

# Welcome to the DoD Natural Resources Webinar Series



# Herpetofauna Biodiversity on United States Air Force Installations



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# Acknowledgements

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- Natural Resources Legacy Program: Project Number 13-642; report available at: <http://www.dodnaturalresources.net/PARC-Resources.htm>
- Air Force HQ staff and installation natural resource managers
- Partners in Amphibian and Reptile Conservation
- State Wildlife Agencies



# Purpose/Need of the Investigation

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Purpose: to review, update and analyze amphibian and reptile (herpetofauna) species lists of Air Force installations with Integrated Natural Resources Management Plans (INRMPs)

Need: no comprehensive inventory of the herpetofauna diversity had been conducted on Air Force properties; accurate and comprehensive biotic inventories are essential for effective management and conservation of natural resources



# Methods

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1. A preliminary list of reptile and amphibian species was developed using data from VertNet, National Amphibian Atlas and other data sources for each Air Force installation.
2. This 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.

Marbled Salamander



Chameleon



# Methods

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3. The species list was then compared to the existing installation INRMP species list (if available) and surveys or species inventories to identify those species that have been confirmed on the installation.
4. The pre-final list was sent to installation's natural resource personnel for review and validation before becoming final.



Northern Two-lined Salamander



Northern Cricket Frog

# Methods

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- Data compiled into an Excel Spreadsheet
- Columns of data include:
  - Installation Name
  - County
  - Scientific Name
  - Presences
  - Federal Status
  - State Status
  - Installation Detachment
  - State
  - Species type
  - Common Name
  - Citation for Presence
  - NatureServe Status
  - Non-Native

# Methods

## Confirmed and Potential Determination

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- Confirmed: when there is literature (site-specific survey, study) or other documentation (INRMP or personal observation) endorsing that the species occurs on the installation
- Potential/Unconfirmed: when the installation property is within the natural or introduced range of that species and the species has been documented in the same county as a particular military installation, but a specimen has not been confirmed within the boundaries of the installation.



# Analysis

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Data summarized for Air Force installations based on the categories below:

- Confirmed and Potential Determination
- Federal Status
- State Status
- NatureServe SAR (G1-G3)
- Non-native Species
- Venomous Species



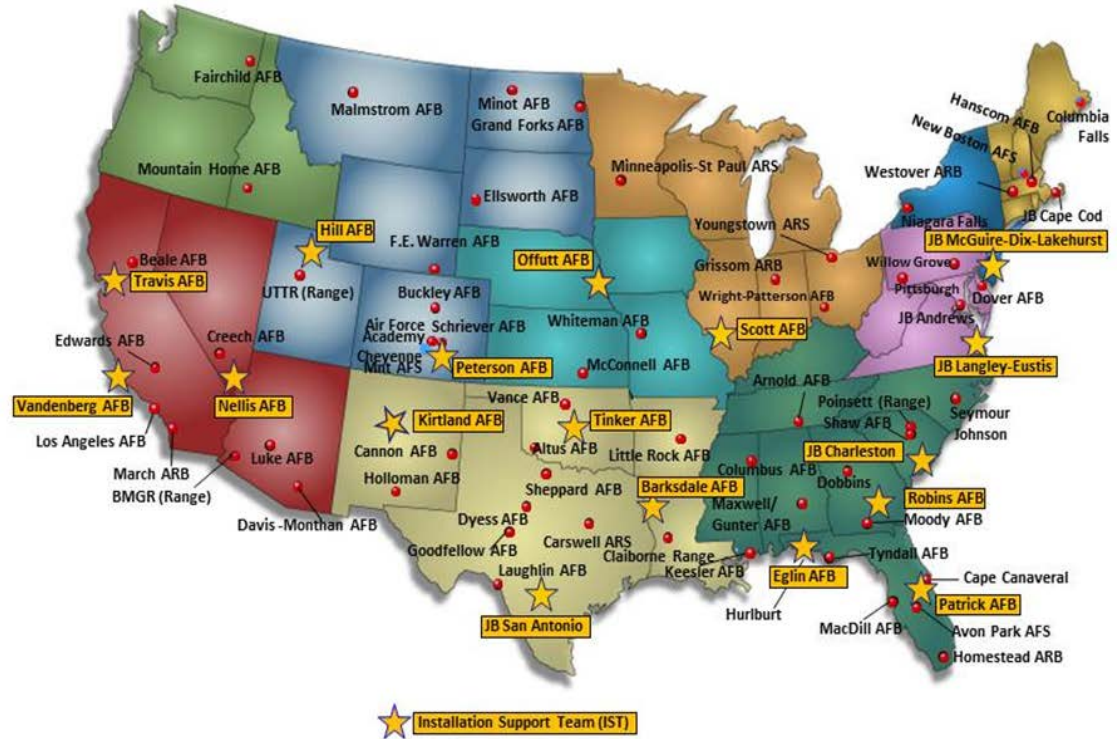
Three-banded  
Reef Gecko

# Results- Air Force Installations

Herpetofauna species lists were updated and analyzed for 80 Air Force installations (115 unique locations including installation detachments) located in 37 States.



## Air Force Installations



# Results

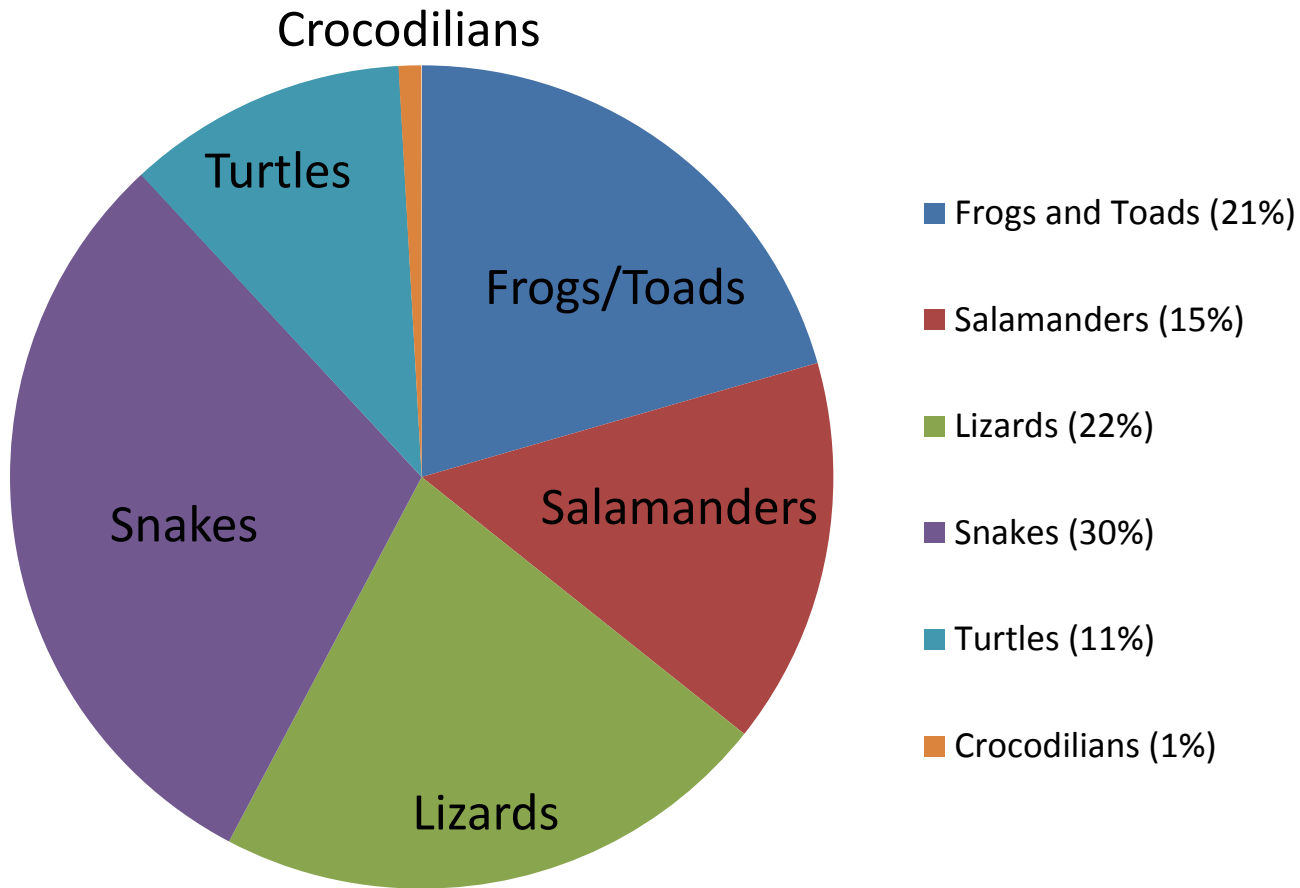
## Confirmed and Potential Species

Species Type	Number of Species Confirmed	Number of Species Potential
Frogs and Toads	69	12
Salamanders	51	23
Lizards	74	27
Snakes	102	34
Turtles	37	10
Crocodiles/ Alligators	3	0
<b>Total</b>	<b>336</b>	<b>106</b>

The herpetofauna species confirmed on the 80 Air Force installations evaluated represent 52 percent of the total native biodiversity of all herpetofauna species documented in the continental United States

# Results

## Percent of Confirmed Species by Species Type



# Results- Air Force Installations

<b>Installation Name</b>	<b>State</b>	<b>No. of Confirmed Species</b>
Avon Park	Florida	70
Eglin AFB	Florida	62
Arnold AFB	Texas	61
JB Charleston (Weapons Station)	South Carolina	59
Sheppard AFB	Texas	57
Robbins AFB	Georgia	57
Shaw AFB (Poinsett Range)	South Carolina	56
Moody AFB	Georgia	55
Homestead ARB	Florida	53
Tinker AFB	Oklahoma	45
Barksdale AFB	Louisiana	45



# Results

## Confirmed Species - Federally Listed

- 6 federally endangered species confirmed on Air Force installations (four sea turtles; one frog [Dusky Gopher Frog]; one salamander [Reticulated Flatwoods Salamander]). Leatherback sea turtle is the most common endangered species and occurs on six installations
- 10 federally threatened species confirmed on Air Force installations (three turtles; two crocodilians; two frogs; one salamander; one lizard; one snake). American Alligator is the most common threatened species and occurs on fourteen installations
- 3 federal candidate species confirmed on Air Force installations (one turtle [Gopher Tortoise]; one frog [Columbia Spotted Frog]; one snake [Eastern Massasauga]). The Gopher Tortoise is the most common candidate species and occurs on eight Air Force installations.



American Alligator



Eastern Indigo Snake



Gopher Tortoise

# Results

## Confirmed Species – State Listed

- 33 species of amphibians and reptiles are confirmed present on Air Force installations where they are listed as endangered or threatened (12 turtles; 9 snakes; 5 frogs/toads; 4 salamanders; 2 crocodylians; 1 lizard).
- Cape Canaveral AFS has the greatest number of state-listed threatened and endangered herpetofauna species (8 species).
- The Eastern Indigo Snake (*Drymarchon couperi*) and the Gopher Tortoise (*Gopherus polyphemus*) are the most common state-listed species confirmed present on Air Force sites and are found on nine installations in Florida and Georgia

Southern Hog-nosed Snake



Rainbow Snake



Timber Rattlesnake

# Results

## Confirmed Species – NatureServe

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- 36 species/subspecies of amphibians and reptiles confirmed present on Air Force lands have a NatureServe status of G1-G3. (10 turtles; 9 snakes; 6 frogs/toads; 5 salamanders; 5 lizards; 1 crocodile).
- Eglin AFB has the greatest number of NatureServe species at risk (9 species).
- G1/T1-Critically Imperiled species are:
  - Atlantic Saltmarsh Watersnake (Cape Canaveral AFS)
  - Dusky Gopher Frog (Arnold AFB)
  - Kemp's Ridley Sea Turtle (Cape Canaveral AFS, Eglin AFB, MacDill AFB, Patrick AFB, Tyndall AFB)
  - Texas Salamander (JB Antonio–Camp Bullis Training Annex)



Kemp's Ridley Sea Turtle



# Results

## Non-native Species

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- 26 confirmed non-native herpetofauna species have been documented on Air Force installations within the United States
- The American Bullfrog, the Red-eared Slider, and the Mediterranean Gecko are the most common non-native species on Air Force installations
- Homestead ARB (FL) has 21 confirmed non-native species on its property

Mediterranean Gecko



American Bullfrog



Red-eared Slider



# Results

## Venomous Species

- 18 species of venomous snakes have been confirmed on Air Force installations within the U.S.: 2 species in the genus *Agkistrodon* (Copperhead and Cottonmouth), 2 species in the genus *Micrurus* (Coralsnake), 1 species in the genus *Micruroides* (Sonoran Coralsnakes), 11 species in the genus *Crotalus*, and 2 in the genus *Sistrurus* (Rattlesnakes).
- The Barry M. Goldwater Range of Luke AFB has the greatest number of confirmed venomous snakes (7 species) as compared to all Air Force installations. Moody AFB, Kirkland AFB, Joint Base Charleston-Weapons Station Area, and Avon Park also have high venomous snake diversity.

Coral Snake



Timber Rattlesnake



Eastern Diamond-backed  
Rattlesnake





# Results

## Venomous Species

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- Both the Copperhead (*Agkistrodon contortrix*) and Cottonmouth (*Agkistrodon piscivorus*) are confirmed present at more Air Force installations (11) than all other venomous snake species.
- The venomous Gila Monster (*Heloderma suspectum*) lizard is confirmed present on three Air Force installations (Davis-Monthan AFB, Gila River Air Force Space Surveillance Station, and Luke AFB–Barry M. Goldwater Range).

Copperhead Snake



Cottonmouth



Gila Monster







# Venomous Snakes on United States Air Force Installations



## Copperheads & Cottonmouths

Copperhead  
(*Agkistrodon contortrix*)



Cottonmouth  
(*Agkistrodon piscivorus*)



## Coral Snakes

Harlequin Coralsnake  
(*Micrurus fulvius*)



Sonoran Coralsnake  
(*Micrurus euryxanthus*)



## Rattlesnakes

Black-tailed Rattlesnake  
(*Crotalus molossus*)



Eastern Diamond-backed Rattlesnake  
(*Crotalus adamanteus*)



Massasauga  
(*Sistrurus catenatus*)



Texas Coralsnake  
(*Micrurus tener*)



Mohave Rattlesnake  
(*Crotalus scutulatus*)



Prairie Rattlesnake  
(*Crotalus viridis*)



Pygmy Rattlesnake  
(*Sistrurus miliarius*)



Red Diamond Rattlesnake  
(*Crotalus ruber*)



Sidewinder  
(*Crotalus cerastes*)



Speckled Rattlesnake  
(*Crotalus mitchelli*)



Tiger Rattlesnake  
(*Crotalus tigris*)



Timber Rattlesnake  
(*Crotalus horridus*)



Western Diamond-backed Rattlesnake  
(*Crotalus atrox*)



Western Rattlesnake  
(*Crotalus oreganus*)



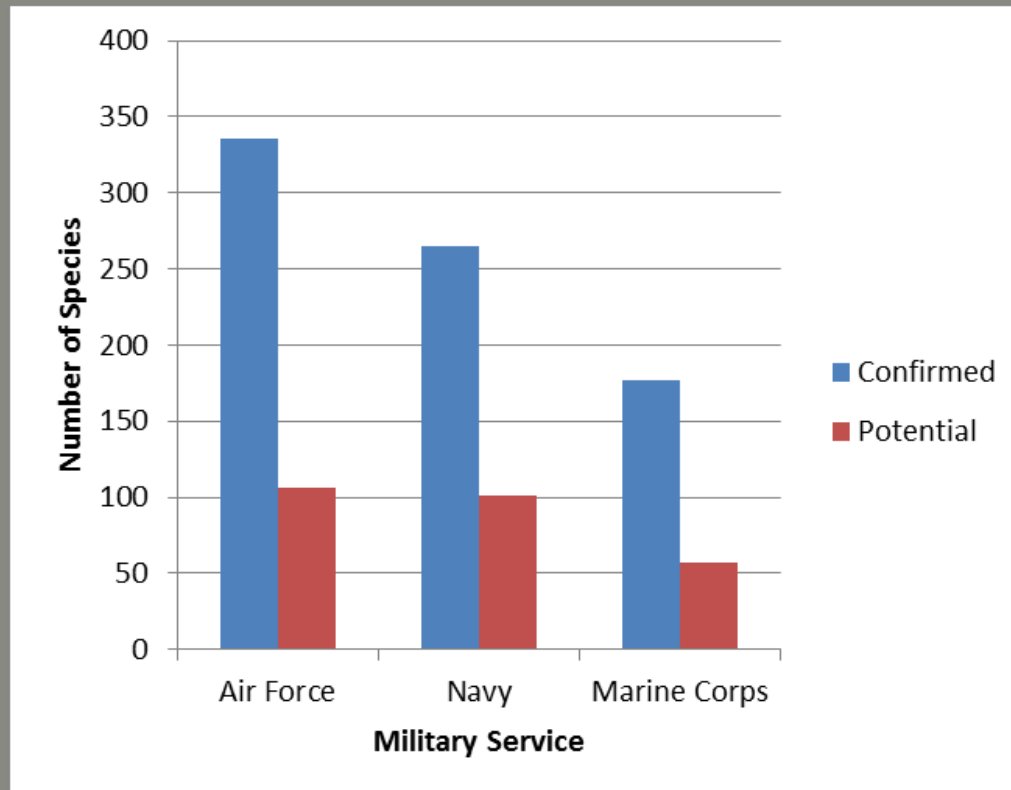
Snake Safety: If you encounter a venomous snake in the field, back away slowly and leave it alone. Many venomous snake bites are caused when attempting to harass or kill snakes. Bites from venomous snakes can be serious. If bitten by a venomous snake try to remain calm and seek immediate emergency medical attention.

Produced by: Chris Petersen, Rob Lovich and Kevin Porteck



# Results-Comparison to Navy and Marine Corps Herpetofauna Biodiversity

- Air Force installations have more confirmed species (336) than both the Navy (265) and Marine Corps (177) based on the same type of analysis





# Conclusions

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- Air Force installations support 442 species (336 confirmed species and 106 potential species)
  - Avon Park AFR has the greatest number of confirmed herpetofauna species (70 species)
  - Air Force lands support 52% of the total native biodiversity in the continental U.S.
- Nineteen herpetofauna species listed as federally endangered, threatened, or candidate by the USFWS are confirmed present on Air Force installations
  - Cape Canaveral AFS has the greatest number of federally-listed species (9 species)
  - Turtle species represent the majority of the federally-listed species on Air Force lands but only represent 11% of total herpetofauna biodiversity



# Conclusions

- Twenty-six non-native amphibian and reptile species are confirmed present on Air Force installations.
  - Homestead ARB has the confirmed most non-native species (21 species)
- Eighteen species of venomous snakes are confirmed on Air Force installations
  - The Barry M. Goldwater Range of Luke AFB has the greatest number of confirmed venomous snakes (7 species)
- Herpetofauna biodiversity on Air Force installations is greater than that of both the U.S. Navy and Marine Corps





# General Recommendations

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- Maintain the herpetofauna species spreadsheet developed for this analysis up to date.
- Conduct general herpetofauna surveys and monitoring every five to seven years to document the presence or absence of species and document general population trends.
- Monitor and control for invasive herpetofauna species, particularly at Air Force installations in the southeast.
- Those installations with venomous snakes, educate military and civilian personnel of the potential dangers of these species. Educational posters, pamphlets, and brochures are recommended.

# Questions?



American Alligator  
(*Alligator mississippiensis*)