



# Commander's Guide to the Department of Defense Partners in Amphibian and Reptile Conservation Network

What Every Commander Should Know About Amphibians and Reptiles on Military Lands





DoD owns or manages nearly 25 million acres of land in the U.S. for its military operations. While this is just 3% of the Nation's total, these lands are critical for enabling readiness, with vast areas protected from public access and development. It is the Department's responsibility to enhance readiness, promote safety, safeguard the environment, and create resilient communities.<sup>1</sup> Stewarding the plants and animals that use military lands for their survival, including natural areas that provide realistic testing and training environments, is an essential component of supporting military operational activities and for securing our Nation's natural heritage and biodiversity for future generations.

This Commander's Guide describes the state of herpetofauna (amphibians and reptiles), why the Department should care, what its resource managers are doing to manage and conserve these animals, and how these activities support and enhance readiness.

<sup>1</sup> <https://www.denix.osd.mil/>

# What are Herpetofauna?

Herpetofauna are reptiles and amphibians, including snakes, lizards, turtles, crocodylians, salamanders, frogs, and toads. They are found in the oceans, lands, and waters of the United States in nearly every habitat, occur on every continent except Antarctica,<sup>2</sup> and are both ecologically and culturally significant around the globe. Amphibians and reptiles are essential components of the ecosystems they inhabit, maintaining the ecological integrity of their habitats as predators, competitors, and prey, often surpassing other vertebrate groups in terms of species abundance, diversity, and biomass,<sup>3</sup> and serving as indicators of environmental health.<sup>4</sup>

An inventory of herpetofauna on military lands in 2018 revealed that DoD lands are home to 66% of all native U.S. amphibian and reptile species, including approximately 40% of all federally listed herpetofaunal species.<sup>5</sup>



## Why DoD Cares

Military personnel need to develop and test warfare technologies and train in similar environments they expect to encounter in areas of conflict. The natural landscapes on DoD lands across the country provide conditions that represent a full complement of operational environments that personnel are likely to encounter. It is imperative that these environments remain healthy and resilient for long-term use. Herpetofauna are excellent indicators of environmental health, and are highly sensitive to environmental changes. This means that reptile and especially amphibian populations will show signs of stress when their habitats become degraded or polluted, or when diseases are introduced. This, in turn, means that herpetofaunal species can be used as indicators to determine if DoD testing and training environments are healthy.

As populations of amphibians and reptiles decline, they become at risk for listing under the U.S. Endangered Species Act (ESA). These listings can result in direct mission impacts such as delays from increased consultation and permitting, modifications to the timing and location of missions, and increased cost due to workarounds. Because reptiles and amphibians are so sensitive to environmental changes, they have relatively high extinction rates. Globally, amphibian extinction rates have risen exponentially since the 1980s, with dozens already gone<sup>6</sup> and 2,200 more at risk of going extinct in the coming years.<sup>7</sup> The story is similar for reptiles, with approximately 1 in 5 species currently facing the threat of extinction.<sup>8</sup>

In the continental U.S., there are 29 amphibian and 32 reptile species/subspecies currently listed as threatened or endangered under the Endangered Species Act.<sup>9</sup> Of these, DoD lands are home to nine of those amphibians and 15 of the reptiles.

<sup>2</sup> AmphibiaWeb, 2020 (see <https://amphibiaweb.org>)

<sup>3</sup> Klemens 2000; Stuart et al. 2008; Vitt and Caldwell 2009; Ernst and Lovich 2009

<sup>4</sup> Hayes et al. 2006; Pounds et al. 2006; Johnson et al. 2007

<sup>5</sup> [http://www.herpconbio.org/Volume\\_13/Issue\\_3/Petersen\\_etal\\_2018.pdf](http://www.herpconbio.org/Volume_13/Issue_3/Petersen_etal_2018.pdf)

\*Footnotes continue on next page.



## Why These Animals are Declining<sup>10</sup>

The biggest single factor contributing to the alarming decline of all species, including herpetofauna, is habitat loss, degradation, and fragmentation. A close second is the introduction and proliferation of non-native invasive species, which can decimate native species directly and indirectly. Globally, invasive species, including feral and free-roaming cats, are responsible for the extinction of nearly 150 species, including 10 reptile species.<sup>11</sup> Whether through displacement or predation, the impact to reptiles and amphibians is on the rise. It is crucial that DoD address the introduction and spread of invasive species with timeliness and aggression.<sup>12</sup>



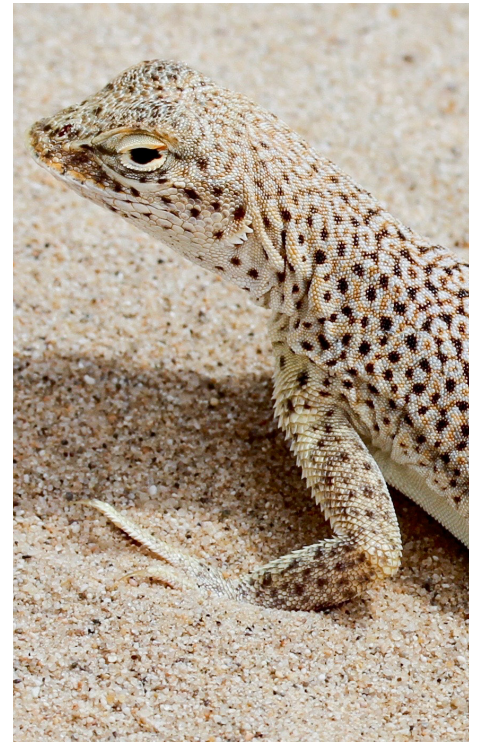
Rivaling habitat loss and non-native species as destructive factors for species survival, and exacerbating all other threats, is changing climate. The decade 2010-2020 was the hottest in recorded history.<sup>13</sup> For herpetofauna, rising temperatures have multiple direct impacts (e.g., moisture loss, thermoregulation, changing acidity of marine environments) but the impacts of our changing climate are myriad, and make other natural threats worse. Increased storm surges result in salt water intrusions into fresh water areas; increased intensity and duration of fires mean habitats are slow to recover; and non-native plants and animals are introduced into habitats and can become invasive, dramatically altering or even destroying native plants and animals.

Other threats to herpetofauna include the introduction and proliferation of diseases, such as snake fungal disease (which is on the rise), amphibian chytrid fungus and ranavirus (which is known to kill individuals and decimate populations); and the overuse or misuse of chemical contaminants (e.g., herbicides, pesticides, fungicides).

## How DoD PARC Supports the Mission

In response to dramatic declines in amphibian and reptile populations and the potential resulting impact to mission readiness, DoD established a network of installation natural resources managers to communicate and collaborate among each other and with a national network of partner organizations.<sup>14</sup> Called the DoD Partners in Amphibian and Reptile Conservation (DoD PARC), the purpose of this network is to implement proactive, habitat-based management that enables readiness by working in partnership with all relevant groups to promote actions that minimize encroachment factors while helping sustain wildlife populations. DoD PARC does this by providing cutting edge scientific information and management recommendations that help preclude or minimize training restrictions due to species endangerment; by providing extensive outreach and education to installation personnel and to the public; and by working closely with all stakeholders, including the test and training communities.

For over a decade, DoD PARC has partnered with approximately 50 federal and state agencies, universities, zoos, and non-governmental organizations to prevent species declines both on and off DoD lands. We also regularly partner with the national Partners in Amphibian and Reptile Conservation network, the nation's largest and most comprehensive conservation effort ever undertaken for amphibians and reptiles. By working in partnership, DoD is able to leverage knowledge, skills, and resources to alleviate constraints to the military mission, and further conservation and recovery goals for imperiled species. DoD PARC's focus also includes overseas military lands at which U.S. military personnel are stationed and/or the U.S. owns or leases.



<sup>6</sup> One study suggests that between 28-201 frog species may already be extinct (McCallum ML. Amphibian decline or extinction? Current declines dwarf background extinction rate. J Herptol. 2007;41(3):483-491)

<sup>7</sup> <https://www.iucnredlist.org/resources/summary-statistics> (Table 4a)

<sup>8</sup> <https://www.scientificamerican.com/article/reptiles-numbers-dwindling>

<sup>9</sup> <https://www.fws.gov/endangered/species/us-species.html>

<sup>10</sup> [https://www.denix.osd.mil/dodparc/parc-resources/policy-guidance/strategic-plan-for-amphibian-and-reptile-conservation-and-management-on-dod-lands/DoD\\_Amphibian\\_and\\_Reptile\\_Strategic\\_Plan.pdf](https://www.denix.osd.mil/dodparc/parc-resources/policy-guidance/strategic-plan-for-amphibian-and-reptile-conservation-and-management-on-dod-lands/DoD_Amphibian_and_Reptile_Strategic_Plan.pdf)

<sup>11</sup> <https://www.pnas.org/content/early/2016/09/13/1602480113.abstract>

<sup>12</sup> [https://www.denix.osd.mil/nr/otherconservationtopics/invasivespecies/manuals/commander-s-guide-on-invasive-species/03\\_IS-Guide-Final-6-3-11.pdf](https://www.denix.osd.mil/nr/otherconservationtopics/invasivespecies/manuals/commander-s-guide-on-invasive-species/03_IS-Guide-Final-6-3-11.pdf)

<sup>13</sup> <https://www.climatecentral.org/gallery/graphics/the-10-hottest-global-years-on-record>

<sup>14</sup> National PARC: <https://parcplace.org>

## Examples of Success

### *Flat-tailed Horned Lizard (FTHL)*

In 1997, multiple federal and state partners, including from the U.S. Marine Corps (USMC) and U.S. Navy, signed a voluntary long-term Interagency Conservation Agreement to use common management goals and strategies to prevent the FTHL from being federally listed. The FTHL lives on ~153,000 acres of training lands on Naval Air Facility El Centro and the Barry M. Goldwater Range West. The FTHL was first considered for listing under the ESA in the 1980s; however, as a result of the partnership's voluntary conservation efforts,<sup>15</sup> the FTHL is not only thriving on military lands, but the U.S. Fish and Wildlife Service (USFWS) has determined listing the FTHL is not warranted.

### *Mohave Desert Tortoise*

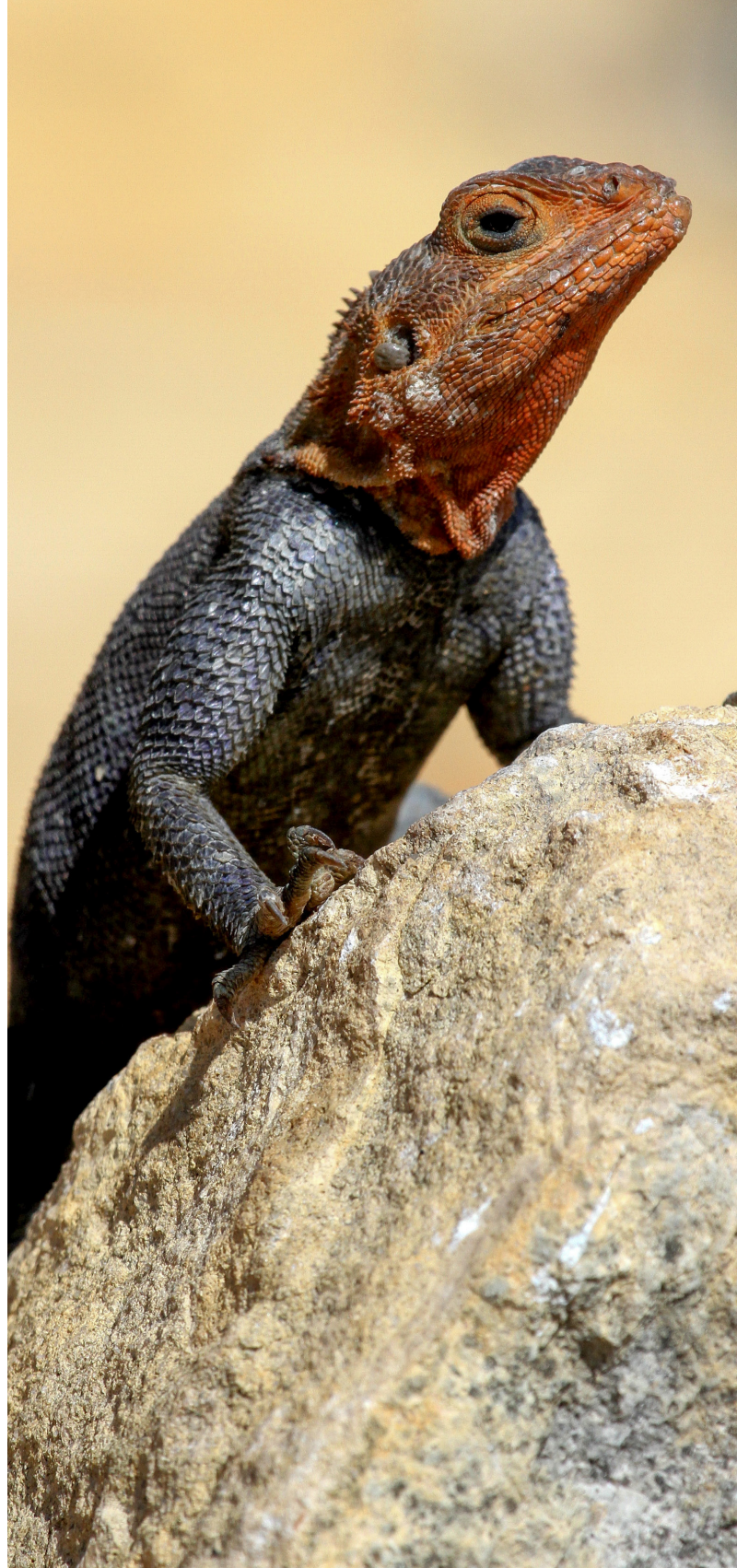
As a result of multiple stressors, the Mohave Desert Tortoise was federally listed under the ESA as threatened throughout its range in 1994. This listing has required significant workarounds for training and exercises in the region, and DoD has spent nearly \$150 million in response.<sup>16</sup> So, when the USMC needed to expand the Marine Corps Air Ground Combat Center 29 Palms training area, installation biologists worked with a team of highly qualified partners in the Southwest<sup>17</sup> to plan the relocation of approximately 1,100 Desert Tortoises.<sup>18</sup> Similar and costly planning, logistics, and conservation measures for the species had to be implemented for Fort Irwin's land expansion, Operation Citadel Shield, and Naval Air Weapons Station China Lake's recent land expansion.

### *Western Pond Turtle*

The Western Pond Turtle has declined across nearly 80% of its range,<sup>19</sup> and is the only remaining native freshwater pond turtle in California. Recently split into two species taxonomically, the USMC is a significant stakeholder for the Southwestern Pond Turtle. Both it and the Northwestern Pond Turtle are currently being considered for listing by the USFWS, which could result in mission impacts. Pro-active conservation actions have been implemented and more are planned to recover these imperiled species and avoid potential regulatory protections by a listing under the ESA. To achieve maximum success, DoD is working with over a dozen state and federal partners through a range-wide conservation coalition to implement a Rangewide Management Strategy for these conservation actions.

### *Longleaf Amphibian and Reptile Conservation (ARC) Project*

Through the national PARC network, DoD became a member of the Longleaf ARC Project, which is focused on accelerating conservation efforts for five at-risk species (Gopher Frog, Gopher Tortoise, Striped Newt, Southern Hog-nosed Snake, Florida Pine Snake) that live in longleaf pine habitats. If these at-risk species were to become listed under the ESA, it could impact training on more than 30 southeastern installations. Project partners are gathering data to improve decisions about where and how to invest conservation resources to ensure the greatest return on investment. Already through these efforts, the Southern Hog-nosed Snake was determined to be not warranted for protections under the ESA.



<sup>15</sup> FTHL ICC. 2003. Flat-tailed Horned Lizard Rangewide Management Strategy, 2003 Revision. US Fish and Wildlife Service, Carlsbad, California

<sup>16</sup> From FY1991-FY2016, DoD spent \$143M on the desert tortoise.

<sup>17</sup> <https://www.swparc.org/resources/desert-tortoise/>

<sup>18</sup> <https://www.defense.gov/Explore/News/Article/Article/1152478/marines-relocate-desert-tortoises/>

<sup>19</sup> Rhodin, Anders G.J.; van Dijk, Peter Paul; Iverson, John B.; Shaffer, H. Bradley (2010-12-14). "Turtles of the World 2010 Update: Annotated Checklist of Taxonomy, Synonymy, Distribution and Conservation Status".

## Key Considerations for Commanders

- Are there venomous snakes on your installation? If so, do your staff need training on how to handle snake encounters?
- Is your installation natural resources manager communicating with the installation's operational community and vice versa to avoid potential conflicts between mission activities and species conservation?
- When was the last time your installation had a survey for amphibians and reptiles?
- Does your installation have any herpetofauna species that could negatively impact readiness?
- What are the key threats to those species, and what are the fastest, safest, and most practical ways to manage or ameliorate threats?
- Does your installation have a current (i.e., up-to-date) Integrated Natural Resources Management Plan (INRMP) that addresses amphibian and reptile management?
- Can management be shared by working across installation boundaries with neighboring conservation groups; local, state and federal partners; or individual landowners?

## How can DoD Commanders Support Herpetofaunal Management on their Installation?

- Encourage your environmental staff and others to reach out to the DoD PARC network.
- Ensure your installation has had a herpetofaunal inventory within the last five years. Species, populations, and habitats naturally change through time.
- Support research and monitoring of amphibians and reptiles on your installation. Good data results in good environmental management decisions.
- Avoid potential impacts to future training exercises by encouraging proactive conservation and management of common and at-risk amphibians and reptiles on your installation today.



### Facts about Amphibians and Reptiles

DoD lands provide habitat for 2/3 of the total number of amphibians and reptile species in this country, including 24 federally listed (threatened or endangered), 55 state-listed, and 70 at-risk species confirmed present on DoD properties.<sup>20</sup>

Herpetofauna include some of the most ancient of species on Earth (they evolved from fish ~365 million years ago), yet are widely misunderstood and often feared.

Approximately half of U.S. military sites with Integrated Natural Resource Management Plans are home to at least one venomous snake species.

Of the Military Services, Army installations have the greatest number of confirmed amphibian and reptile species (355 species); they also are the largest landholder.

<sup>20</sup>[http://www.herpconbio.org/Volume\\_13/Issue\\_3/Petersen\\_etal\\_2018.pdf](http://www.herpconbio.org/Volume_13/Issue_3/Petersen_etal_2018.pdf)

## Where to Get More Information

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DoD PARC has developed 45 amphibian and reptile species fact sheets, five venomous snake posters, seven online training modules, more than 20 trifold pamphlets of the snakes on DoD installations located around the world, two snake safety videos (including one on removal techniques), a strategic plan, INRMP guidelines, best management practices documents to prevent species from being listed under the ESA (e.g., Gopher Frog, Spotted Turtle, Wood Turtle), a webinar series, and a Shutterfly website with thousands of free images available for all DoD personnel to use.<sup>21</sup>

<sup>21</sup><https://www.denix.osd.mil/dodparc/parc-resources>



## Contact Us

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For more information on the DoD PARC network visit our website (<https://www.denix.osd.mil/dodparc/home/>) or contact our national representatives.

**Chris Petersen**; DoD PARC National Representative: [chris.petersen@navy.mil](mailto:chris.petersen@navy.mil)

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DoD PARC is supported by the Office of the Assistant Secretary of Defense (Sustainment)/Office of the Deputy Assistant Secretary of Defense (Environment). Contact Ryan Orndorff (Director, DoD Natural Resource Program, [ryan.b.orndorff.civ@mail.mil](mailto:ryan.b.orndorff.civ@mail.mil)) for more information about this program.



## Photo Credits

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### Cover

Timber Rattlesnake (*Crotalus horridus*), Seth Berry  
Wood Turtle (*Glyptemys insculpta*), Paul Block  
Eastern Tiger Salamander (*Ambystoma tigrinum*), Lisa Powers  
Blanchard's Cricket Frog (*Arcis blanchardi*), J.D. Willson

### Page 1

Sonoran Collared Lizard (*Crotaphytus nebrius*) Larry Jones  
Pacific Treefrog (*Pseudacris regilla*), Paul Block

### Page 2

Cuban Boa (*Chilabothrus angulifer*), Guantanamo Bay, Cuba, Peter J. Tolson  
Alligator Snapping Turtle (*Macrochelys temminckii*), Jim Godwin  
Eastern Indigo Snake (*Drymarchon couperi*), Roy King  
Flat-tailed Horned Lizard (*Phrynosoma mcallii*), Rob Lovich

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Desert Tortoise (*Gopherus morafkai*), Arizona Army National Guard  
Florence Military Reservation  
Reticulated Flatwoods Salamander (*Ambystoma bishop*), Pierson Hill  
Mohave Fringe-toed Lizard (*Uma scoparia*), Adam Clause

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Red-headed Agama (*Agama agama*), J.D. Willson

### Page 5

American Alligator (*Alligator mississippiensis*), Paul Block

### Page 6

Gulf Coast Toad (*Incilius nebulifer*), J.Y. Lamb  
Leopard Tortoise (*Stigmochelys pardalis*), Jelger Herder

### Back Cover

Southern Black Racer (*Colubor constrictor priapus*), William Frye