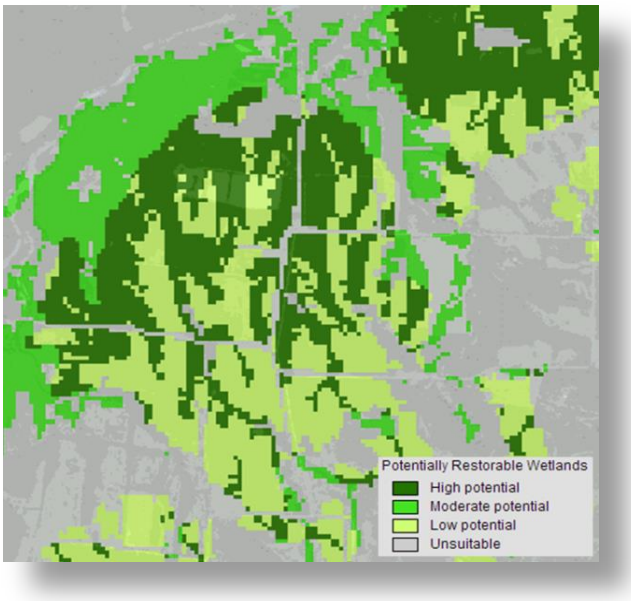
Potentially Restorable Wetlands

This EnviroAtlas supplemental map depicts potentially restorable wetlands, defined as agricultural areas that naturally accumulate water and contain some proportion of poorly-drained soils. The EnviroAtlas Team produced this dataset by combining three data layers—land cover, digital elevation, and soil drainage information.



Why are potentially restorable wetlands important?

EnviroAtlas provides information about the benefits provided by wetland ecosystems for clean and plentiful water. Although wetlands contain intrinsic and aesthetic values, they also offer more tangible ecosystem services such as wildlife habitat, biological diversity, soil loss reduction, groundwater recharge, nutrient and toxin filtration, carbon sequestration, and flood water storage.[1]

Major regional wetland losses have occurred across the conterminous U.S. over the last 200+ years with expanding coastal development, agricultural land conversion, and urbanization. For example, California and the five top agricultural Midwestern states have lost over 80% of their historical wetland area.[2] Wetland mitigation programs have not been able to significantly offset or reverse continued wetland losses.[2, 3] Recently, working groups have formed to regain lost wetland area through a more comprehensive effort; they promote and coordinate research to quantify 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 of the North (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.[4]

Wetlands also have the ability to store atmospheric carbon (carbon sequestration). Potentially restorable 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 carbon is rapidly restored when wetland function is restored.[5] A study in the Prairie Pothole region estimated that the 12.2 million acres of potentially restorable wetlands in that area have the potential to sequester 122.6 million tons of soil organic carbon over a 10-year period.[5] Studies such as these reveal the range of what is possible; it is the job of local land managers to locate the areas with the greatest potential to restore wetland benefits in a cost-effective manner.

How can I use this information?

This map identifies agricultural lands in the US with wetland restoration potential. This dataset may be overlaid with other data such as National Wetland Inventory (NWI) or Protected Areas (PADUS) data. Information on wetland distribution and protection is useful to compare with areas of high wetland conversions in planning for optimal areas for restoration.

The potentially restorable wetland layer overlaid with EPA impaired waters data may 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.

Multiple wetland functions may be ranked in importance depending on local needs for water quality improvement, wildlife habitat, flood protection, nutrient filtration, or groundwater recharge. Once high-ranking areas of potentially restorable wetlands are identified, detailed site analysis may be planned for restoring individual wetlands. Another metric developed from this data, Percent of 12-

CONTINUED ON BACK ▶

digit Hydrologic Units (HUCs) with Potentially Restorable Wetlands, is located under National Ecosystem Services in the Interactive Map Table of Contents.

How was the data for this map created?

To map these potentially restorable wetlands, 2006 National Land Cover Data (NLCD) classes *pasture/hay* and *cultivated crops* were reclassified as potentially suitable and all other landcover classes as unsuitable. Poorly- and very poorly drained soils were identified using Natural Resources Conservation Service (NRCS) Soil Survey information mainly from the higher resolution Soil Survey Geographic (SSURGO) Database. The two poorly drained soil classes, expressed as percentage of a polygon in the soil survey, were combined to create a raster layer. A wetness index or Composite Topographic Index (CTI) was developed to identify areas wet enough to create wetlands. The wetness index grid, calculated from National Elevation Data (NED), relates upstream contributing area and slope to overland flow. Results from previous studies suggested that CTI values ≥ 550 captured the majority of wetlands.

The three layers, when combined, resulted in four classes: unsuitable, low, moderate, and high wetland restoration potential. Areas with high potential for restorable wetlands have suitable landcover (crop/pasture), CTI values ≥ 550, and 80–101% poorly- or very poorly drained soils (PVP). Areas with moderate potential have suitable landcover, CTI values ≥ 550, and 1–79% PVP. Areas with low potential meet the landcover and 80–101% PVP criteria, but do not have CTI values ≥ 550 to corroborate wetness. All other areas were classed as unsuitable.

What are the limitations of these data?

EnviroAtlas uses the best data available, but there are still limitations associated with these data: 1) the landcover classes found in NLCD are created through the classification of satellite imagery. Human classification of different landcover types that have a similar spectral signature can result in classification errors; 2) the poorly-drained soils data were transformed from a proportion of a polygon to a raster data structure, which affected their location; and 3) CTI tended to overestimate wet areas, in part because it does not consider precipitation and evaporation water balances. However, the final map, derived through data transformation and spatial analysis, is not meant to be a recreation of reality but a model of potentially restorable wetlands in the U.S. that can serve as a useful planning and screening tool.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded.

Where can I get more information?

A selection of references relating to potentially restorable wetlands is listed below. See the metadata for a summary of the processes that generated these data. Information about the base data layers can be found at the websites linked throughout the text. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

Acknowledgments

EnviroAtlas is a collaborative effort led by EPA. Data for potentially restorable wetlands were generated by Elena Horvath, Jay Christensen, Megan Mehaffey, and Anne Neale, EPA. The fact sheet was created by Sandra Bryce, Innovate!, Inc.

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. Zedler, J. B. 2004. Compensating for wetland losses in the United States. *Ibis* 146: 92–100.

3. Turner, R.E., A.M. Redmond, and J.B. Zedler. 2001. Count it by acre or function—mitigation adds up to net loss of wetlands. *National Wetlands Newsletter* 23(6):1–16.

4. 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.

5. 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.