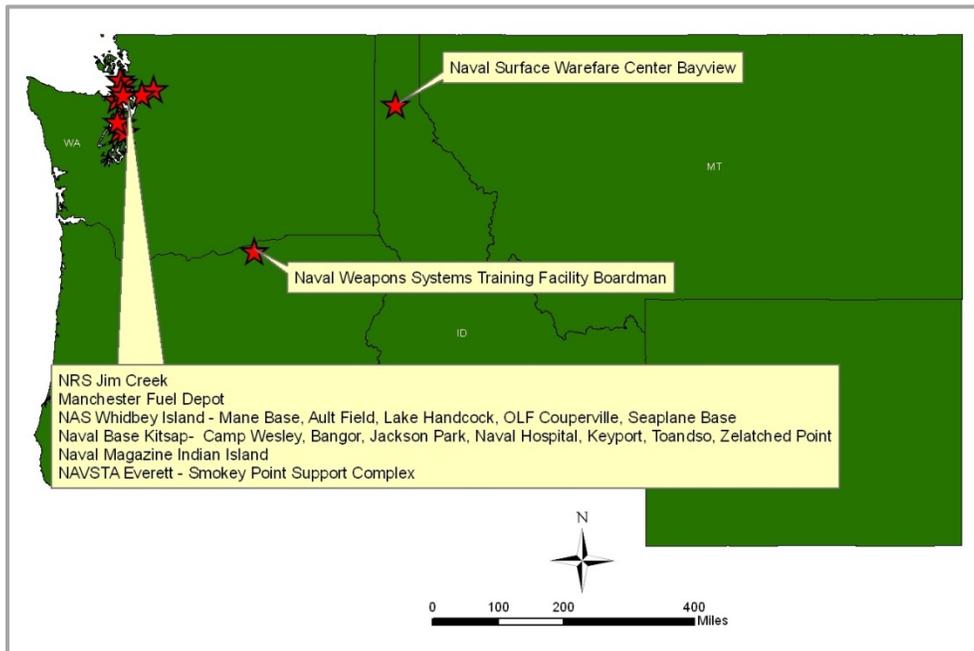


FIGURE 4-30. COMMANDER NAVY REGION NORTHWEST

Eight installations (a total of sixteen geographic parcels) were included in the herpetofauna inventory analysis for the Northwest region (table 18).

4.5.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of the CNR Northwest region showed that 23 species (66 percent) are confirmed present and 12 additional species (34 percent) may be present on Navy installations within the region. There are 12 confirmed amphibian species and 11 confirmed reptile species. The number of confirmed frog/toad, salamander and snake species are equal (6 species) and there are zero confirmed turtle species (table 19).

TABLE 18. CNR NORTHWEST INSTALLATIONS AND PARCELS INCLUDED IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013)

Installation Name	Parcel Name	Acres*
NRS Jim Creek	Main Base	4901
Manchester Fuel Depot	Main Base	234
NAS Whidbey Island	Ault Field	4361
	Lake Hancock	373
	OLF Coupeville	1060
	Seaplane Base	2785
Naval Base Kitsap	Camp Wesley Harris	388
	NBK Bangor	6,609
	NBK Jackson Park Housing Complex and Naval Hospital Bremerton	459
	NBK Keyport	358
	Toandos Peninsula	756
	Zelatched Point	30
Naval Magazine Indian Island	Main Base	2716
Naval Surface Warfare Center Acoustic Research Detachment Bayview	Main Base	22
Naval Weapons Systems Training Facility Boardman	Main Base	47,432
NS Everett	Smokey Point Support Complex	54
8 Installations	16 Distinct Parcels	72,538 acres
*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP		

TABLE 19. SPECIES TYPE AND OCCURRENCE IN CNR NORTHWEST (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	6	3	9	67%	33%
Salamanders	6	2	8	75%	25%
Lizards	5	1	6	83%	17%
Snakes	6	3	9	67%	33%
Turtles	0	3	3	0%	100%
Total	23	12	35	66%	34%

4.5.2 Federal Status

The Columbia Spotted Frog (*Rana luteiventris*) is a federal Candidate species and is potentially present at Naval Surface Warfare Center Acoustic Research Detachment Bayview. The Cascades Frog (*Rana cascadae*) is currently under review by the USFWS and is confirmed at NRS Jim Creek (table 20). Lastly, the Pacific Pond Turtle (*Actinemys marmorata*) is currently under review by the USFWS for listing as a candidate species. This species has not been confirmed on Navy installations in this region, but has the potential to occur on NAS Whidbey Island and Naval Base Kitsap.



FIGURE 4-31. COLUMBIA SPOTTED FROG

4.5.3 State Status

4.5.3.1 Confirmed Species—State Threatened or Endangered

No herpetofauna species confirmed on Navy installations in CNR Northwest are state endangered or threatened.

4.5.3.2 Potential Species—State Threatened or Endangered

The Pacific Pond Turtle (*Actinemys marmorata*) is listed as endangered in the state of Washington. Although this species has not been confirmed on any of the installations considered in this analysis, this species has the potential to occur at several installations and detachments in Washington, including NAS Whidbey Island (Ault field and the Seaplane Base), Manchester Fuel Depot, and Naval Base Kitsap (all detachments).



FIGURE 4-32. PACIFIC POND TURTLE

4.5.4 NatureServe Status

Only one species in the Northwest region is considered a species at risk based on its NatureServe status. The Cascades Frog (*Rana cascadae*), which is confirmed at NRS Jim Creek, has a NatureServe status of G3-Vulnerable.



FIGURE 4-33. CASCADE FROG-RANA (PHOTO BY PAUL BLOCK)

TABLE 20. CONSERVATION STATUS SUMMARY (2013).

Species	Federal Status	State Status	NatureServe Status	Confirmed Location	Potential Location
Cascades Frog (<i>Rana cascadae</i>)	Under Review		G3– Vulnerable	NRS Jim Creek	
Columbia Spotted Frog (<i>Rana luteiventris</i>)	Candidate Species		G4– Apparently Secure		<ul style="list-style-type: none"> • Naval Surface Warfare Center Acoustic Research Detachment Bayview
Pacific Pond Turtle (<i>Actinemys marmorata</i>)	Under Review	WA– Endangered	G3– Vulnerable		<ul style="list-style-type: none"> • NAS Whidbey Island (Ault Field, Seaplane Base) • Manchester Fuel Depot • Naval Base Kitsap (all detachments).

4.5.5 Non-native Species

One non-native herpetofauna species has been confirmed on CNR Northwest region installations, and another is potentially present. The American Bullfrog (*Lithobates catesbeianus*) has been recorded at Naval Base Kitsap Bangor. This species may also be present on multiple other installations and detachments in the CNR Northwest region, including NRS Jim Creek, Manchester Fuel Depot, NAS Whidbey Island (Ault Field and Seaplane Base), Naval Base Kitsap (Camp Wesley, NBK Jackson Park Housing Complex, Naval Hospital Bremerton, NBK Keyport, Toandos Peninsula, and Zelatched Point), and Naval Surface Warfare Center Acoustic Research Detachment Bayview. The non-native Red-eared Slider (*Trachemys scripta elegans*) has been confirmed in Washington and may occur at the Manchester Fuel Depot.



FIGURE 4-34. AMERICAN BULLFROG (PHOTO BY CHRIS PETERSEN)

4.5.6 Venomous Species

The Western Rattlesnake (*Crotalus oreganus*) is the only species of venomous reptile found on Navy installations in CNR Northwest. This species has been confirmed on NWS Training Facility Boardman, Oregon.



FIGURE 4-35. WESTERN RATTLESNAKE (PHOTO BY ROB LOVICH)

4.5.7 Comparison of Herpetofauna Biodiversity on Navy Sites in the CNR Northwest to Regional Biodiversity

Commander, Navy Region Northwest installations evaluated in this report have 39 percent of the total biodiversity of herpetofauna (confirmed and potential) of all species documented in the six states of this region (table 21). Of the species types, Navy sites have the greatest percentage of frogs/toads (50 percent) on their lands in comparison to all herpetofauna species within this region. Turtle species represented the least percentage (30 percent).

TABLE 21. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013)

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Northwest	Number of Herpetofauna Species Within the States Comprising CNR Northwest	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Frogs and Toads	9	18	50%
Salamanders	8	21	38%
Lizards	6	18	33%
Snakes	9	22	41%
Turtles	3	10	30%
Total	35	89	39%

4.6 COMMANDER, NAVY REGION SOUTHWEST

Commander, Navy Region Southwest (figure 4-36) encompasses the states of California, Arizona, Nevada, Utah, Colorado, and New Mexico. California has the highest concentration of Navy installations in this region. NAWS China Lake is the largest Navy installation in the world and encompasses more than one million acres.

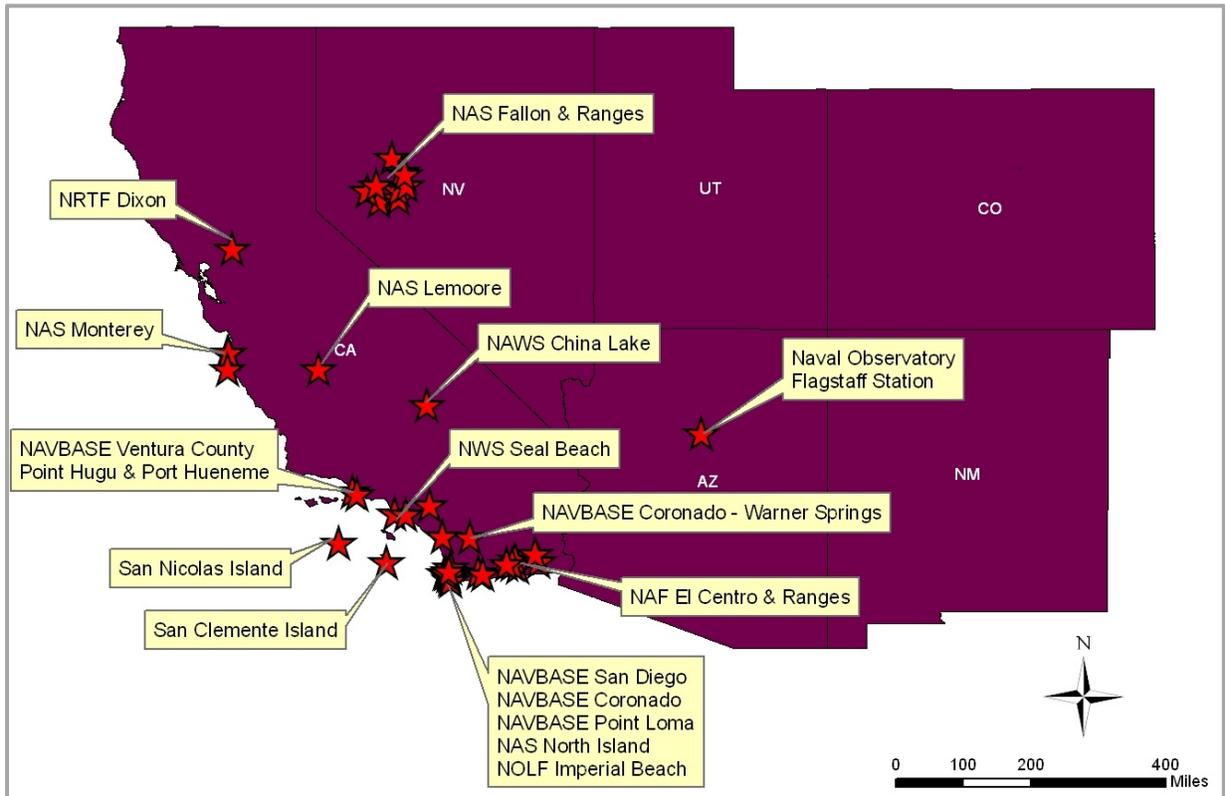


FIGURE 4-36. COMMANDER NAVY REGION SOUTHWEST

Thirteen installations (44 distinct parcels) were included in the inventory of herpetofauna for the Southwest region (table 22). These installations were chosen for analysis because they contain significant natural resources and have an INRMP.

TABLE 22. CNR SOUTHWEST INSTALLATIONS AND PARCELS INCLUDED
IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013; SHEET 1 OF 2)

Installation Name	Parcel Name	Acres
NAF El Centro	Main Base	2863
	Parachute Drop Zone–Range 2510	7346
	Target 101–Range 2510	17,782
	Target 103–Range 2510	10,269
	Target 68–Range 2512	7848
	Target 95–Range 2512	6074
NAS Fallon	Dixie Meadows	760
	Dixie Valley Training Area	68,437
	Dixie Valley Settlement Area	8,481
	Horse Creek	272
	Main Base	12,502
	Range B-16	27,300
	Range B-17	52,940
	Range B-19	29,276
	Range B-20	41,117
NAS Lemoore	Main Base	29,394
NSA Monterey	Main Base	133
	Annex Area, Lab/Rec	130
	Dunes/Research	55
	Naval Industrial Reserve Ordnance Plant Santa Cruz	271
	Point Sur	3
Naval Amphibious Base Coronado	Camp Michael Monsoor	6,634
	Camp Morena	63
	Naval Air Station North Island	2,803
	Naval Outlying Landing Field, Imperial Beach	1295
	Remote Training Site, Warner Springs	12,544
	Silver Strand Training Complex North (including NAB Coronado)	1000
	Silver Strand Training Complex South	548
	San Clemente Island	36,206

TABLE 22. CNR SOUTHWEST INSTALLATIONS AND PARCELS INCLUDED
IN THE HERPETOFAUNA INVENTORY ANALYSIS (2013; SHEET 2 OF 2)

Installation Name	Parcel Name	Acres
Naval Base Point Loma	Main Base	288
Naval Base San Diego	Chollas Heights Housing Area	26
	Murphy Canyon Housing Area	252
	Eucayptus Ridge Housing Area	16
	Howard Gillmore Housing Area	19
	Main Base	949
	Mission Gorge Recreational Facility	448
	Naval Medical Center San Diego	76
Naval Observatory Flagstaff Station	Main Base	160
NAVBASE Ventura County	Point Mugu	4,484
	Port Hueneme	1,741
NAWS China Lake	Main Base	1,111,044
NRTF Dixon	Main Base	1280
NWS Seal Beach	Main Base	4853
	Defense Fuel Support Point San Pedro	272
	Fallbrook	8852
	NORCO/Corona	281
San Nicolas Island	San Nicolas Island	13,370
13 Installations	47 Distinct Parcels	1,479,817 acres
*Acres recorded from Navy Facility Assets Data Store Management System (iNFADS) or reported in the INRMP		

4.6.1 Confirmed and Potential Species

Analysis of the herpetofauna inventory data of CNR Southwest showed 84 species (72 percent) are confirmed present and 33 species (28 percent) have the potential to be present on Navy installations in this region (table 23). There are 18 confirmed amphibian species and 66 confirmed reptile species. Of the species types, lizards have the greatest number of confirmed species (32 species) in the region, while turtle species (5 species) have the least. Lizard species have the largest number of potential species in the region (11 species).

TABLE 23. SPECIES TYPE AND OCCURRENCE IN CNR SOUTHWEST (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs and Toads	11	6	17	65%	35%
Salamanders	7	6	13	54%	56%
Lizards	32	11	43	74%	26%
Snakes	29	6	35	83%	17%
Turtles	5	4	9	56%	44%
Total	84	33	117	72%	28%

4.6.2 Federal Status

4.6.2.1 Confirmed Species—Federally Threatened or Endangered

The Arroyo Toad (*Anaxyrus californicus*) is the only species that is federally listed as endangered and is confirmed on installations in CNR Southwest. This species is confirmed present at NB Coronado (Remote Training site, Warner Springs) and Seal Beach (Fallbrook Detachment; table 24).

Four confirmed herpetofauna species in CNR Southwest are federally listed as threatened—the Green Sea Turtle (*Chelonia mydas*), the San Clemente Island Night Lizard (*Xantusia riversiana reticulata*), the Desert Tortoise (*Gopherus agassizii*), and the California Red-legged Frog (*Rana draytonii*). The Green Sea Turtle (*Chelonia mydas*) is confirmed at NB Coronado (Silver Strand Training Complex North) and NWS Seal Beach, and may be present at NB Point Loma. The San Clemente Island Night Lizard (*Xantusia riversiana reticulata*) is confirmed on San Clemente Island and the San Nicolas Island Night Lizard (*Xantusia riversiana riversiana*) is confirmed on San Nicolas Island. The Desert Tortoise (*Gopherus agassizii*) is confirmed at NAWA China Lake. Finally, the California Red-legged Frog (*Rana draytonii*) is confirmed at NAS Monterey Point Sur and potentially occurs at NWS Seal Beach (Fallbrook Detachment).



FIGURE 4-37. ARROYO TOAD (PHOTO BY ROB LOVICH)

4.6.2.2 Potential Species—Federally Threatened or Endangered

Three federally-listed threatened species have the potential to occur on CNR Southwest installations. The California Tiger Salamander (*Ambystoma californiense*) may be present at NRTF Dixon and NSA Monterey. The Olive Ridley Sea Turtle (*Lepidochelys olivacea*) has the potential to occur in the waters off of NWS Seal Beach. Lastly, the Hawksbill Sea Turtle (*Eretmochelys imbricata*) is listed as endangered and may occur at NB Coronado (Silver Strand Training Complex North) and NB Point Loma.

4.6.3 State Status

The Desert Tortoise (*Gopherus agassizii*) is listed in the State of California as threatened, and is confirmed at NAWA China Lake. The California Tiger Salamander (*Ambystoma californiense*) is also state-listed as threatened and may be present at NRTF Dixon and NSA Monterey.



FIGURE 4-38. DESERT TORTOISE (PHOTO BY AARON ALVIDREZ)

4.6.4 NatureServe Status

4.6.4.1 Confirmed Species—Species at Risk

Thirteen confirmed species in CNR Southwest are listed as species at risk by NatureServe. The San Clemente Island Night Lizard (*Xantusia riversiana reticulata*) is the only confirmed species in the region listed as G1-Critically Imperiled. Three confirmed species have a NatureServe status of G2-Imperiled—the Arroyo Toad (*Anaxyrus californicus*), the Panamint Alligator Lizard (*Elgaria panamintina*), and the California Red-legged Frog (*Rana draytonii*). Nine confirmed species are classified by NatureServe as G3-Vulnerable—the Green Sea Turtle (*Chelonia mydas*), the Pacific Pond Turtle (*Emys (Actinemys) marmorata*), the Desert Tortoise (*Gopherus agassizii*), the Western Spadefoot (*Spea hammondi*), the California Legless Lizard (*Anniella pulchra*), the Southern California Legless Lizard (*Anniella stebbinsi*), the Flat-tailed Horned Lizard (*Anota (Phrynosoma) mcallii*), the Blainville's Horned Lizard (*Phrynosoma blainvillii*), and the Colorado Fringe-toed Lizard (*Uma notata*).



FIGURE 4-39. ISLAND NIGHT LIZARD-XANTUSIA (PHOTO BY DAVID JAMES)



FIGURE 4-40. FLAT-TAILED HORNED LIZARD (PHOTO BY ROB LOVICH)

4.6.4.2 Potential Species—Species at Risk

Seven species that may occur on installations in CNR Southwest are considered species at risk by NatureServe. The Hawksbill Sea Turtle (*Eretmochelys imbricata*), the Olive Ridley Sea Turtle (*Lepidochelys olivacea*), and the Mohave Fringe-toed Lizard (*Uma scoparia*) all have a NatureServe status of G3-Vulnerable. Species with a NatureServe status of G2-Imperiled that may occur on installation in CNR Southwest are the California Tiger Salamander (*Ambystoma californiense*), the Santa Lucia Slender Salamander (*Batrachoseps luciae*), and the Kern Plateau Slender Salamander (*Batrachoseps robustus*). The San Joaquin Coachwhip (*Coluber flagellum ruddocki*) has a NatureServe status of T2-Imperiled.

TABLE 24. CONSERVATION STATUS SUMMARY (2013; SHEET 1 OF 4)

Species	Federal Status	State Status	NatureServe Status	Confirmed Location	Potential Location
Pacific Pond Turtle <i>(Actinemys marmorata)</i>	Under Review		G3– Vulnerable	<ul style="list-style-type: none"> • NAVBASE Ventura County (Point Mugu) • NWS Seal Beach (Fallbrook Detachment) 	<ul style="list-style-type: none"> • NAS Monterey (main base), NAVBASE Ventura County (Port Hueneme), NRTF Dixon
Green Sea Turtle <i>(Chelonia mydas)</i>	Threatened		G3– Vulnerable	<ul style="list-style-type: none"> • NB Coronado (Silver Strand Training Complex North) • NWS Seal Beach 	<ul style="list-style-type: none"> • NB Point Loma
Island Night Lizard <i>(Xantusia riversiana)</i>	Threatened		G1–Critically Imperiled	<ul style="list-style-type: none"> • San Clemente Island • San Nicolas Island 	
California Red-legged Frog <i>(Rana draytonii)</i>	Threatened		G2– Imperiled	<ul style="list-style-type: none"> • NAS Monterey Point Sur 	<ul style="list-style-type: none"> • NWS Seal Beach (Fallbrook Detachment)
Desert Tortoise <i>(Gopherus agassizii)</i>	Threatened	CA– Threatened	G3– Vulnerable	<ul style="list-style-type: none"> • NAWS China Lake 	
California Tiger Salamander <i>(Ambystoma californiense)</i>	Threatened	CA– Threatened	G2– Imperiled		<ul style="list-style-type: none"> • NRTF Dixon • NSA Monterey
Olive Ridley Sea Turtle <i>(Lepidochelys olivacea)</i>	Threatened		G3– Vulnerable		<ul style="list-style-type: none"> • NWS Seal Beach (main base)
Hawksbill Sea Turtle <i>(Eretmochelys imbricata)</i>	Endangered		G3– Vulnerable		<ul style="list-style-type: none"> • NB Coronado (Silver Strand Training Complex North) • NB Point Loma

TABLE 24. CONSERVATION STATUS SUMMARY (2013; SHEET 2 OF 4)

Species	Federal Status	State Status	NatureServe Status	Confirmed Location	Potential Location
Arroyo Toad <i>(Anaxyrus californicus)</i>	Endangered		G2– Imperiled	<ul style="list-style-type: none"> • NB Coronado (Remote Training site, Warner Springs) • NWS Seal Beach (Fallbrook Detachment) 	
Panamint Alligator Lizard <i>(Elgaria panamintina)</i>			G2– Imperiled	<ul style="list-style-type: none"> • NAWS China Lake (main base) 	
Western Spadefoot <i>(Spea hammondi)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • NAS Lemoore • Naval Amphibious Base Coronado (Remote Training Site, Warner Springs) • NWS Seal Beach (Fallbrook Detachment) 	<ul style="list-style-type: none"> • Naval Amphibious Base Coronado (Camp Michael Monsoor) • NWS Seal Beach (main base) • NRTF Dixon Naval Base San Diego (Mission Gorge Recreational Facility and Housing Area)
California Legless Lizard <i>(Anniella pulchra)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • NAS Monterey (main base, dues/research) • NAWS China Lake • NWS Seal Beach (main base) 	<ul style="list-style-type: none"> • NAS Lemoore • NAVBASE Ventura County (Point Mugu, Port Hueneme)

TABLE 24. CONSERVATION STATUS SUMMARY (2013; SHEET 3 OF 4)

Species	Federal Status	State Status	NatureServe Status	Confirmed Location	Potential Location
Southern California Legless Lizard <i>(Anniella stebbinsi)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • Naval Amphibious Base Coronado (Camp Morena, Naval Outlying Landing Field Imperial Beach, Remote Training Site Warner Springs, Silver Strand Training Complex North) • Naval Base Point Loma • NWS Seal Beach (Fallbrook Detachment) 	<ul style="list-style-type: none"> • Naval Amphibious Base Coronado (Camp Michael Monsoor) • Naval Air Station North Island (Silver Strand Training Complex South) • Naval Base San Diego (Mission Gorge Recreational Facility, Naval Medical Center San Diego)
Flat-tailed Horned Lizard <i>(Anota (Phrynosoma) mcallii)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • NAF El Centro (Parachute Drop Zone - Range 2510, Target 101–Range 2510, Target 103–Range 2510) 	<ul style="list-style-type: none"> • NAF El Centro (Target 68–Range 2512, Target 95–Range 2512)
Blainville’s Horned Lizard <i>(Phrynosoma blainvillii)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • Naval Amphibious Base Coronado (Camp Morena, Naval Outlying Landing Field Imperial Beach, Remote Training Site Warner Springs, Silver Strand Training Complex North) • NWS Seal Beach (Fallbrook Detachment) 	<ul style="list-style-type: none"> • Naval Amphibious Base Coronado (Camp Michael Monsoor) • Naval Base San Diego (Mission Gorge Recreational Facility, Housing Area) • NRTF Dixon

TABLE 24. CONSERVATION STATUS SUMMARY (2013; SHEET 4 OF 4)

Species	Federal Status	State Status	NatureServe Status	Confirmed Location	Potential Location
Colorado Fringe-toed Lizard <i>(Uma notata)</i>			G3– Vulnerable	<ul style="list-style-type: none"> • NAF El Centro (Parachute Drop Zone– Range 2510, Target 101– Range 2510, Target 103– Range 2510, Target 68– Range 2512, Target 95– Range 2512) 	
Mohave Fringe-toed Lizard <i>(Uma scoparia)</i>			G3– Vulnerable		<ul style="list-style-type: none"> • NAWS China Lake (main base)
Santa Lucia Slender Salamander <i>(Batrachoseps luciae)</i>			G2– Imperiled		<ul style="list-style-type: none"> • NAS Monterey (main base)
Kern Plateau Slender Salamander <i>(Batrachoseps robustus)</i>			G2– Imperiled		<ul style="list-style-type: none"> • NAWS China Lake (main base)
San Joaquin Coachwhip <i>(Coluber flagellum ruddocki)</i>			T2–Imperiled		<ul style="list-style-type: none"> • NAS Lemoore

4.6.4.3 Non-native Species

Two non-native herpetofauna species are confirmed on installations in CNR Southwest. The San Diego Alligator Lizard (*Elgaria multicarinata webbii*) is confirmed on San Nicolas Island, where it is not native. In addition, the Red-eared Slider turtle (*Chrysemys scripta elegans*) is confirmed at NSA Monterey (Annex Area, Lab/Rec) where it is not native.

There are two species that have the potential to occur on installations in CNR Southwest that are not native. The Western Painted Turtle (*Chrysemys picta belli*) is not native to California, and may be present on NWS Seal Beach (Fallbrook Detachment). There are no native softshell turtles in California. The Texas Spiny Softshell (*Apalone spinifera emoryi*) was introduced throughout the lower Colorado River drainage, and is the only one that may occur in NAF El Centro as a non-native.

4.6.4.4 Venomous Species

Eight species of rattlesnake are confirmed or potential on Navy installations in CNR Southwest. The Black-tailed Rattlesnake (*Crotalus molossus*) is confirmed on Naval Observatory Flagstaff Station. The Western Diamond-backed Rattlesnake is confirmed on NAF El Centro main base and Range 2512 and the Western Diamond-back Rattlesnake (*Crotalus atrox*) is potentially present at NAF El Centro (Range 2510). The Sidewinder (*Crotalus cerastes*) is confirmed on all of the NAF El Centro parcels except the main base, as well as on NAWS China Lake. The Speckled Rattlesnake (*Crotalus mitchellii*) is confirmed on Naval Amphibious Base Coronado (Remote Training Site Warner Springs) and NWS Seal Beach (Fallbrook Detachment), and potentially occurs at NAF El Centro (Target 101-Range 2510) and three additional locations (Naval Amphibious Base Coronado, Camp Michael Monsoor, and Camp Morena).



FIGURE 4-41. SIDEWINDER (PHOTO BY GREG WATSON)

Several subspecies of the Western Rattlesnake (*Crotalus oreganus spp.*) are confirmed on installations within CNR Southwest—NB Point Loma, NAS Lemoore, NAS Fallon (Dixie Valley Highway, Dixie Valley Settlement Area, Horse Creek, and Ranges B-16, B-19, and B-20), NAS Monterey (Naval Industrial Reserve Ordnance Plant), NAB Coronado (Camp Morena, Naval Outlying Landing Field Imperial Beach, and Remote Training Site, Warner Springs), NB San Diego (Mission George Recreational Facility), NB Ventura County (Point Mugu), and NWS Seal Beach Fallbrook Detachment. The Pacific Rattlesnake (*Crotalus oreganus spp.*) may also be present at NAS Fallon (main base, Dixie Meadows, and Range B-17), NAB Coronado (Camp Michael Monsoor), NB San Diego (Naval Medical Center San Diego), NRTF Dixon, and NWS Seal Beach (Defense Fuel Support Point San Pedro).

Two installations, NWS Seal Beach (Fallbrook Detachment) and NAB Coronado (Camp Morena), are known to have the Red Diamond Rattlesnake (*Crotalus ruber*) present. This species may also be present at NB San Diego (Mission George Recreational Facility) and NAB Coronado (Camp Michael Monsoor and Remote Training Site Warner Springs).

NAWS China Lake is the only installation where both the Mohave Rattlesnake (*Crotalus scutulatus*) and the Panamint Rattlesnake (*Crotalus stephensi*) are confirmed present.



FIGURE 4-42. RED DIAMOND RATTLESNAKE (PHOTO BY ROBERT HAASE)

4.6.4.5 Comparison of Herpetofauna Biodiversity on Navy Sites in the CNR Southwest to Regional Biodiversity

Commander, Navy Region Southwest installations evaluated in this report have 39 percent of the total biodiversity of herpetofauna (confirmed and potential) of all species documented in the six states of this region (table 25). Of the species types, Navy sites have the greatest percentage of turtle species (50

percent) on their lands in comparison to all herpetofauna species within this region. Salamander species represented the least percentage (29 percent).

TABLE 25. COMPARISON OF NAVY HERPETOFAUNA BIODIVERSITY TO REGIONAL BIODIVERSITY (2013)

Species Type	Number of Confirmed and Potential Herpetofauna Species on Navy lands in CNR Southwest	Number of Herpetofauna Species Within the States Comprising CNR Southwest	Percent of Navy Herpetofauna Biodiversity to Regional Biodiversity
Frogs and Toads	17	52	33%
Salamanders	13	45	29%
Lizards	43	100	43%
Snakes	35	86	41%
Turtles	9	18	50%
Total	117	301	39%

4.7 HERPETOFAUNA BIODIVERSITY WITHIN ALL CONTINENTAL U.S. COMMANDER NAVY REGIONS

This study analyzed herpetofauna inventory data from a total of 54 Navy installations (including 131 distinct parcels) within six Commander, Navy Regions (Mid-Atlantic, Washington, Southeast, Mid-west, Northwest, and Southwest) of the continental United States. The area of Navy-owned land covered in this analysis was 1,787,215 acres. This analysis was the first comprehensive investigation into the herpetofauna biodiversity on Navy lands.

4.7.1 Confirmed and Potential Species

Considering all six continental U.S. CNRs, Navy lands support a total of 366 species (265 confirmed species and 101 potential species; figure 4-43, table 26). In comparison to the total number of herpetofauna species within the United States (approximately 617 species), the DoN lands support 43 percent of the confirmed species. The researchers found these results surprising considering the relatively small area of Navy-owned land considered in the analysis (1,787,215 acres) in comparison to area of land within the continental United States (approximately 2.3 billion acres).

The species that are confirmed on Navy lands are ones that typically occupy coastal habitats of the United States. As such, those species predominantly not present on Navy lands (like many salamander species), are found in montane, or interior, locations of the United States.

Commander, Navy Region Southeast have the greatest number of confirmed and potential herpetofauna species (148 and 77 respectively) than any other Navy region. Commander, Navy Region Mid-Atlantic and CNR Southwest have the same number of confirmed species (84) and approximately the same number of potential species (30). The number of confirmed herpetofauna species for CNR Naval District Washington and CNR Mid-west are similar (approximately 60 species), however CNR Mid-west has more than two times the number of potential species. Lastly, Commander, Navy Region Northwest has the least number of confirmed and potential species than any other Navy region (23 species and 12 species respectively).

The percent of confirmed species for each CNR are as follows: Mid-Atlantic–74 percent, Naval District Washington–85 percent, Southeast–66 percent, Midwest–62 percent, Northwest–66 percent, and Southwest–72 percent. The percent of confirmed species for all regions combined was 72 percent. Thus nearly three quarters off all herpetofauna biodiversity on Navy lands has been confirmed as the results of surveys, studies, and monitoring.

Commander, Navy Region Mid-Atlantic has the greatest percent of confirmed and potential herpetofauna species (60 percent) in comparisons of regional biodiversity than any other Navy region, whereas, Commander, Navy Region Northwest and CNR Southwest have the least (39 percent each).

More reptile species (162 species) are confirmed on Navy lands than are amphibian species (103 species). Snakes are the dominant herpetofauna species type on Navy installations, with 76 confirmed species on Navy installations (table 27). The second greatest number of confirmed species type are frogs and toads with 59 confirmed species, while lizard species represented the third greatest species type with 54 species. There are 44 confirmed species of salamanders, making them the fourth greatest number of confirmed species on DoN lands, while turtle species have 30 confirmed species. Lastly, alligators and crocodiles represented the least common species type with only two species. However, as stated previously, there are only two species of crocodylians in the United States, both which have been confirmed on Navy installations. Of the potential species, salamanders represented the least percent of confirmed species (65 percent).

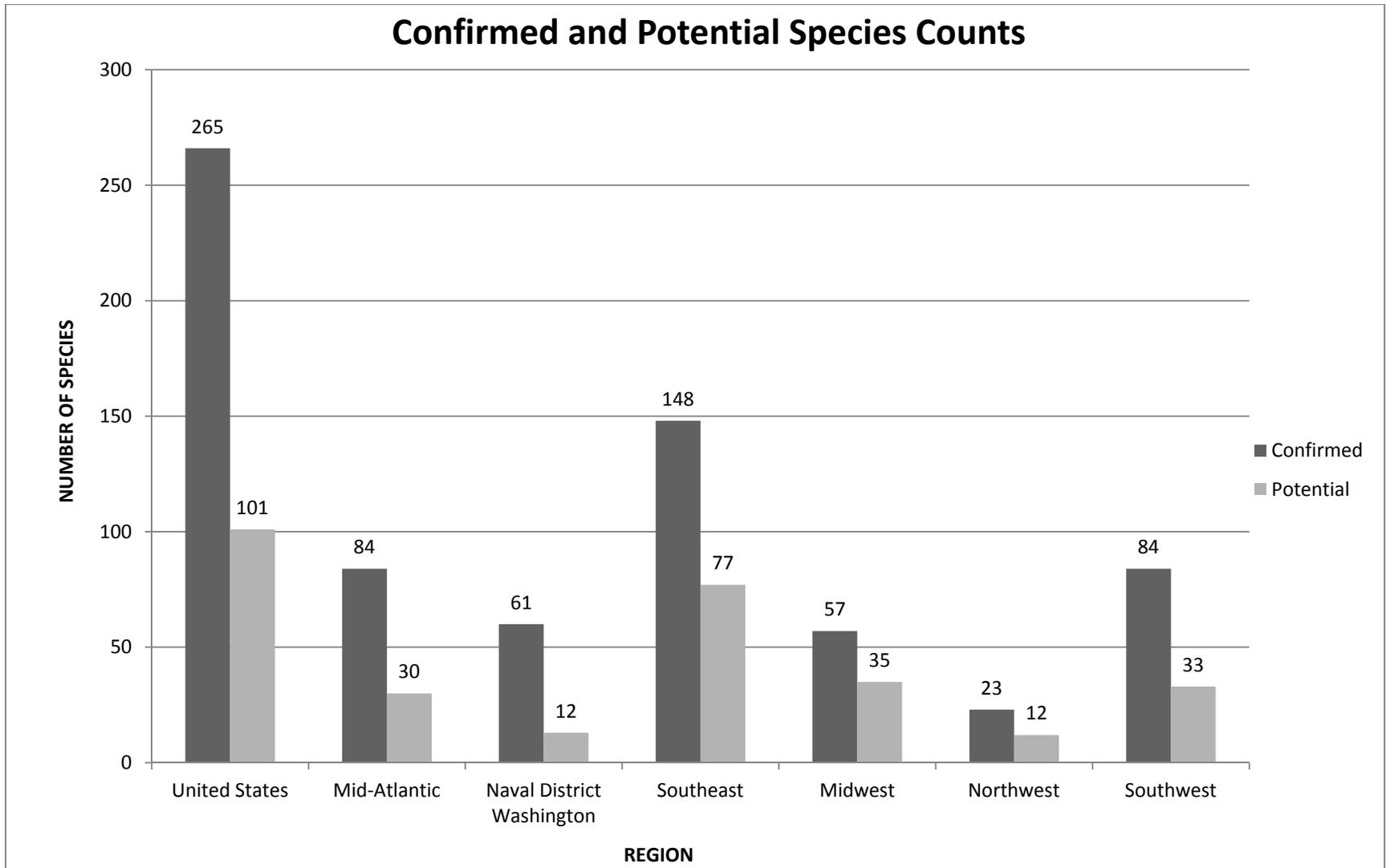


FIGURE 4-43. CONFIRMED AND POTENTIAL SPECIES COUNTS BY CNR (2013)

TABLE 26. SPECIES TYPE COUNTS BY REGION (2013).

	United States		Mid-Atlantic		Naval District Washington		Southeast		Midwest		Northwest		Southwest	
	Confirmed	Potential	Confirmed	Potential	Confirmed	Potential	Confirmed	Potential	Confirmed	Potential	Confirmed	Potential	Confirmed	Potential
Frogs and Toads	59	15	26	3	16	0	36	12	17	6	6	3	11	6
Salamanders	44	24	17	14	9	7	19	13	11	9	6	2	7	6
Lizards	54	22	6	3	5	0	23	11	3	3	5	1	32	11
Snakes	76	28	23	3	18	4	45	30	18	12	6	3	29	6
Turtles	31	12	12	7	13	2	23	11	8	5	0	3	5	4
Alligators/ Crocodiles	2	0	0	0	0	0	2	0	0	0	0	0	0	0
Total	265	101	84	30	61	12	148	77	57	35	23	12	84	33

TABLE 27. SPECIES TYPE AND OCCURRENCE IN ON NAVY INSTALLATIONS WITHIN THE CONTINENTAL UNITED STATES (2013)

Species Type	Number of Species Confirmed	Number of Species Potential	Confirmed and Potential	Percent Confirmed	Percent Potential
Frogs or Toads	59	15	74	80%	20%
Salamanders	44	24	68	65%	35%
Alligator and Crocodile	2	0	2	100%	0
Lizards	54	22	76	71%	29%
Snakes	76	28	104	73%	27%
Turtles	30	12	42	71%	29%
Total	265	101	366	72%	28%

4.7.2 Federal Status

A total of 23 (14 confirmed and nine potential) species, subspecies, or population segments listed as federally-endangered or -threatened or as a candidate species by the USFWS were recorded on Navy installations (tables 4, 8, 12, 16, 20, 24). Commander, Navy Region Southeast has the greatest number of federally-listed species (15 species). Seventy percent (16 species) of the federally-listed species are reptiles and 30 percent (7 species) are amphibians. Of the species types, turtles (11 species) represented the greatest number of federally-listed reptiles whereas salamanders (four species) represented the greatest number of federally-listed amphibian species (figure 4-44).

In addition to the federally-listed species, there are nine species (eight confirmed and one potential) that are currently under review for listing by the USFWS. Species types that are currently under review include three snake species, three turtle species, two frog species, and one salamander species. All of the species under review except two occur in CNR Southeast.

4.7.3 State Status

A total of 45 (22 confirmed and 23 potential) species, subspecies, or population segments listed as state-endangered or -threatened were recorded on Navy installations (tables 4, 8, 12, 16, 20, 24). Commander, Navy Region Southeast has the greatest number of state-listed species (26 species). Seventy three percent (33 species) of the state-listed species are reptiles and 27 percent (12 species) are amphibians. Of the reptile species, turtles (15 species) and snakes (14 species) represented the greatest number of state-listed species. Salamanders (seven species) and frogs (five species) represented the greatest number of state-listed species for amphibians.

4.7.4 Nature Serve Status

A total of 53 (29 confirmed and 24 potential) NatureServe species at risk were recorded on Navy installations (tables 4, 8, 12, 16, 20, 24). Commander, Navy Region Southeast and CNR Southwest have more species at risk than all other Navy regions. Seventy two percent (38 species) of the species at risk are reptiles and 28 percent (15 species) are amphibians. Of the reptile species, turtles (15 species) have

the greatest number of species at risk while salamanders (nine species) have the greatest number of species at risk for amphibian species.

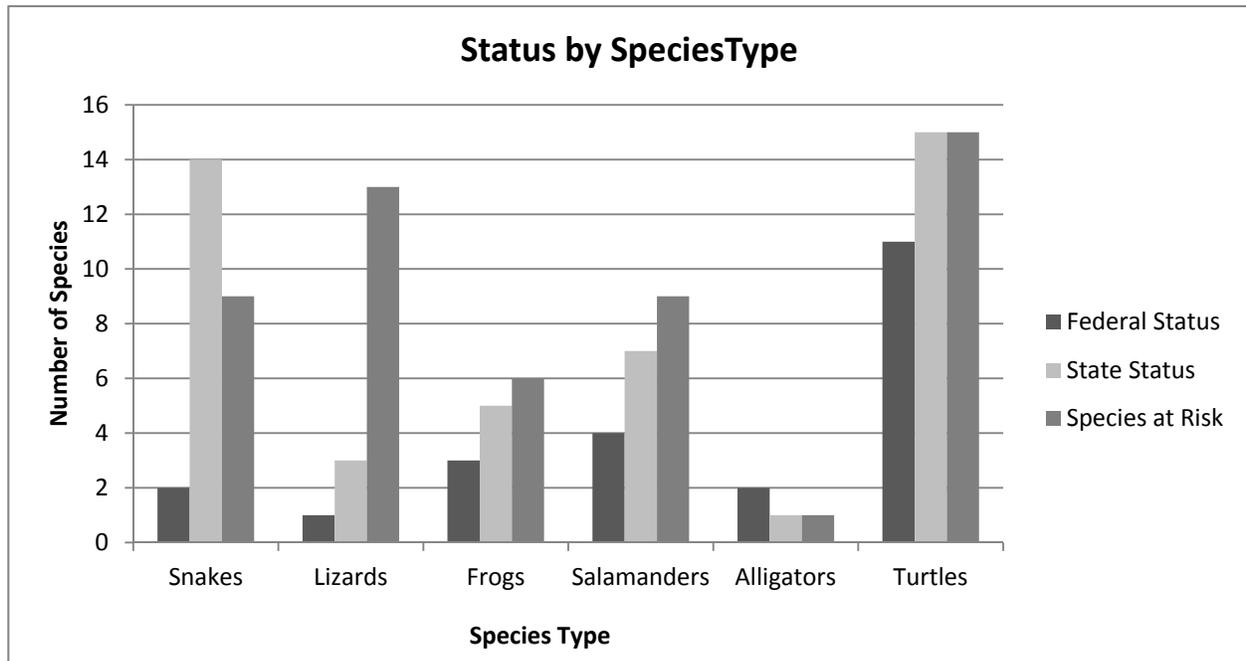


FIGURE 4-44. FEDERAL-, STATE- AND NATURESERVE-LISTED SPECIES BY SPECIES TYPE (2013)

4.7.5 Non-native Species

Five confirmed non-native species have been documented on Navy installations within the United States—the Red-eared Slider (*Trachemys scripta elegans*), the Brown Anole (*Anolis sagrei*), the Mediterranean gecko (*Hemidactylus turcicus*), the American Bullfrog (*Lithobates catesbeianus*), and the San Diego Alligator Lizard (*Elgaria multicarinata webbii*). The San Diego Alligator Lizard is confirmed on San Nicolas Island, where it is not native. The Red-eared Slider (*Trachemys scripta elegans*) is the most common non-native species on Navy installations. All Navy regions except CNR Midwest have confirmed non-native species.

There is the potential for dozens of additional non-native species to be present in future years on Navy lands (particularly in CNR Southeast) (Meshaka, 2011). The pet trade and global warming will play a significant role in the spread of non-native species in coming years.

4.7.6 Venomous Species

Fifteen species of venomous snakes have been confirmed on Navy installations within the United States (two species in the genus *Agkistrodon* [Copperhead and Cottonmouth], two species in the genus *Micrurus* [Coral Snake], ten species in the genus *Crotalus* and 1 in the genus *Sistrurus* [rattlesnakes]). Every Navy region has at least one species of venomous snake. Commander, Navy Region Southeast and CNR Southwest have the most venomous snake species (nine and eight species respectively), whereas CNR Naval District Washington and CNR Northwest have the least (one species each).

CHAPTER 5

Summary and Conclusions

5.1 COMMANDER, NAVY REGION MID-ATLANTIC

Two groups of species (sea turtles and salamanders) stand out in the inventory of herpetofauna in CNR Mid-Atlantic. Sea turtles, whether known to occur or potentially present on CNR Mid-Atlantic installations, are recognized on the NatureServe, state, and federal levels as species in need of protection. The Navy is expected to comply with federal and state laws (when applicable) to protect these species. Increased monitoring and research could help the Navy determine the prevalence of sea turtles in and around naval installations in CNR Mid-Atlantic and the potential of these species to breed on shore facilities.

The Mid-Atlantic region had a high number of potential salamander species. Approximately 45 percent of all salamander species in this region have not been documented on Navy installations and remain unconfirmed. These results suggest that additional surveys for salamander species are necessary. This is particularly true for NOIC Sugar Grove where eight salamander species are potentially present.

5.2 COMMANDER, NAVY REGION NAVAL DISTRICT WASHINGTON

Commander, Navy Region Naval District Washington is a unique region geographically. Installations within the region range from urban to island habitats leading to a diverse array of herpetofauna when compared to the size of the region. Three of the four confirmed species in this region that are legally protected by the ESA are sea turtles: the Loggerhead Sea Turtle (*Caretta caretta*), the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), and the Leatherback Sea Turtle (*Dermochelys coriacea*). However, sea turtles nesting on Navy installations in this region are not common (Kyle Rambo, personal communication).

All of the frog and lizard species that could potentially occur on the installations in this region have been documented. The percent of confirmed snake and turtle species are also high (approximately 86 percent). These data suggest there have been sufficient surveys for these species groups in this region. As with CNR Mid-Atlantic, the percent of potential salamander species was the greatest (44 percent). Five of the seven potential salamander species in this region are at Naval Support Facility Dahlgren. It is recommended that a survey focused on salamander species be conducted at this Navy facility.

5.3 COMMANDER, NAVY REGION SOUTHEAST

As a result of the diverse geography, climate, and number of habitats across the southeastern United States, CNR Southeast has the greatest herpetofauna species diversity of all Navy regions. This region has the greatest number of snake species that are potential, but not confirmed (30 species). Many of these species inhabit freshwater environments and are difficult to detect. Future surveys focused on aquatic habitats could assist in confirming these species.

CNR Southeast also has the most non-native species with the majority of these species being in Florida (Meshaka 2011). Although there are many causes of non-native species being introduced into an area, the pet trade in Florida has certainly played a role in the introduction of non-native species in the state.

Although the non-native Burmese python (*Python molurus bivittatus*) has not been documented on any Navy installations in Florida to date, the rapid expansion of this species in the state makes several installations vulnerable to the devastating impacts of this invasive species.

5.4 COMMANDER, NAVY REGION MIDWEST

Commander, Navy Region Midwest covers a large area geographically, but has the lowest number of naval installations of all of the regions (NAVSTA Great Lakes, NSA Crane, and NSA Midsouth). The installations in this region have no herpetofauna species confirmed or potential to be present that are federally listed as endangered or threatened. There is one confirmed state-listed species on NSA Crane and several species that have potential to be present on all three sites. Approximately 60 percent of the possible herpetofauna biodiversity on the Navy sites has been confirmed. Since no formal survey or inventory for amphibians and reptiles has been conducted at Naval Station Great Lakes, it is recommended that a survey is conducted by a recognized expert.

5.5 COMMANDER, NAVY REGION NORTHWEST

While relatively large geographically, CNR Northwest has low herpetofauna species biodiversity compared to the other Navy regions. This is most likely a result of the lower diversity of cold blooded vertebrates at northern latitudes in the northwestern United States, which is less desirable for herpetofauna. No amphibian or reptile species found in CNR Northwest are listed as federally endangered or threatened; however the Columbia Spotted Frog (*Rana luteiventris*) is a candidate species and the Cascades Frog (*Rana cascadae*) is currently under review. The Western Pond Turtle (*Actinemys marmorata*) is state endangered in Washington and potentially occurs at several installations surrounding Puget Sound. No turtle species have been confirmed on any Navy sites in this region. Species-specific turtle surveys would assist with confirming the presence or absence of this species type and aid in the management and conservation of these animals on Navy installations.

5.6 COMMANDER, NAVY REGION SOUTHWEST

Commander, Navy Region Southwest has a large concentration of installations and detachments in California and Nevada. This geographic concentration would lead one to conclude that there would be lower species diversity, except that species diversity in the southwestern United States is very high. The variation of habitats in the region including coastal, desert, and montane resulted in higher species diversity than expected. In fact, the number of confirmed and potential species for this region (117 species) is second only to CNR Southeast (225 species). Navy installations within the CNR Southwest contain four federally-threatened species and one endangered species. There is the potential for an additional three federally-listed species and numerous species at risk to be present on Navy lands within this region. This Navy region contains the great number of venomous species (eight species), primarily due to the diversity rattlesnake species in the southwestern United States. More than 50 percent of the salamander species and 44 percent of turtle species are unconfirmed on Navy sites in this region. It is recommended that future surveys focus on these two species types.

5.7 GENERAL RECOMMENDATIONS FOR ALL NAVY INSTALLATIONS

The following recommendations are suggested to help conserve and manage amphibians and reptiles on Navy lands. These recommendations are applicable to all Navy installations.

1. Maintain the herpetofauna species spreadsheet developed for the analysis of this report up to date.
2. A general herpetofauna inventory be conducted every five to seven years to document the presence or absence of species and document general population trends.

3. Monitor for the occurrence of invasive herpetofauna species, particularly at Navy installations in the CNR Southeast.
4. Focused surveys for salamander species are warranted since this species type has the greatest percent of potential species in four of the six CNRs.
5. Those installations with venomous snakes, educate military and civilian personnel of the potential dangers of these species. Educational posters, pamphlets, and brochures are recommended.

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CHAPTER 6

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LIST OF ACRONYMS

CNIC	Commander, Navy Installations Command
CNR	Commander Navy Region
DoD	Department of Defense
DoD PARC	Department of Defense Partners in Reptile and Amphibian Conservation
DoN	Department of the Navy
ESA	Endangered Species Act
INRMP	Integrated Natural Resource Management Plan
JEB	joint expeditionary base
NAB	naval amphibious base
NAF	naval air field
NALF	naval auxiliary landing field
NAS	naval air station
NAS JRB NOLA	Naval Air Station Joint Reserve Base New Orleans
NAVSUBASE	naval submarine base
NAWS	naval air weapons station
NB	naval base
NIOC	Navy Information Operations Command
NJDEP	New Jersey Department of Environmental Protection
NOAA	National Oceanic and Atmospheric Administration
NOLF	naval outlying landing field
NRTF	naval radio transmitter facility
NS	naval station
NSA	naval support activity
NWS	naval weapons station

OLF	outlying landing field
PARC	Partners in Reptile and Amphibian Conservation
SAIA	Sikes Act Improvement Act
SERE	survival, evasion, resistance, and escape
U.S.	United States
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VDGIF	Virginia Department of Game and Inland Fisheries

References

- AmphibiaWeb. (2011) from www.amphibiaweb.org
- AmphibiaWeb. (2012) from <http://amphibiaweb.org/>
- Collins, J. P. (2010). Amphibian decline and extinction: what we know and what we need to learn. *Diseases of Aquatic Organisms*, 92, 93-99. doi: 10.3354/dao02307
- Collins, J. P., & Crump, M. L. (2009). *Extinction in Our Times. Global Amphibian Decline.*: Oxford University Press.
- Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers* (2008). N. Benton, J. D. Ripley & F. Powledge (Eds.), Retrieved from <http://www.dodbiodiversity.org/>
- Crother, B. I., Boundy, J., Burbrink, F. T., Campbell, J. A., de Queiroz, K., Frost, D. R., . . . Wake, D. B. (2012). Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in our Understanding. In C. o. S. E. a. S. Names (Ed.): Society for the Study of Amphibians and Reptiles.
- Endangered Species Glossary-Midwest Region. (2013) from <http://www.fws.gov/midwest/endangered/glossary/index.html>
- Ernst, C. H., & Lovich, J. E. (2009). *Turtles of the United States and Canada*: JHU Press.
- Faber-Langendoen, D., Nichols, J., Master, L., Snow, K., Tomaino, A., Bittman, R., . . . Young, B. (2012). NatureServe Conservation Status Assessments: Methodology for Assigning Ranks (Revised ed., pp. 1-52). Arlington, Virginia: NatureServe.
- Hayes, T. B., Case, P., Chui, S., Chung, D., Haeffele, C., Hatson, K., . . . Tsui, M. (2006). Pesticide mixtures, endocrine disruption, and amphibian declines: Are we underestimating the impact? *Environmental Health Perspectives*, 114, 40-50. doi: 10.1289/ehp.8051
- Hayes, T. B., Collins, A., Lee, M., Mendoza, M., Noriega, N., Stuart, A. A., & Vonk, A. (2002). Hermaphroditic, demasculinized frogs after exposure to the herbicide atrazine at low ecologically relevant doses. *Proceedings of the National Academy of Sciences of the United States of America*, 99(8), 5476-5480. doi: 10.1073/pnas.082121499
- Johnson, P. T. J., Chase, J. M., Dosch, K., Hartson, R. B., Gross, J. A., Larson, D. J., . . . Carpenter, S. R. (2007). Aquatic eutrophication promotes pathogenic infection in amphibians. *Proceedings of the National Academy of Sciences of the United States of America*, 104(40), 15781-15786. doi: 10.1073/PNAS.0707763104
- Marks, R. (2006). Amphibians and Reptiles (Vol. 35): Natural Resources Conservation Service and Wildlife Habitat Council.

- McCallum, M. L. (2007). Amphibian decline or extinction? Current declines dwarf background extinction rate. *Journal of Herpetology*, 41(3), 483-491. doi: <http://dx.doi.org/10.1670/0022-1511>
- Nanjappa, P., & Conrad, P. M. (2014). Conservation and Protection Status by Species. In P. Nanjappa & P. M. Conrad (Eds.), *State of the Union: Legal Authority Over the Use of Native Amphibians and Reptiles in the United States* (1.04 ed., pp. 189-225). Washington, DC: Association of Fish & Wildlife Agencies.
- NatureServe Explorer. (2013) from <http://explorer.natureserve.org/ranking.htm#global>
- NatureServe Network. (2013) from <http://www.natureserve.org/>
- Office of the Chief of Naval Operations. (2014a). *OPNAV Instruction 5090.1D, Environmental Readiness Program Manual*. Retrieved from <http://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-00%20General%20Admin%20and%20Management%20Support/5090.1C%20CH-1.pdf>.
- Office of the Chief of Naval Operations. (2014b). *OPNAV M-5090.1, Environmental Readiness Program Manual*. Retrieved from <http://doni.daps.dla.mil/SECNAV%20Manuals1/5090.1.pdf>.
- Pounds, A., Bustamante, M. R., Coloma, L. A., Conuegra, J. A., Fogden, M. P. L., Foster, P. N., . . . Young, B. E. (2006). Widespread amphibian extinctions from epidemic disease driven by global warming. *Nature*, 439, 161-167. doi: 10.1038/nature04246
- Ribeiro, R., Santos, X., Sillero, N., Carretero, M. A., & Llorente, G. A. (2009). Biodiversity and land uses at a regional scale: Is agriculture the biggest threat for reptile assemblages? *Acta Oecologica*, 35(2), 327-334. doi: <http://dx.doi.org/10.1016/j.actao.2008.12.003>
- Semitsch, R. D. (2003). Conservation of Pond-Breeding Amphibians. In R. D. Semlitsch (Ed.), *Amphibian Conservation* (First ed., pp. 8-23). Washington, DC: Smithsonian Institution Press.
- Stein, B., Scott, C., & Benton, N. (2008). Federal lands and endangered species: The role of military and other federal lands in sustaining biodiversity. *BioScience*, 58(4), 339-347. doi: 10.1641/B580409
- Threatened Amphibians of the World*. (2008). (S. N. Stuart, M. Hoffmann, J. S. Chanson, N. A. Cox, R. J. Berridge, P. Ramani & B. E. Young Eds.). Barcelona, Spain; Gland, Switzerland; Arlington, Virginia: Lynx Edicions; IUCN; Conservation International.
- Turtle Conservation*. (2000). (M. W. Klemens Ed.). Washington, DC: Smithsonian Institution Pres.
- U.S. Fish and Wildlife Service. (2014). Endangered Species from <http://www.fws.gov/endangered/>
- U.S. Geological Survey. (2014). Nonindigenous Aquatic Species from <http://nas.er.usgs.gov>
- Uetz, P. (1995a). The Reptile Database. from www.reptile-database.org
- Uetz, P. (1995b, 2013). The Reptile Database from www.reptile-database.org

Vitt, L. J., & Caldwell, J. P. (2008). *Herpetology, Third Edition: An Introductory Biology of Amphibians and Reptiles* (Third ed.): Academic Press.