NIB Furbearer Species Richness: Southeast

This EnviroAtlas national map displays the Normalized Index of Biodiversity (NIB) for furbearer species richness based on potential habitat within each 12-digit hydrologic unit (HUC) in 9 southeastern states. These data are based on habitat models rather than wildlife counts. Potential habitat may be specific to wintering, breeding, or year-round activities depending on the species.


Photo: Mink, C. Homler

Why are furbearer species important?

The term furbearer refers to animals that have been traditionally trapped or hunted for their fur. Furbearer species in the Southeast are a diverse group of mammals that include beaver, fox, raccoon, coyote, skunk, mink, and weasel. The furbearer designation varies by state depending on species populations and management.

Furbearer species richness estimates the number of furbearing species that may inhabit an area based on potential habitat. Species richness is frequently used as a surrogate for measuring biodiversity and as a measure of the relative conservation value of a particular area. Many scientists believe that biodiversity, because it represents all forms of life on earth, provides or supports the core benefits that humans derive from their environment. Many organizations consider managing areas for biodiversity as a means to achieve an acceptable balance among competing demands for various ecosystem services.[1]

Though some furbearer species such as skunks, raccoons, beavers, and coyotes can be perceived as pests or threats, each species plays an important role within its ecosystem. Herbivorous species disperse plant seeds, which can influence the distribution and diversity of plant species. Skunks help control insect populations, and coyotes, foxes, mink, and weasels are important predators. The removal of even one species from an ecosystem can create a trophic cascade that can affect the entire food chain.

Beavers are furbearers that are influential within their ecosystems as ecosystem engineers. They are able to change the landscape and hydrology of an area through felling trees and creating dams and ponds. Beaver have been reintroduced to streams in the Southeast to restore natural functions to degraded stream ecosystems. Beaver ponds retain sediment and floodwater, raise local ground water tables, and create transitional wetland zones. Beaver can be viewed as agents of stream restoration or as a public nuisance if their work impinges on human development.[2]

Fur trapping has a long tradition in the U.S. and it is considered by wildlife managers to be a necessary tool for managing furbearer populations. Data from 1998 show that the top ten furbearing species harvested in the U.S. had a total value of $60 million.[3] In addition to the market value of fur, trapping contributes to the economy through the sale of permits and equipment—revenue that is re-invested into wildlife management and conservation programs.

How can I use this information?

The map, NIB Furbearer Species Richness: Southeast, is one of three EnviroAtlas maps that illustrate indicators of furbearer species richness for the Southeast. Other EnviroAtlas maps show the maximum and mean furbearer species richness for each 12-digit HUC.[4] Used together or independently, these maps help identify areas of potentially low or high furbearer species richness to help inform decisions about resource restoration, use, and conservation.

These maps can be used in conjunction with other maps in EnviroAtlas such as protected areas (PADUS), connectivity, or GAP ecological systems to help identify areas with high ecological or recreational value for inclusion in conservation, recreation, or restoration planning. After learning the furbearer species richness values for a particular 12-digit HUC, users can investigate an area more intensively by using higher resolution individual species models available through the Southeast Regional Gap Analysis Project (SEGAP).

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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.

Southeast GAP modeled habitat for 17 furbearer species that reside, breed, or use the habitat within 9 southeastern states for a significant portion of their life history. Furbearer species richness was calculated by combining predicted habitat for all GAP individual furbearer species by pixel across the 9 states. The number of furbearer species in each pixel was summarized by 12-digit HUC and the mean value calculated for each HUC. The NIB was calculated by dividing the mean species richness 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, based on models and large national geospatial databases, are estimations of reality that may overestimate actual furbearer species presence. Modeled data are intended to complement rather than replace monitoring data. Habitat models do not predict the actual occurrence of species, but rather their potential 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.

Other essential species information in addition to species richness includes the types of species and their functional groups, whether they are rare or common, native or non-native, tolerant or intolerant of disturbance. It is also important to consider that species numbers (at a landscape scale) tend to increase with moderate disturbance, meaning that moderately human-altered or disturbed habitats have higher numbers of species than either minimally disturbed or highly disturbed sites.[5]

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. Individual species data may be obtained from the SEGAP geo-data server.

Where can I get more information?

A selection of resources related to furbearers and biodiversity is listed below. Information on the models and data used in the USGS GAP and SEGAP projects is available on their respective websites. 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

The data for Furbearer Species Richness were created through a collaborative effort between the USGS GAP and EPA. Kenneth Boykin and graduate students from New Mexico State University generated the data. The data used to derive southeastern furbearer species richness came from SEGAP and the Biodiversity and Spatial Information Center (BaSIC) at North Carolina State University. The fact sheet was written by Kenneth Boykin, New Mexico State University, Anne Neale and William Kepner, EPA, Jessica Jahre, EPA Student Services Contractor, and Sandra Bryce, Innovate!, Inc.

Selected Publications

1. Boykin, K.G., W.G. Kepner, D.F. Bradford, R.K. Guy, D.A. Kopp, A. Leimer, E. Samson, F. East, A. Neale, and K. Gergely. 2013. A national approach for mapping and quantifying habitat-based biodiversity metrics across multiple spatial scales. *Ecological Indicators* 33:139–147.

2. Lewis, M.E., and T. Tricot. 2003. The return of beavers to southern Piedmont streams: Stream restoration or disruption? *The North Carolina Geographer* 11:1–9.

3. Southwick, R., A. Woolley, D. Leonard, and S. Rushton. 2005. Potential costs of losing hunting and trapping as wildlife management methods. International Association of Fish and Wildlife Agencies, Washington, D.C. 52 p.

4. 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.

5. 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.

NIB Furbearer Species Richness: Southwest

This EnviroAtlas national map displays the Normalized Index of Biodiversity (NIB), an index value for furbearer species richness based on potential habitat within each 12-digit hydrologic unit (HUC) in the southwestern United States (Arizona, Colorado, Nevada, New Mexico, and Utah). Furbearer refers to animals that have been traditionally trapped or hunted for their fur. 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.

Photo: Gary M. Stolz/USFWS

Why are furbearer species important?

Furbearer species are a diverse group of mammals that include beaver, foxes, raccoons, coyotes, skunks, and mink. Similar to other game species, the designation of "furbearer" varies by state depending on population and management.

Furbearer species richness estimates how many different furbearing 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.

Though some furbearer species such as skunks, raccoons, beavers, and coyotes can be perceived as pests or threats, 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. Skunks help control insect and snapping turtle populations, while coyotes and foxes are important predators.

Beavers are unique furbearers that are influential within their ecosystems. Considered to be ecosystem engineers, beavers have a remarkable capacity to change the landscape through felling trees, creating dams, and shifting the hydrology of an area. These natural services help create habitat, restore wetlands, and protect natural ecosystem functions.

When they are overabundant, some furbearers can cause damage to ecosystems and may be considered nuisances and threats to humans. Trapping is an important aspect of managing these populations. Fur is a valuable renewable resource, and fur trapping has been a long-standing tradition in the U.S. In addition to the marketability of fur, trapping drives the economy through the sale of permits and equipment. Revenue from permit sales and hunting equipment is invested into wildlife management and conservation programs that enhance ecosystem integrity and support biodiversity.

How can I use this information?

The map, NIB Furbearer Game Species Richness: Southwest, is one of three EnviroAtlas maps that illustrate indicators of furbearer species richness for the Southwest. Additional EnviroAtlas maps show the maximum and mean furbearer species richness for each 12-digit HUC. Used together or independently, these maps can help identify areas of potentially low or high furbearer species richness to help inform decisions about resource restoration, use, and conservation. Knowing the furbearer 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 and protection from further development 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 furbearer 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 furbearer species that reside, breed, or use the habitat within the 5-state Southwest study area for a significant portion of their life history. Furbearer species richness was calculated by combining predicted habitat for all GAP individual furbearer game species by pixel across the Southwestern United States. The number of furbearer species in each pixel was 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.

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 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.

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 about the importance of wildlife management and on biodiversity in general; a selection of these resources is listed below. Information on what is considered furbearer, and applicable management, rules, and regulations, can be found on each state's fish and wildlife department website. 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

EnviroAtlas is a collaborative effort led by EPA. The data for Furbearer Species Richness were created through a collaborative effort between the USGS GAP and EPA. The data were generated by Kenneth Boykin and graduate students from New Mexico State University. The data used to derive Furbearer Species Richness came from SWReGAP. The fact sheet was written by Kenneth Boykin, New Mexico State University, Anne Neale and William Kepner, EPA, and Jessica Jahre, EPA Student Services Contractor.

Selected Publications

Boykin, K.G., W.G. Kepner, D.F. Bradford, R.K. Guy, D.A. Kopp, A. Leimer, E. Samson, F. East, A. Neale, and K. Gergely. 2013. A national approach for mapping and quantifying habitat-based biodiversity metrics across multiple spatial scales. *Ecological Indicators* 33:139–147.

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.

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. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, and U.S. Census Bureau. 2013. 2011 National survey of fishing, hunting, and wildlife-associated recreation, FHW/11-NAT (RV), Washington, D.C.