



NIB Threatened and Endangered Vertebrate Species: Southwest

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

Why are threatened and endangered vertebrate species important?

Endangered species are those species that are in danger of extinction through all or much of their range; threatened species are likely to become endangered. The [Endangered Species Act \(ESA\)](#) provides protections for listed species that include protection from Federal activities, restrictions on taking or selling the species, plans to help them recover, and authority to acquire important habitat. Despite these protections, threatened and endangered vertebrate species remain at risk of extinction due to many factors such as habitat loss, competition from invasive species, pollution, climate change, and disease. The loss of these species may affect the function of some ecosystems and the many benefits they provide, including their added recreation, aesthetic and cultural value.

Each species 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, decompose matter, pollinate plant species, or control pest species. Thus, the removal of even one species from an ecosystem could potentially have cascading effects throughout the system.

For instance, the endangered Gray Wolf is a [keystone](#) predator and an integral part of the ecosystems to which it belongs. It's re-introduction into Yellowstone National Park helped bring balance to both animal and plant communities, aiding in the recovery of this degraded ecosystem.¹

In addition to their ecosystem roles, threatened and endangered vertebrate species are important to many people simply for their presence within environments. Many of these species provide recreational, cultural, or aesthetic value



Photo: Gary Kramer/USFWS

and may contribute to an area's ability to attract tourism and tourism-related jobs. People who are interested in viewing wildlife, such as avid birdwatchers, may visit areas for the purpose of viewing species such as the endangered southwestern willow flycatcher or the recovered bald eagle.

How can I use this information?

The map, NIB Modeled Threatened and Endangered Vertebrate Species: Southwest, is one of three EnviroAtlas maps that illustrate indicators of threatened and endangered vertebrate species richness for the Southwest. Additional EnviroAtlas maps show the maximum and mean threatened and endangered vertebrate species richness for each 12-digit HUC. Used together or independently, these maps can help identify areas of potentially low or high threatened and endangered vertebrate species richness to help inform decisions about resource restoration, use, and conservation. Knowing threatened and endangered species richness provides one aspect necessary to conserve biodiversity.

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 or protection from further development for recreational or aesthetic reasons. This information can help identify areas that may be vulnerable to development.

After finding out the threatened and endangered species richness values for a particular 12-digit HUC, an area can be more intensively investigated by using individual species models at a higher resolution. 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 21 threatened and endangered vertebrate species that reside, breed, or use the habitat within the 5-state Southwest study area for a significant portion of their life history. Species richness was calculated by combining predicted habitat for all GAP individual threatened and endangered vertebrate species by pixel across the southwestern United States. The number of threatened and endangered vertebrate species in each pixel was then summarized by 12-digit HUC and the mean value for each HUC calculated. The NIB was calculated by dividing the mean value by the maximum value for each HUC.

What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with the data. These data are based on models and large national geospatial databases. Calculations based on the data are estimations of the truth founded on the best available science. Modeled data can be complementary but the information is 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.

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 and accuracy information can be accessed through their respective websites.

Where can I get more information?

There are numerous resources on the importance of threatened and endangered species; a selection of these is below. For additional information on how the data were created, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

Acknowledgments

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Selected Publications

1. Beschta, R.L., and W.J. Ripple. 2009. [Large predators and trophic cascades in terrestrial ecosystems of the western United States](#). *Biological Conservation* 142(11): 2401–2414.
- Boykin, K.G., B.C. Thompson and S. Propeck-Gray. 2010. [Accuracy of gap analysis habitat models in predicting physical features for wildlife-habitat associations in the southwest U.S.](#) *Ecological Modelling* 221:2769–2775.
- Kepner, W.G., K.G. Boykin, D.F. Bradford, A.C. Neale, A.K. Leimer, and K.J. Gergely. 2011. [Biodiversity metrics fact sheet](#), EPA/600/F-11/006, U.S. Environmental Protection Agency, Washington, D.C.
- Marzluff, J.M. 2008. [Island biogeography for an urbanizing world: How extinction and colonization may determine biological diversity in human-dominated landscapes](#). *Urban Ecosystems* 8:155–177.
- Prior-Magee, J.S., K.G. Boykin, D.F. Bradford, W.G. Kepner, J.H. Lowry, D.L. Schrupp, K.A. Thomas, and B.C. Thompson, Editors. 2007. [Southwest Regional Gap Analysis Project Final Report](#). U.S. Geological Survey, Gap Analysis Program, Moscow, Idaho.
- U.S. Fish & Wildlife Service. 2005. [Why save endangered species?](#) U.S. Fish & Wildlife Service, Endangered Species Program, Arlington, Virginia.