



Percent Emergent Herbaceous Wetlands

This EnviroAtlas national map estimates the percentage of emergent herbaceous wetlands within each 12-digit hydrologic unit (HUC). The map layer uses the EnviroAtlas hybrid 2011 Cropland Data Layer (CDL) - 2011 National Land Cover Dataset (NLCD) to define emergent herbaceous wetlands.

Why are emergent herbaceous wetlands important?

Emergent herbaceous wetlands are dominated (>75%) by herbaceous plants that are hydrophytic or water-adapted. The vegetation is rooted below the water's surface and either stands erect above the water (e.g., cattails) or grows at the surface (e.g., lily pads). These wetlands may occur as isolated systems or associated with other waterbodies (e.g., rivers, streams, lakes, and intertidal channels and estuaries). Emergent herbaceous wetlands are represented in various ecosystems by a range of wetland types, including salt and brackish tidal wetlands, marshes, wet meadows, prairie potholes, vernal pools, and desert alkaline playas.

EnviroAtlas provides information about the benefits provided by wetland ecosystems, particularly for clean and plentiful water, natural hazard mitigation, and recreational and cultural values. Wetlands provide aesthetic value, and they also offer tangible [ecosystem services](#) such as soil loss reduction, nutrient and toxics filtration, [groundwater recharge](#), flood water storage, [carbon sequestration](#), storm surge mitigation, wildlife habitat, biological diversity, and recreational opportunities.¹ By slowing the passage of water, wetlands can prevent sediment, nutrients, harmful bacteria, pesticides, and metals from entering waterways and degrading water quality.¹ Recent wetland research efforts focus on quantifying the benefits of wetlands and wetland restoration. For example, a model developed to simulate wetland water storage in a sub-basin of the Red River in Minnesota (a system that floods frequently) showed that restoring 25% of drained wetlands would increase water storage by 27–32% basin-wide to help alleviate flooding.²

Wetlands also have the ability to store atmospheric carbon ([carbon sequestration](#)) in standing vegetation, litter, and organic soil and sediments. Restored wetlands, by banking additional stored carbon, can make a significant contribution to [climate change](#) mitigation. Cultivated wetlands lose their stored soil organic carbon to the atmosphere, but soil organic



Photo: Great Blue Heron, NOAA

carbon is rapidly restored when wetland function is restored.³ A study in the Prairie Pothole region estimated that the 12.2 million acres of potentially restorable herbaceous wetlands in that area have the potential to sequester 122.6 million tons of soil organic carbon over a 10-year period.³

Coastal wetlands provide a valuable service in reducing the destructive power of wave damage from storm surges, tropical storms, and hurricanes. A recent study of U.S. hurricanes over the last 35 years estimated that coastal wetlands provide over \$23 billion per year in storm protection services.⁴ In Louisiana, for example, the paper noted that the state had lost an estimated 480,000 hectares (1,186,106 acres) of coastal wetlands, a cumulative loss that contributed to exposing New Orleans and its constructed levees to the Katrina storm surge in 2005.⁴

Wetlands support [biodiversity](#) by providing habitat for fish, amphibians, reptiles, birds, and semi-aquatic mammals. Coastal marshes, estuaries, and the wetland backwaters of streams and rivers serve as nurseries for young fish. Migratory waterfowl use coastal and inland wetlands for resting, feeding, breeding, and nesting. Wildlife in wetland areas attracts bird-watchers, photographers, and hunters, providing aesthetic and recreational value.

How can I use this information?

This map is one of a series of EnviroAtlas data layers that depict national land cover. Continuous nationwide land cover data allows the assessment of national and regional environmental issues. The map estimates the percent land

area of 12-digit HUCs covered by emergent herbaceous wetlands. Knowing the distribution of emergent herbaceous wetlands is important for locating and prioritizing candidate areas for wetland conservation or restoration. Multiple wetland functions may be ranked by regional needs for water quality improvement, wildlife habitat, flood protection, nutrient filtration, or groundwater recharge. Once candidate wetland areas are identified, detailed site analysis may be planned for restoring individual wetlands.

Land cover overlaid with other EnviroAtlas data can be used to evaluate areas for conservation and to estimate risks related to natural hazards. This map may be used with other metrics such as protected lands, National Wetland Inventory (NWI) wetlands, or other national EnviroAtlas data layers such as Potentially Restorable Wetlands on Agricultural Land. Areas of potential restoration may be compared with EnviroAtlas impaired waters data to assist in planning to maximize wetland filtration capabilities when implementing [Total Maximum Daily Loads](#) in streams. Wetlands restored alongside or upstream of impaired stream segments may help reduce sediment and nutrient loads to streams. Wetlands restored downstream of pollutant loads may help mitigate water quality. Herbaceous wetlands may also be associated with major stressors such as national patterns of impervious area or nutrient sources such as manure or nitrogen fertilizer application.

How were these data created?

These data were generated by using an EnviroAtlas hybrid 2011 Cropland Data Layer (CDL) - 2011 National Land Cover Dataset (NLCD) in the landscape assessment tool, Analytical Tools Interface for Landscape Assessments (ATtILA). [ATtILA](#) is an Esri ArcView extension created by EPA that calculates many commonly-used landscape metrics. NLCD class 95 Emergent Herbaceous Wetlands was used for this map. The landcover data were summarized by 12-digit HUC boundaries taken from the [NHDPlusV2](#) Watershed Boundary Dataset (WBD Snapshot). For more information on the metric, see the [ATtILA](#) User's Manual.

Selected Publications

1. Natural Resources Conservation Service. 2012. [Restoring America's wetlands: A private lands conservation success story](#). Natural Resources Conservation Service, Washington, DC. 16 p.
 2. Gleason, R.A., B.A. Tangen, M.K. Laubhan, K.E. Kermes, and N.H. Euliss, Jr. 2007. [Estimating water storage capacity of existing and potentially restorable wetland depressions in a subbasin of the Red River of the North](#). USGS Open File Report 2007-1159, U.S. Geological Survey, Reston, Virginia. 36 p.
 3. Gleason, R.A., N.H. Euliss, Jr., R.L. McDougal, K.E. Kermes, E.N. Steadman, and J.A. Harju. 2005. [Potential of restored prairie wetlands in the glaciated North American prairie to sequester atmospheric carbon](#). Paper 92, U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, North Dakota.
 4. Costanza, R., O. Perez-Maqueo, M.L. Martinez, P. Sutton, S.J. Anderson, and K. Mulder. 2008. [The value of coastal wetlands for hurricane protection](#). *Ambio* 37(4):241-248.
- Dahl, T.E. 2011. [Status and trends of wetlands in the conterminous United States 2004 to 2009](#). U.S. Fish and Wildlife Service, Washington, D.C. 108 p. (slow to open)

What are the limitations of these data?

Though EnviroAtlas uses the best data available, there are limitations associated with the data. The landcover classes found in NLCD are created through the classification of 30 meter resolution satellite imagery. Human classification of land cover types that have a similar spectral signature can result in classification errors. As a result, NLCD is a best estimate of actual land cover. Each version of NLCD is released several years after the date of the satellite imagery used in its creation, meaning that the land cover patterns are several years out of date when released. Accuracy information for the NLCD can be found on its website.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. The [NLCD](#) and [WBD](#) data are accessible through their respective websites. NLCD data are updated every 5 years to enable change detection research; a land cover change data layer is also available that contains only the pixels identified as changed during the ten year interval from 2001 to 2011.

Where can I get more information?

A selection of references relating to wetlands and the ecosystem services they provide is listed 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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