Small Game Species Richness

These EnviroAtlas national maps display the number of small game species with potential habitat within each 12-digit hydrologic unit (HUC) in the conterminous United States. These data are based on habitat models rather than wildlife counts.

Why are small game species important?

The term small game refers to smaller upland animals that are hunted. Their designation as a game species is determined by state fish and wildlife agencies. Small game species may include grouse, quail, pheasant, doves, squirrels, and rabbits. Small game species richness estimates the number of small game species that may inhabit an area based on potential habitat. Species richness is one measure of biodiversity that can represent 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 to sustain human society, economy, health, and well-being. Managing for biodiversity is one way to balance competing demands for various ecosystem services.[1]

Each species plays an important role within its ecosystem. Within a food chain, small game animals are primary consumers that serve as an important food source for other wildlife (secondary consumers). Small game species disperse plant seeds, which can influence the distribution of (both native and non-native) plant species. Seedling recruitment in grasslands occurs in areas of disturbance where openings are created in the turf. Grazing rabbits affect meadow grass and forb diversity through their varying grazing intensity and the numbers and species composition of seeds dispersed in disturbance patches.[2] Squirrels influence forest species diversity by broadcasting or burying seeds and nuts at feeding stations and buried caches.

Population declines have occurred in some historically abundant small game species because of habitat change and loss. Bobwhite quail depend on patches of early-successional vegetation, and their numbers have declined partly as a result of industrial farming and fire suppression. A similar decline in squirrel populations has occurred from widespread forest conversion to tree plantations and commercial development.

In addition to their roles in ecosystems, small game species are also an important food source. They are appreciated for the recreational opportunities they provide. Hunting for small


Photo: Eastern Fox Squirrel, Wikimedia Commons

game has a long tradition in the U.S. In 2011, hunters nationwide spent $2.6 billion on hunting small game species.[3] Revenue from federal excise taxes and state hunting licenses and permits contributes to the conservation of lands that support small game species. In 2022, the U.S. Fish and Wildlife Service appropriated $1,115,157,974 for U.S. states and territories to use for wildlife conservation and restoration purposes.[4] This revenue comes from a federal excise tax placed on hunting equipment, and it is used to support conservation efforts, land acquisition, and wildlife restoration projects.

How can I use this information?

Three EnviroAtlas maps, Mean, Maximum, and Normalized Index of Biodiversity (NIB), illustrate Small Game Species Richness within each 12-digit HUC across the conterminous United States. 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. Mean richness is a commonly used and understood value for comparison. NIB provides an index to compare a metric with other metrics across multiple project scales simultaneously. Maximum richness identifies areas that are species rich but may not occupy large areas (e.g. linear riparian areas).

These maps can be used in conjunction with other EnviroAtlas maps such as ecoregions, the U.S. Geological Survey (USGS) protected areas database (PAD-US), or the USGS Gap Analysis Project (GAP) ecological systems to identify areas with high ecological or recreational value for conservation,

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recreation, or restoration planning. Connectivity planning is also important for small game species because their life cycles often require traveling among different habitats. After learning the small game species richness values for a particular 12-digit HUC (click on a HUC area to see the popup), users can investigate an area more intensively by increasing the transparency to view aerial imagery beneath. Individual species models are also available from the GAP project.

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 Project (GAP). The GAP project maps the distribution of natural vegetation communities and potential habitat for individual terrestrial vertebrate species. These models use environmental variables (e.g., land cover, elevation, and distance to water) to predict habitat for each species. GAP modeled habitat for small game species that reside, breed, or use the habitat within the conterminous United States for a significant portion of their life history. The list is derived from 120 GAP modeled species identified as small game species by state wildlife agencies combined to calculate richness by pixel. The mean and maximum numbers of small game species in each 30-meter pixel were calculated for each 12-digit HUC. The mean species richness value by HUC was divided by the maximum mean value within all HUCs to calculate the NIB.

What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with these data. These data, based on models and large national geospatial databases, are estimations of reality that may overestimate actual small game 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.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. Individual 30-meter pixel data may be downloaded from the New Mexico State University Center for Applied Spatial Ecology.

Where can I get more information?

A selection of resources related to small game species and biodiversity is listed below. Information on small game species management can be found on each state's fish and wildlife department website. Information on the models and data used in the USGS Core Science Analytics, Synthesis & Library's GAP project is available on their website. For additional information on how the data were created, access the metadata for the data layer from the layer list drop down menu. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

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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. Edwards, G.R., and M.J. Crawley. 1999. Effects of disturbance and rabbit grazing on seedling recruitment of six mesic grassland species. *Seed Science Research* 9:145–156.

3. U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2013. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, FHW/11-NAT (RV), Washington, D.C.

4. U.S. Fish and Wildlife Service. 2022. Certificate of the Apportionment of the Appropriation of the Pittman-Robertson Wildlife Restoration. FWS/ FWS/AWSR:076355. Accessed September 2022.

Kepner, W.G., K.G. Boykin, D.F. Bradford, A.C. Neale, A.K. Leimer, and K.J. Gergely. 2013. Biodiversity metrics fact sheet. EPA/600/F-11/006, U.S. Environmental Protection Agency, Washington, D.C. (Fact sheet for the original regional habitat models for southeastern and southwestern U.S.)