

ENVIROATLAS USE CASE

Evaluating sites for an agricultural wetlands mitigation bank in Illinois

DECEMBER 2017



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Forest Trends' Ecosystem Marketplace

This use case was developed in partnership with Magnolia Land Partners LLC, the USDA Office of Environmental Markets, and the United States Environmental Protection Agency (EPA) EnviroAtlas team. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of Magnolia Land Partners or the USDA or USEPA.



Conservation compliance and agricultural wetland mitigation banking

- 1. Introduction
- 2. Research question
- 3. Identify relevant datasets and develop research approach
- 4. Analysis: Agricultural lands with high wetlands restoration potential
- 5. Analysis: Potential demand for agricultural wetland mitigation credits
- 6. Analysis: Ecosystem services co-benefits from wetlands restoration
- 7. Findings: Combine indices

Background

- **Wetland ecosystems are extremely valuable to society:** they can absorb floodwaters, recharge groundwater, stabilize shorelines, filter out pollutants, provide habitat to numerous species, and act as carbon sinks. But by 1984, more than half of the nation’s wetlands had been drained or filled in to make way for agriculture or development. In 1989, President George H.W. Bush established a national policy of “**no net loss**” of **wetlands**. Today, a range of policies, regulations, and incentives exist to conserve wetlands in the United States.
- One such incentive is the “Swampbuster” provision. Farmers who receive federal crop insurance premium subsidies must meet certain **conservation compliance** requirements. This includes a commitment not to drain, dredge, or fill wetlands on their property. If negative impacts to wetlands are unavoidable, farmers must mitigate for those impacts by restoring wetlands elsewhere on their property or buying a wetland mitigation credit from a third party.
- In 2016, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) provided more than \$7 million in funding to support the development of **agricultural wetland mitigation banks** in ten states in the Midwest and Northern Great Plains. These banks specifically serve farmers and ranches seeking mitigation credits in order to meet conservation compliance requirements.

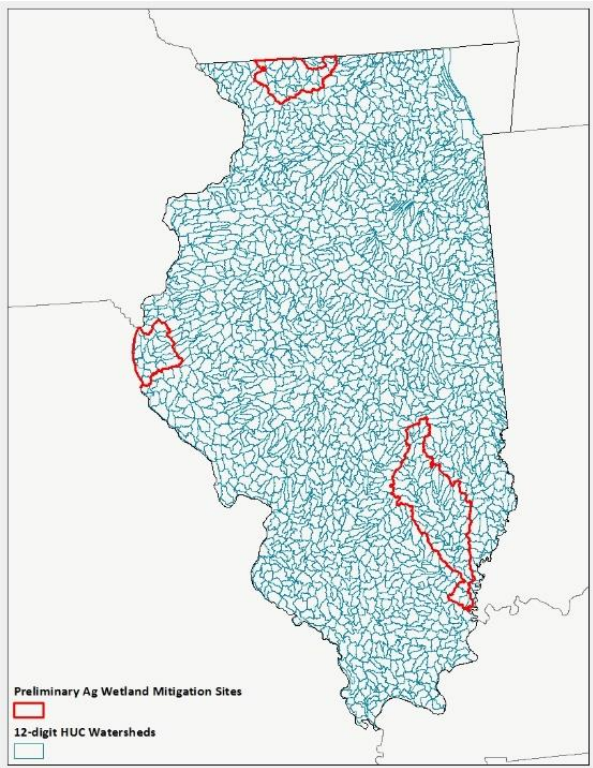
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About this use case: Evaluating potential locations for an agricultural wetlands mitigation bank in Illinois

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Introduction

- This use case explores a method for evaluating potential sites for agricultural wetland mitigation banking under the NRCS wetland mitigation banking program.
- It uses data on ecosystem services and ecosystem services markets available on the EnviroAtlas federal decision support tool and data from the NRCS and the National Wetlands Inventory maintained by the U.S. Fish and Wildlife Service.
- Magnolia Land Partners, LLC is an environmental offsets developer active in wetland/stream and conservation banking. Magnolia Land Partners is working with NRCS to develop an agricultural wetlands mitigation bank in Illinois.
- The company has already identified some watersheds of interest, shown as red polygons in the map to the right, but is seeking additional information about subwatersheds within these watersheds and their compatibility with agricultural wetlands mitigation banking. Those red polygons will be the ultimate focus of this analysis, though results are shown for all 8-digit HUC watersheds in Illinois in the following maps.



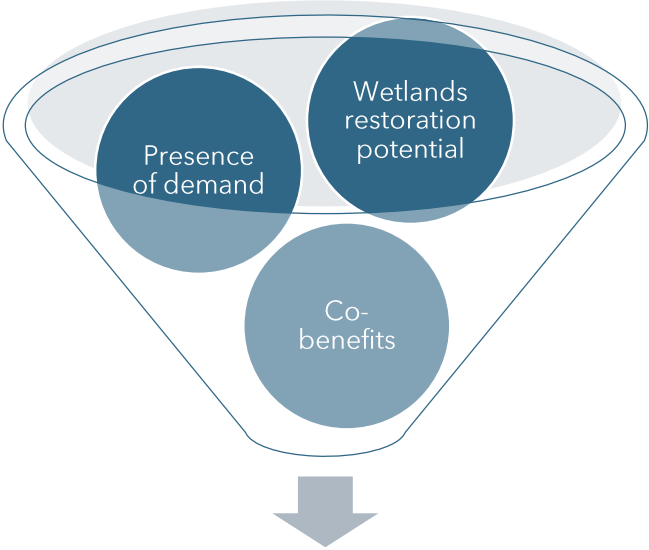
This map displays 8-digit HUC watersheds in Illinois in red that have already been identified by Magnolia Land Partners as being of interest for agricultural wetland mitigation sites. Twelve-digit HUC subwatersheds, the unit of analysis in this use case, are outlined in blue.

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The research question: Where should a new agricultural wetlands mitigation bank be located in Illinois?

Key factors identified in evaluating sites for an agricultural wetland mitigation bank

- ✓ **Restoration potential:** Where are restoration efforts most likely to result in healthy wetlands?
- ✓ **Presence of demand:** Demand is anticipated to come from farmers seeking to convert wetlands to agricultural use. One good proxy indicator is wetland determination requests by farmers exiting the Wetlands Reserve Program, since this suggests that they plan to farm wetlands areas and thus may need mitigation credits. Where in Illinois are many of these determination requests occurring, since credits must generally come from the same 8-digit HUC watershed? Are there other agricultural wetland mitigation providers in the vicinity?
- ✓ **Co-benefits:** What other ecosystem services could be protected/enhanced on the site in question?



Compatibility with agricultural wetlands mitigation banking

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Approach: Evaluate potential agricultural wetland mitigation bank locations by combining indications of restoration potential, potential demand, and ecosystem services co-benefits.

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Research approach

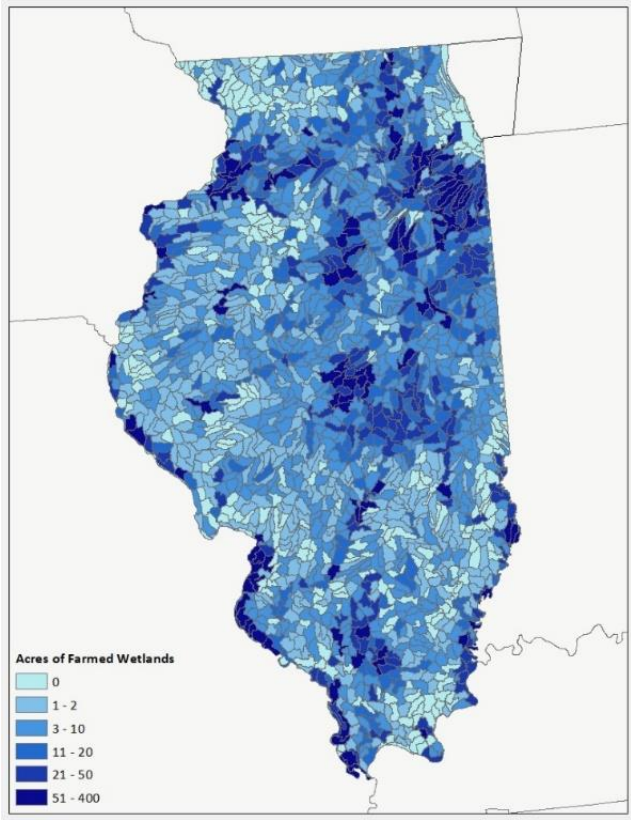
- 1. Identify indicators that suggest wetland restoration feasibility, potential unmet demand for mitigation, and ecosystem services co-benefits at the 12-digit HUC scale.
- 2. Normalize and combine indicators in a multi-factor index.

Index	Datasets	Data source
WETLAND RESTORATION POTENTIAL <i>These indicators suggest where wetland restoration activities are likely to be successful.</i>	Percent of subwatershed with potentially restorable wetlands	EnviroAtlas
	Farmed wetland areas in the subwatershed	National Wetlands Inventory
POTENTIAL DEMAND FOR AGRICULTURAL WETLAND MITIGATION BANKING <i>These indicators tell us about watersheds where demand is most likely, based on likelihood of farmers requiring mitigation and where demand for mitigation credit may already be met by credit suppliers.</i>	Average number of annual wetland determination requests in the subwatershed	NRCS
	Proximity to other ecosystem markets/projects focused on wetlands mitigation in the watershed	EnviroAtlas
POTENTIAL ECOSYSTEM SERVICES CO-BENEFITS <i>These indicators help us understand where co-benefits from wetland restoration might be optimized.</i>	Stream length impaired by nutrients in the subwatershed	EnviroAtlas
	Percent natural cover in buffer in the subwatershed	EnviroAtlas
	Total number of wetland species in the subwatershed	EnviroAtlas

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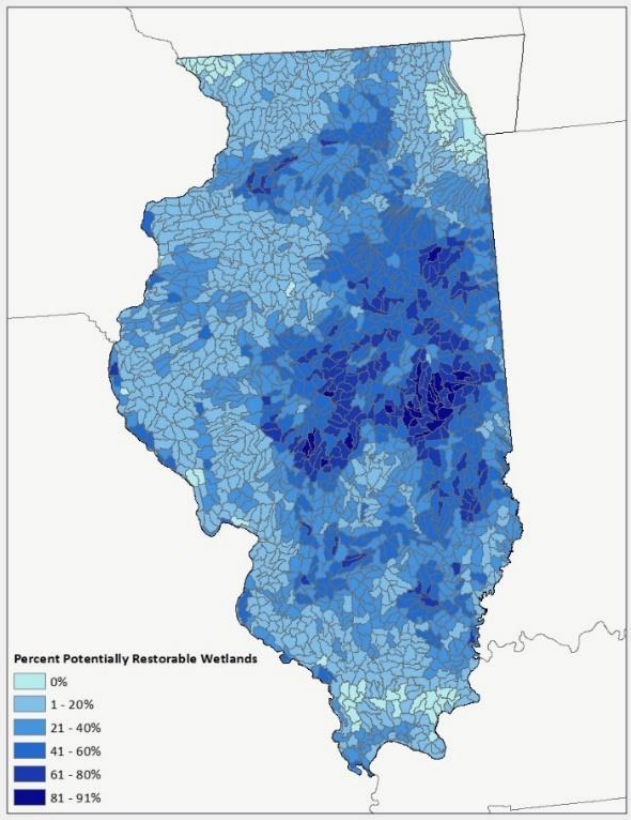
The wetland restoration potential index is created with two map layers: Acres of farmed wetlands, and percent potentially restorable wetlands. A simple scoring system is used to rate each subwatershed with a score from 0-5.

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Acres of farmed wetlands

This map displays data from the National Wetlands Inventory (NWI) on farmed wetlands as defined by Cowardin et al. (1979). Depicted are the total number of acres of farmed wetlands identified within each subwatershed (12-digit HUC) in Illinois. The U.S. Fish and Wildlife Service produced the NWI dataset using remotely sensed data to delineate the areal extent of wetlands and surface waters in the U.S.



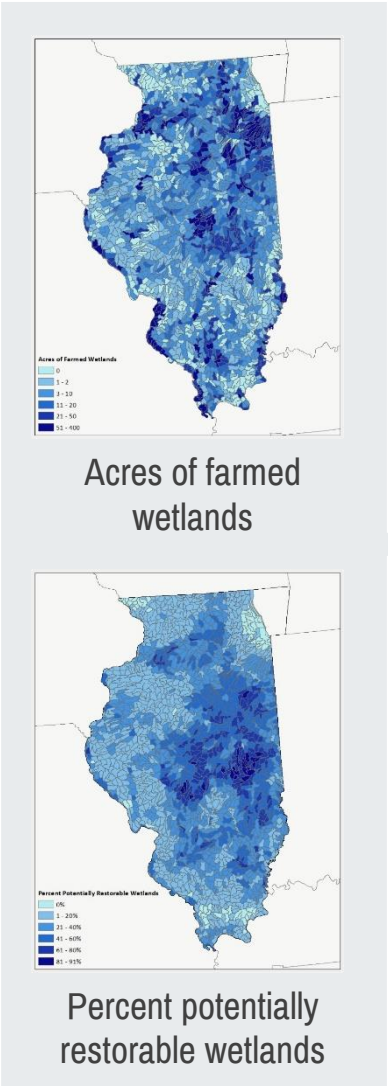
Percent potentially restorable wetlands

This EnviroAtlas national map depicts the percent potentially restorable wetlands within each subwatershed (12-digit HUC) in the U.S. Potentially restorable wetlands are 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.

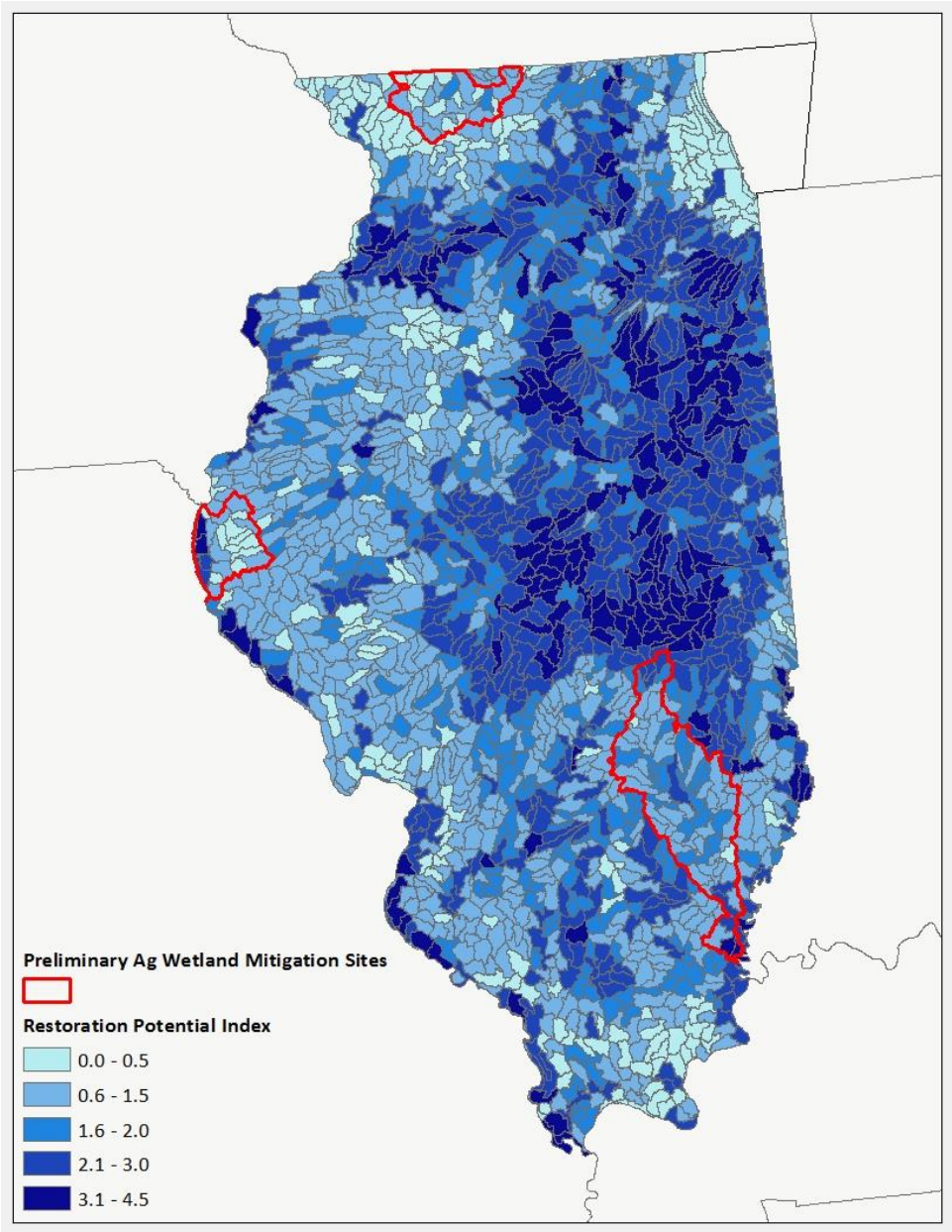
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For each data layer, subwatersheds (12-digit HUCs) were assigned a score of 0-5. Then, these scores were averaged to generate a composite index score for each subwatershed.

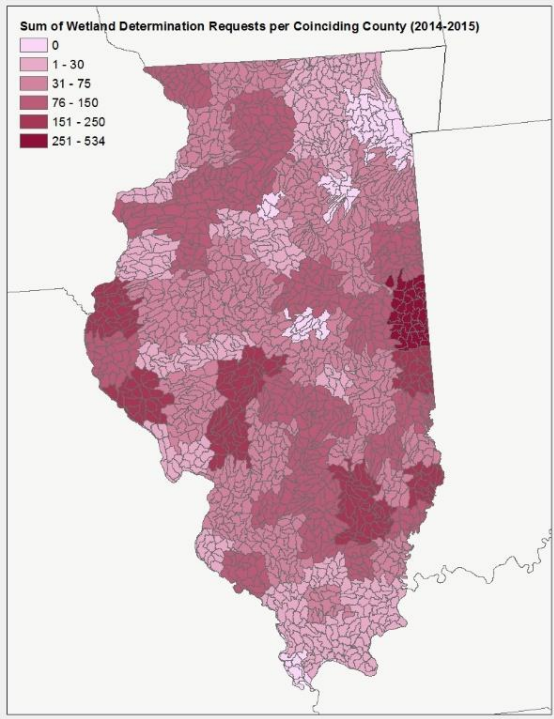


INDEX: WETLAND RESTORATION POTENTIAL

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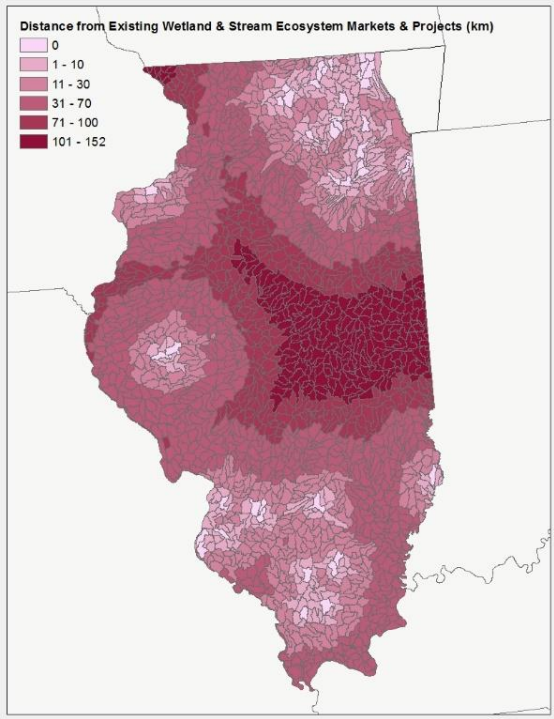
Next, we assessed potential demand for wetland mitigation, using data on wetland determination requests and the locations of existing wetland mitigation banks in Illinois. The same scoring approach is used as for the wetland restoration potential index.

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Annual wetland determination requests

This map displays the sum total of annual wetland determination requests per coinciding county during 2014 and 2015. Each subwatershed (12-digit HUC) in Illinois is ranked according to the number of wetland determination requests in its overlying county. Wetland determination requests are a proxy indicator for areas of farmland ending enrolment in the NRCS Wetlands Reserve Program. These areas are likely to be good candidates for generated agricultural wetland restoration credits. Magnolia Land Partners produced this map with data provided by the NRCS Illinois state office.



Proximity to existing ecosystem markets & projects focused on wetland mitigation

This map displays the distance (in kilometers) that subwatersheds (12-digit HUC) in Illinois are located from existing wetland restoration projects providing mitigation credits. Project points represent the centroids of project footprints or project primary impact areas in which wetland and stream ecosystem service projects operate.

A Closer Look:

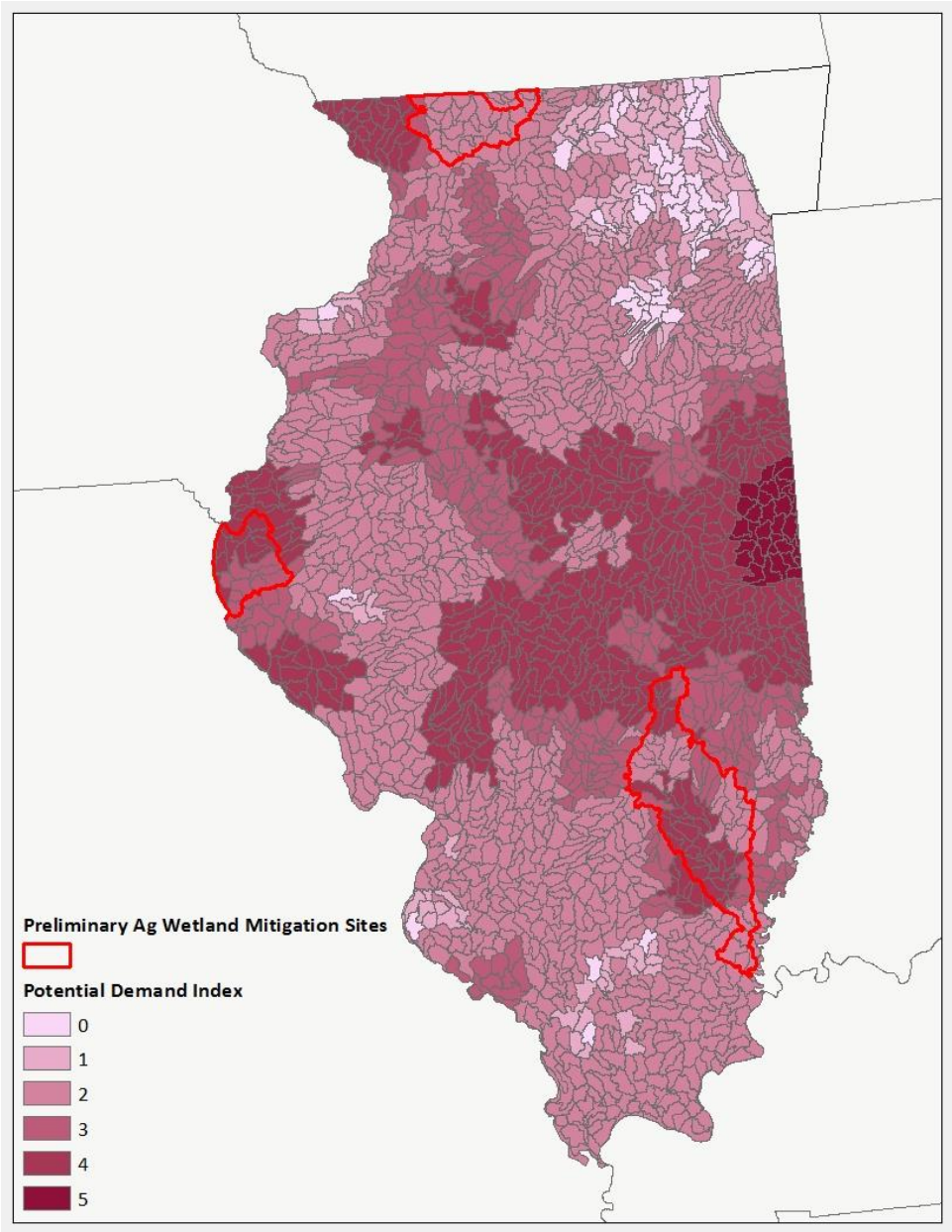
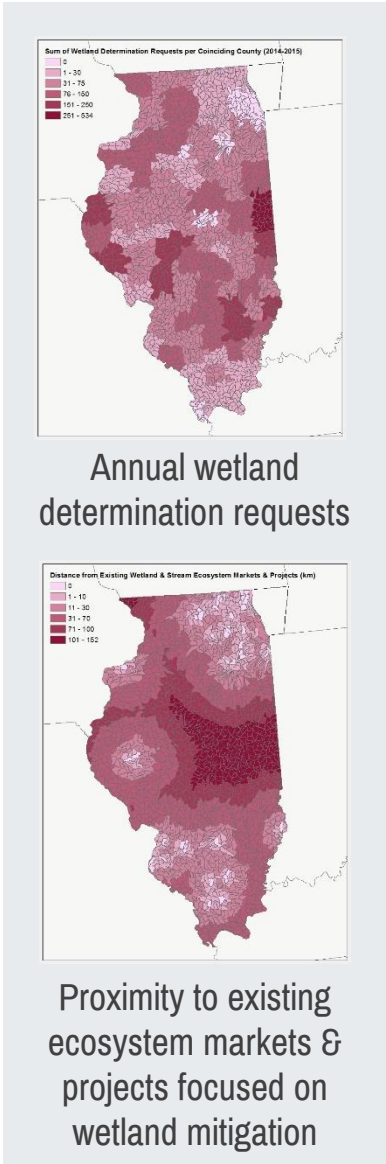
EnviroAtlas's ecosystem markets maps include detailed data on projects' status, mechanism, drivers, conservation activities, and more. Here, the data show that all of the projects identified in this map mainly develop credits designed to comply with Clean Water Act §404.

Since these "404" banks can also sell their credits to farmers and ranchers, they could be competition for Magnolia Land Partners. However, CWA §404 credits are held to a more rigorous standard than what's mandated by conservation compliance under the Farm Bill, which means 404 credits are typically more expensive than credits for conservation compliance. Thus even if a wetland bank already exists nearby, a new bank specifically focused on mitigation credits for conservation compliance might still be appealing to farmers.

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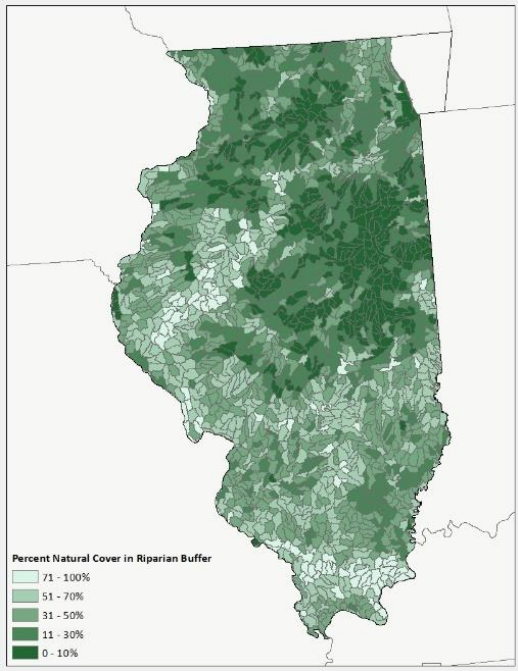


INDEX: POTENTIAL DEMAND FOR AGRICULTURAL WETLANDS MITIGATION CREDITS

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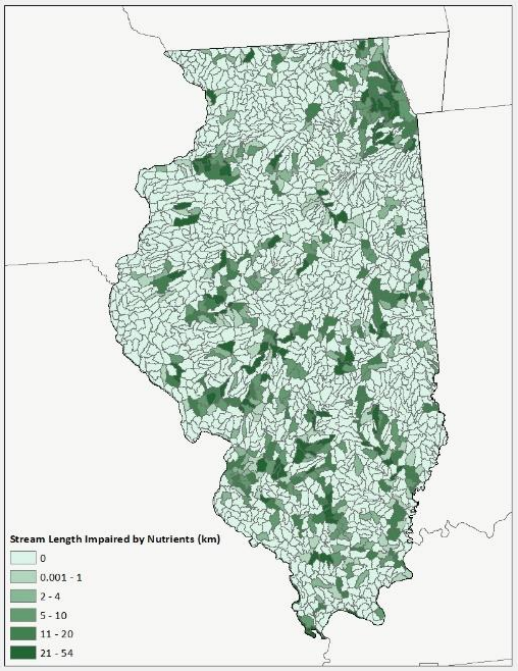
Finally, the potential ecosystem services co-benefits index is created using three map layers suggesting potential for water quality improvements and species conservation from wetlands restoration. The same scoring approach is used as for the previous indices.

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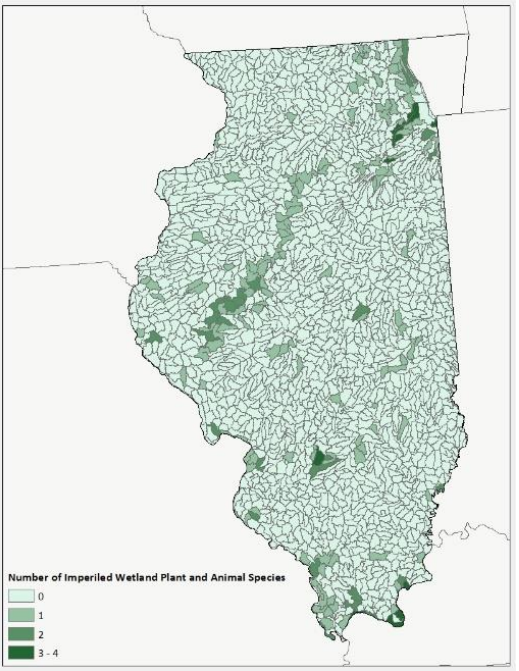
Percent natural cover in buffer

This EnviroAtlas national map layer portrays the percent of naturally covered land within 30 meters of streams, rivers, and other hydrologically connected waterbodies within each subwatershed (12-digit HUC). Natural land cover includes forests, shrubs, grasslands, barren land, and wetlands; it excludes agriculture and developed land.



Stream length impaired by nutrients

This EnviroAtlas national map layer depicts the total stream length in kilometers within the subwatershed (12-digit HUC) that has been listed as impaired due to the presence of nutrients in the water.



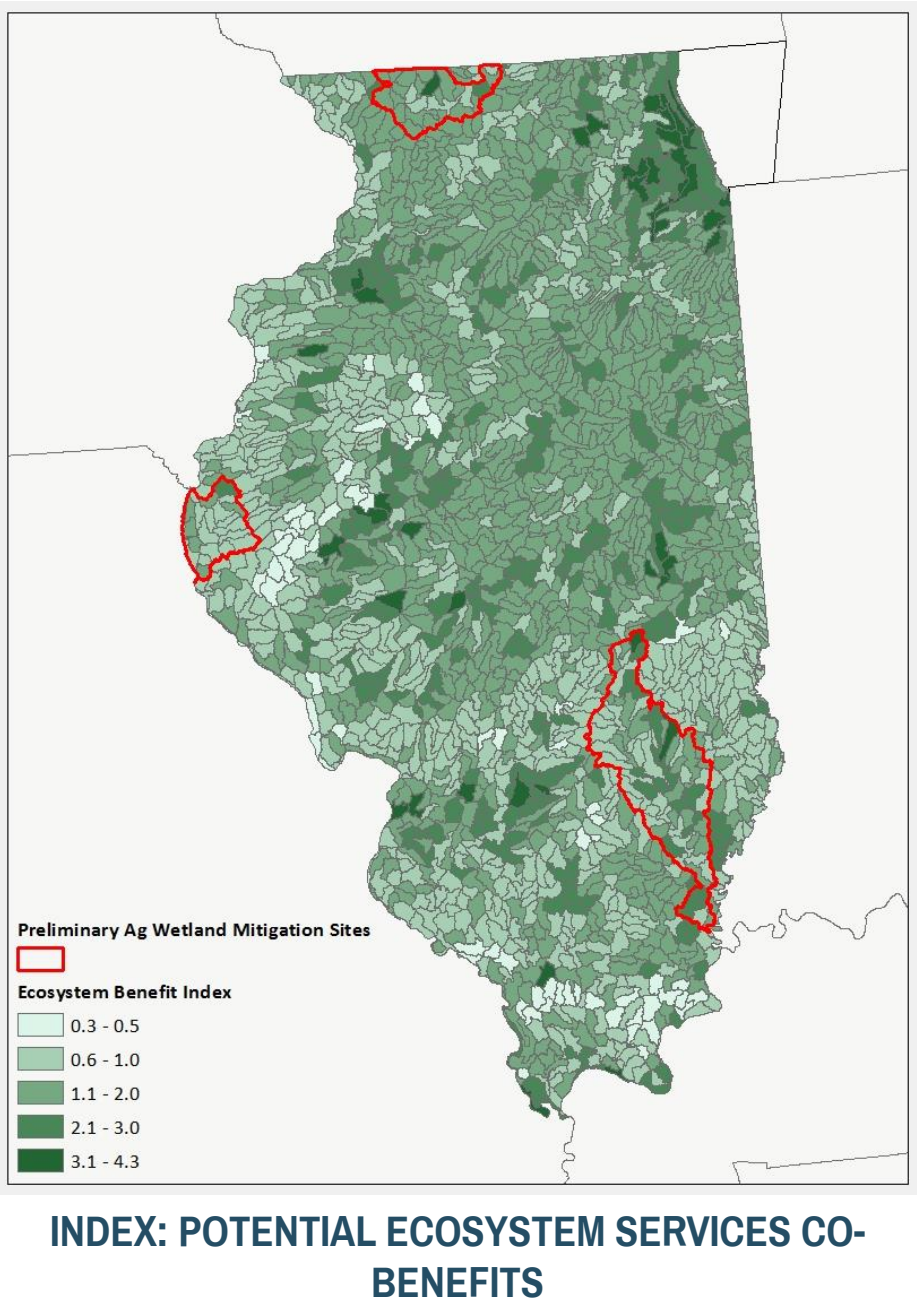
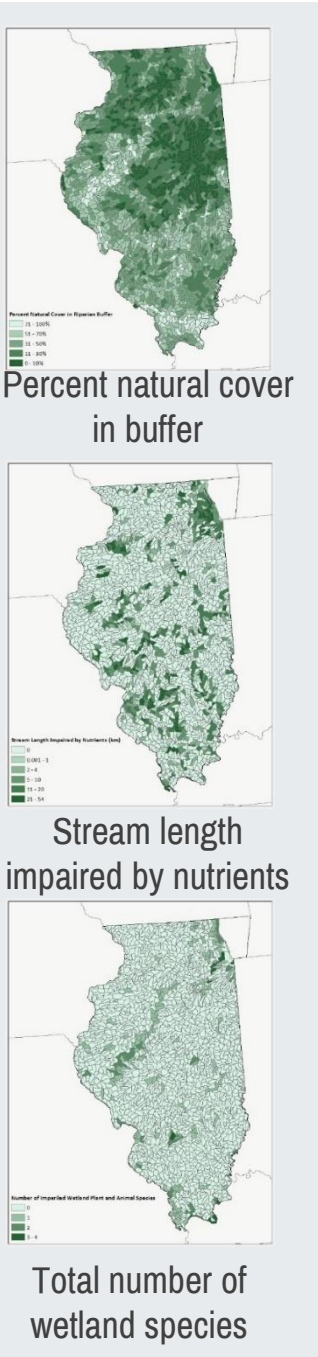
Total number of wetland species

This EnviroAtlas national map layer illustrates the total number of species associated with wetland habitat that are listed as G1, G2, or in the federal endangered species program that may reside within each subwatershed (12-digit HUC). G1 and G2 denote Global Conservation Ranks classified by NatureServe.

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Finally, the potential ecosystem services co-benefits index is created using three map layers suggesting potential for water quality improvements and species conservation from wetlands restoration. The same scoring approach is used as for the previous indices.

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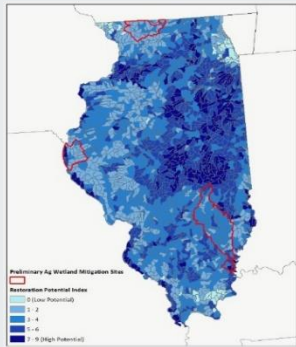
A Closer Look:
These map layers provide only a limited assessment of all of the potential ecosystem services benefits from wetlands restoration. Indicators in this use case were chosen to reflect some of Magnolia Land Partner's priorities and conservation priorities in Illinois, namely water quality and providing habitat for imperiled wetland species.

To expand this analysis, additional ecosystem services indicators could be selected from the hundreds of scientific and demographic data layers available on EnviroAtlas.

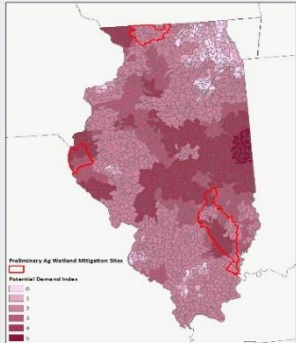
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The multi-factor index reflects the relative suitability of HUC-12 subwatersheds for an agricultural wetland mitigation bank, based on a sum of index scores for wetland restoration potential, potential unmet demand for agricultural wetland mitigation credits, and potential ecosystem services co-benefits. Based on these values, the darkest-shaded subwatersheds within the red polygons are the best candidates for a new bank.

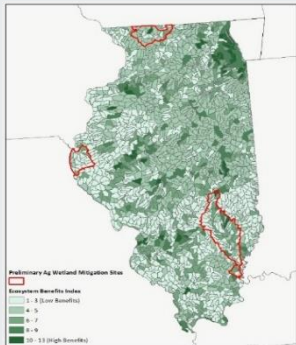
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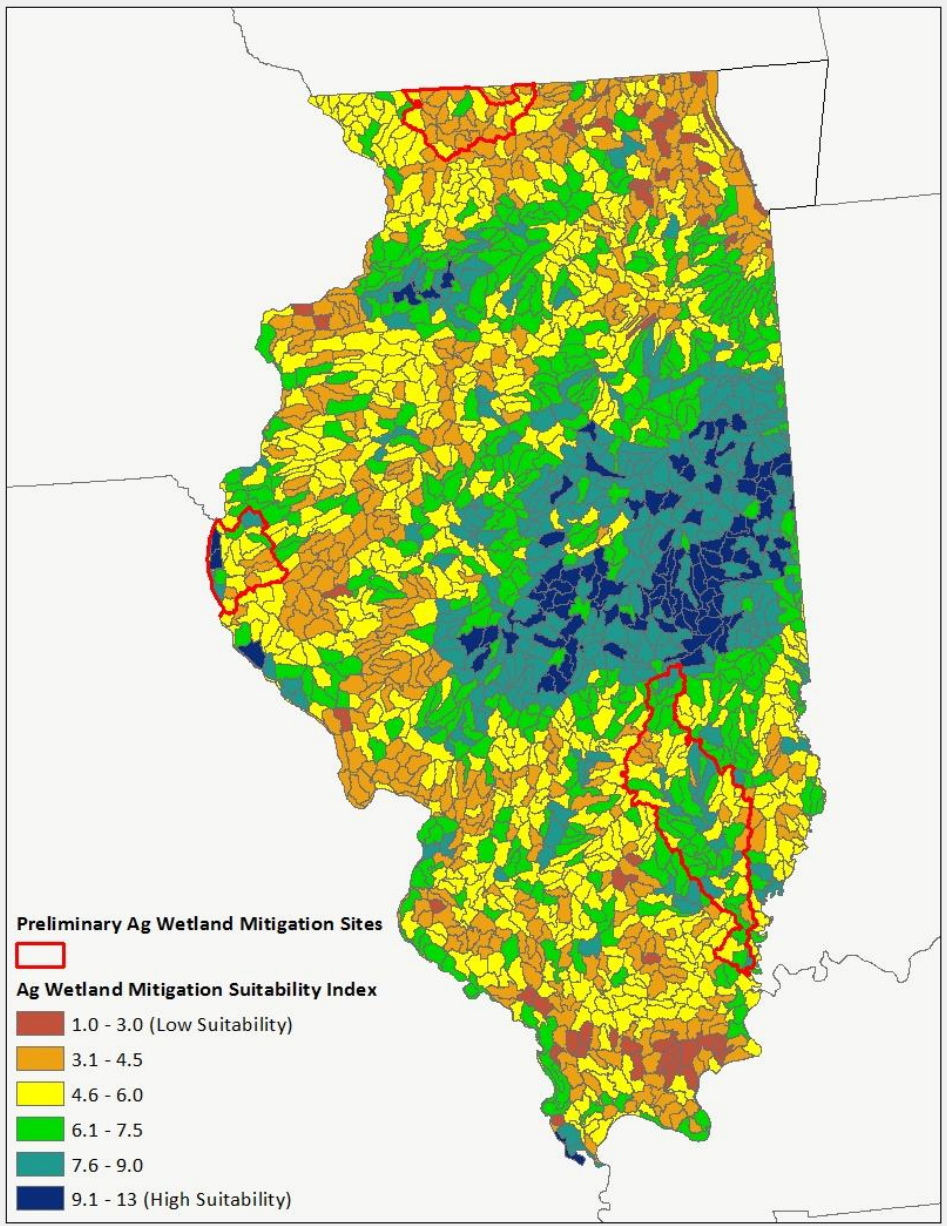
Index: Wetland restoration potential



Index: Potential demand for credits



Index: Potential ecosystem services co-benefits



MULTI-FACTOR INDEX: AGRICULTURAL WETLAND MITIGATION SITE SUITABILITY

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Keep Exploring: About the EnviroAtlas Tool

EnviroAtlas is an online tool giving users the ability to view, analyze, and download geospatial data and other resources, and it is designed to inform decision-making, education, and additional research.

EnviroAtlas includes: Geospatial indicators of ecosystem goods and services; Supplemental data, such as boundaries, land cover, soils, hydrography, impaired water bodies, wetlands, demographics, built infrastructure, and roads; analytic and interpretive tools; and ecosystem markets data.

Explore EnviroAtlas at:
<https://www.epa.gov/enviroatlas>

Summary

- Conservation compliance requirements link federal crop insurance premium subsidies to wetland conservation. Wetland mitigation banking allows landowners whose activities unavoidably impact wetlands to purchase compensatory credits from a mitigation bank. Agricultural wetland mitigation banks are designed to specifically serve farmers and ranchers.
- Evaluating potential bank sites for biophysical feasibility, potential demand, and multiple ecosystem services benefits can improve the chances of bank approval and successful operation, and deliver greater ecological benefits to society at large. In this use case, biophysical, regulatory, and ecosystem markets data were used to develop a model evaluating potential sites for an agricultural wetland mitigation bank in Illinois.
- Indicators were combined to create three indices representing wetland restoration potential, potential demand for agricultural wetlands mitigation credits, and ecosystem services co-benefits. These indices allowed for the creation of a multi-factor index, which ranked suitability of catchments for developing a new agricultural wetlands mitigation bank. The multi-factor index map identified two subwatersheds in Illinois with the highest possible suitability score for a new bank (shaded in dark blue on the map), and twelve subwatersheds with a high suitability score (shaded in light blue).
- One limitation of this study is that since agricultural wetland mitigation banking is a very new mechanism, our indicators of potential demand are only rough proxies. Future analysis could introduce better indicators as markets mature, or adjust the weighting of demand in the overall index. Other indicators could also be included in the other indices, such as different ecosystem services co-benefits.