Potential Wetland Areas

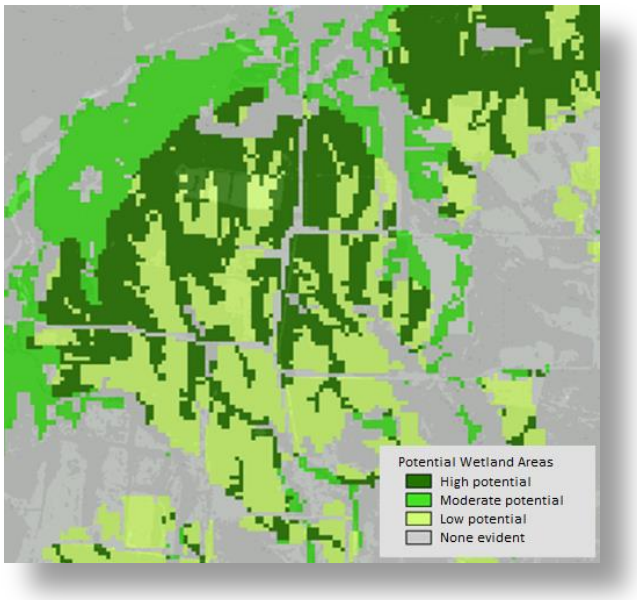
This EnviroAtlas map depicts potential wetland areas (PWA) in the U.S. which are defined, in this case, as areas that naturally accumulate water and contain some proportion of poorly- or very poorly-drained soils. This dataset was produced by combining digital elevation and soil drainage information.

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 flood mitigation, soil loss reduction, carbon sequestration, toxics and nutrient filtration, groundwater recharge, wildlife habitat, and biological diversity.[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] Recent efforts focus on comprehensive restoration efforts, promoting and coordinating 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 prioritize needs and locate areas with the greatest potential to restore wetland benefits in a cost-effective manner.



How can I use this information?

This map identifies potential wetland areas in the U.S. This dataset may be overlaid with other data such as the National Land Cover Database (NLCD), 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 PWA layer overlaid with EPA impaired waters data may assist in planning to maximize wetland filtration and flood mitigation 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, as well as flow volume, to streams. Multiple wetland functions may be ranked depending on local priorities for flood protection, nutrient filtration, groundwater recharge, or wildlife habitat. Once potential areas are identified, detailed site analyses may be planned for restoring individual wetlands.

Another raster map, Potentially Restorable Wetlands on Agricultural Land, incorporates land cover in the analysis and is located under Supplemental Maps in the interactive map table of contents. A companion map, Percent Potentially Restorable Wetlands on Agricultural Land

summarized by 12-digit Hydrologic Unit (HUC), is located under National Ecosystem Services.

How was the data for this map created?

To map potential wetland area, poorly- and very poorly-drained soils (PVP) were identified using Natural Resources Conservation Service (NRCS) Soil Survey information mainly from the higher resolution Soil Survey Geographic (SSURGO) Database. The PVP soil classes, expressed as percentage of a polygon in the soil survey, were combined to create a raster layer. The greater the presence of poorly draining soils, the greater the wetland potential. A wetness index or Composite Topographic Index (CTI) was developed to identify areas with the potential to be wet enough to create wetlands. The wetness index grid, calculated from National Elevation Data (NED), relates upstream contributing area and slope to overland flow and potential accumulation. Results from previous studies suggested that CTI values ≥ 550 captured the majority of wetlands.

The two layers were combined and the results were divided into four classes: high, moderate, low, and no evident wetland potential. Areas with high wetland potential have CTI values ≥ 550 and 80–100% PVP. Areas with moderate potential have CTI values ≥ 550, and 1–79% PVP. Areas with low potential have 80–100% PVP, 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 limitations associated with these data: 1) the PVP soils data were converted from a percentage estimate of a polygon to a raster or grid data structure, which has the potential to misrepresent the presence at the individual cell level; and 2) the 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 potential wetland areas 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. For additional information on the data creation process, 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 these data, please contact the EnviroAtlas Team.

Acknowledgments

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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.

Zedler, J.B., and S. Kercher. 2005. Wetland Resources: Status, Trends, Ecosystem Services, and Restorability. *Annual Review of Environment and Resources* 30: 39–74.