

## Number of At-Risk Aquatic Animal Species

This EnviroAtlas national map displays the number of at-risk aquatic animal species observed within each subwatershed (12-digit HUC). It includes animal species that are ranked as [Imperiled \(G1/G2\)](#) by NatureServe or listed as threatened or endangered under the U.S. Endangered Species Act.

### Why are at-risk aquatic animals important?

At-risk aquatic animal species are in danger of extinction due to habitat loss, over-exploitation, competition from invasive species, pollution, and disease. The loss of these species would affect many benefits that we derive from aquatic ecosystems. For example, many aquatic animal species contribute to a clean and plentiful supply of water by filtering out pollution, preventing overgrowths of algae, or acting as water quality indicators. Some species also provide recreational, cultural, or aesthetic value.

Each species, regardless of type or size, 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, to serve as food source, to decompose matter, 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.

NatureServe and others have developed a global system of conservation status ranking that ranks species according to their imperilment status. G1 and G2 species are those species that have been deemed to be critically imperiled (G1) or imperiled (G2) across their entire ranges. Species with these rankings are believed to be at high risk of extinction.

The [Endangered Species Act \(ESA\)](#) provides protections for listed species; these include protections from Federal activities, restrictions on taking or selling these species, plans to help them recover, and authority to acquire important habitat. For a species to be protected under the ESA, it must be added to the List of Endangered and Threatened Wildlife or the List of Endangered and Threatened Plants. An endangered species is one that is in danger of extinction through all or much of its range. A threatened species is one that is likely to become endangered.



One example demonstrating the importance of a threatened aquatic animal species is the mussel. Mussels provide an important service by filtering toxic substances from streams. However, this makes them especially vulnerable to pollution. As a result, many mussel species are threatened or endangered. Additionally, species such as the endangered Florida Manatee provide opportunities for wildlife watching and tourism.

### How can I use this information?

The map, Number of Aquatic Animal Species, provides information about the number of observed aquatic animal species that are at risk of extinction. These data are summarized by 12-digit HUC. Users can identify watersheds where many at-risk species live, or find out how many at-risk animal species have been observed in their own watershed. This information could inform decisions about where to protect habitat.

This layer can be used in conjunction with other EnviroAtlas layers. For example, it could be compared with maps showing land cover, stream length, impaired waters, dams, or lake and stream buffers to analyze the relationship between habitat and at-risk species and to determine potential threats. By comparing this map to the layers on potentially restorable wetlands, opportunities to restore aquatic habitat can be identified.

## How were the data for this map created?

This map was created by NatureServe based on records of species occurrences derived from the State Heritage programs. NatureServe maintains records of all G1 and G2 plants and animals as well as those that are on the lists of Endangered and Threatened Wildlife and Plants.

To create this map, occurrences of G1/G2 and ESA species were selected and mapped. These were joined with a map of 12-digit HUCs to create a list of each species in each watershed. Species were flagged as aquatic, wetland, or terrestrial, though these three categories are not mutually exclusive given that species can spend only parts of their lives in these habitats. The total number of aquatic animal species was found for each 12-digit HUC. For detailed information on the processes through which this data was generated, see the metadata.

## 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.

Even if no at-risk species appear in a 12-digit HUC, this does not necessarily mean they are not present; it could mean that no one has looked for them. Many areas have not been thoroughly surveyed for at-risk species, and new species are still being discovered. NatureServe has more data on some species than others; better local data may be

available. Less data is available on invertebrates, non-vascular plants such as lichens and mosses, and marine species. This dataset does not currently include data for Delaware, Massachusetts, or Pennsylvania. Data on plants, but not animals, is included for Washington State.

For more technical details about the limitations of these data, refer to the metadata. Accuracy information for the source data sets can be found on their respective web sites.

## How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. Current state heritage data and contact information are available at the [NatureServe Network](#) website.

## Where can I get more information?

There are numerous resources on at-risk species; a selection of these resources is below. Information about NatureServe and additional data sets can be found at their [website](#). Information about State Heritage data can be accessed through the individual State Heritage programs. Information about the Endangered Species Act can be found at the U.S. Fish and Wildlife Service's [website](#). To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

## Acknowledgments

The data for this map were generated by NatureServe. This fact sheet was created by Megan Culler, EPA Student Services Contractor, and Anne Neale, US EPA.

## Selected Publications

Dobson, A.P., J.P. Rodriguez, W.M. Roberts, and D.S. Wilcove. 1997. Geographic distribution of endangered species in the United States. *Science* 275:550–553.

Fisher, B., R.B. Bradbury, J.E. Andrews, M. Ausden, et al. 2011. Impacts of species-led conservation on ecosystem services of wetlands: Understanding co-benefits and tradeoffs. *Biodiversity & Conservation* 20: 2461–2481.

Helfrich, L.A., Neves, R.J. and J. Parkhurst. 2009. [Sustaining America's Aquatic Biodiversity: What Is Aquatic Biodiversity? Why Is it Important?](#) Virginia Cooperative Extension, publication 420-520.

Qiu, D., Z. Wu, B. Liu, J. Deng, G. Fu, and F. He. 2001. The restoration of aquatic macrophytes for improving water quality in a hypertrophic shallow lake in Hubei Province, China. *Ecological Engineering* 18:147–156.

U.S. Fish and Wildlife Service. 2011. [Listing a Species as Threatened or Endangered: Section 4 of the Endangered Species Act](#). U.S. Fish and Wildlife Service, Arlington, Virginia, USA.

U.S. Fish and Wildlife Service. 2005. [Why Save Endangered Species?](#) U.S. Fish and Wildlife Service, Endangered Species Program, Arlington, Virginia, USA.

Wenger, S.J., M.C. Freeman, L.A. Fowler, B.J. Freeman, and J.T. Peterson. 2010. Conservation planning for imperiled aquatic species in an urbanizing environment. *Landscape and Urban Planning* 97:11–21.

Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *BioScience* 48:607–615.