NIB Reptiles Species Richness - Southwest

This EnviroAtlas national map displays the Normalized Index of Biodiversity (NIB), an index value for reptile species richness based on potential habitat within each subwatershed (12-digit HUC) in the southwestern United States (Arizona, Colorado, Nevada, New Mexico, and Utah). These data are based on habitat models, and not wildlife counts. The potential habitat may be specific to wintering, breeding, or year-round activities depending on the species.


Photo: Gary M. Stolz/USFWS

Why are reptile species important?

Reptile species richness estimates how many different reptile species may inhabit an area, based on potential habitat. Species richness, or diversity, is frequently used as a measure of the relative conservation value of a particular area. It has been used as a surrogate for measuring biodiversity. Many scientists believe biodiversity, as it represents all forms of life on earth, provides or supports the core benefits that humans derive from their environment and helps sustain human culture throughout the world. Therefore, many organizations consider managing areas for biodiversity a means to achieve an acceptable balance among competing demands for various ecosystem services. Reptile species richness is one indicator of biodiversity within an area.

Each species, regardless of size or function, plays an important role within its ecosystem. Ecosystems are highly interconnected, with numerous food chains that form a food web, where all species have a vital function. Each species depends on other species for some aspect of their survival, whether it is to provide habitat, serve as food source, to decompose matter, for the pollination of plant species, or for the control of pest species. Thus, the removal of even one species from an ecosystem could potentially have cascading effects throughout the system.

Reptiles are a diverse group of vertebrate species and play a vital role in ecosystems. Reptile species include turtles, snakes, lizards, and alligators. They are an integral part of the food web, acting as both predators and prey species. Many reptiles feed on pests, such as insects and rodents, which helps to control insect populations that may damage plants and cultivated crops. Herbivorous reptiles can also be important seed dispersers and pollinators. Some reptiles, such as the gopher tortoise and alligators, may also be keystone species in their respective habitats.

In addition to playing important roles in their ecosystems, these species can also be important to human health and the development of pharmaceuticals. For instance, substances taken from snakes have been used to develop antimicrobials, anticoagulants, and painkillers, as well as in drugs to treat hypertension and high cholesterol.[1] Diversity and richness in these species allows for the discovery of these important treatments.

Many reptile species are also economically and culturally important, and have aesthetic value in their inhabited areas. For example, rattlesnakes are used for medicinal purposes in some cultures and snake skins are sold in a number of products. Many people enjoy simply viewing reptiles and seek them out in their natural habitats.

How can I use this information?

The map, NIB Reptile Species Richness – Southwest, is one of three EnviroAtlas maps that illustrate indicators of reptile species richness for the southwest. Additional EnviroAtlas maps show the maximum and mean reptile species richness for each 12-digit HUC. Used together or independently, these maps can help identify areas of potentially low or high reptile species richness to help inform decisions about resource restoration, use, and conservation.

These maps can also be used in conjunction with other maps in EnviroAtlas to help identify areas with high ecological or recreational value for inclusion in conservation or restoration planning, protection from further development, or highlighted for recreational or aesthetic reasons. This information can help identify areas that may be vulnerable to development.

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After finding out the values of reptile species richness for a particular 12-digit HUC, an area can be more intensively investigated by using individual species models at a higher resolution. The individual species models are available through the Southwest Regional Gap Analysis Project (SWReGAP).

How were the data for this map created?

This data layer is based on data generated by the U.S. Geological Survey (USGS) National Gap Analysis Program (GAP). The GAP program maps the distribution of natural vegetation communities and potential habitat for individual terrestrial vertebrate species. These models utilize predictive environmental variables (e.g., GAP land cover, elevation, distance to water) to derive deductive habitat models for each species.

A component of GAP, SWReGAP modeled habitat for 130 reptile species that reside, breed, or use the habitat within the 5-state Southwest study area for a significant portion of their life history. Reptile species richness was calculated by combining predicted habitat for GAP individual reptile species by pixel across the Southwestern United States.

The number of reptile species in each pixel was then summarized by 12-digit HUC and the mean value for each HUC was calculated. The NIB was calculated by dividing the mean value by the maximum value for each HUC. For more information on these methods, see the layer's metadata or the publications below.

What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with these data. These data are based on models and large national geospatial databases. Calculations based on these data are estimations of the truth founded on the best available science. Modeled data can be complementary but are not meant to replace monitoring data.

Habitat models do not predict the actual occurrence of species, but rather their predicted occurrence based on their known associations with certain habitat types. Habitat is only one factor that determines the actual presence of a species. Other factors include habitat quality, predators, prey, competing species, and fine scale habitat features such as woody debris.

Accuracy information for the SWReGAP and GAP projects can be found on their respective web sites. For more technical details about the limitations of these data, refer to the layer's metadata.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. Metric values for individual pixels may be obtained from the New Mexico State University Center for Applied Spatial Ecology. SWReGAP and GAP data can be accessed through their respective websites.

Where can I get more information?

There are numerous resources about the importance of reptiles and on biodiversity in general; a selection of these resources is below. Additional information on the models and data used in the USGS GAP and SWReGAP projects are available on their respective websites. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

Acknowledgements

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Selected Publications

[1] USDA, APHIS. 2011. The Reptile and Amphibian Communities in the United States. Accessed March 2013.

Boykin, K.G., W.G. Kepner, D.F. Bradford, R.K. Guy, D.A. Kopp, et al. 2013. A National Approach for Mapping and Quantifying Habitat-based Biodiversity Metrics across Multiple Spatial Scales. Ecological Indicators. In Press.

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Kepner, W. G., K. G. Boykin, D. F. Bradford, A. C. Neale, A. K. Leimer, and K. J. Gergely. 2011. Biodiversity Metrics Fact Sheet. U.S. Environmental Protection Agency, Washington, DC, EPA/600/F-11/006.

Prior-Magee, J.S., K.G. Boykin, D.F. Bradford, W.G. Kepner, J.H. Lowry, D.L. Schrupp, K.A. Thomas, and Bruce C. Thompson, Editors. 2007. Southwest Regional Gap Analysis Project Final Report. U.S. Geological Survey, Gap Analysis Program, Moscow, ID.