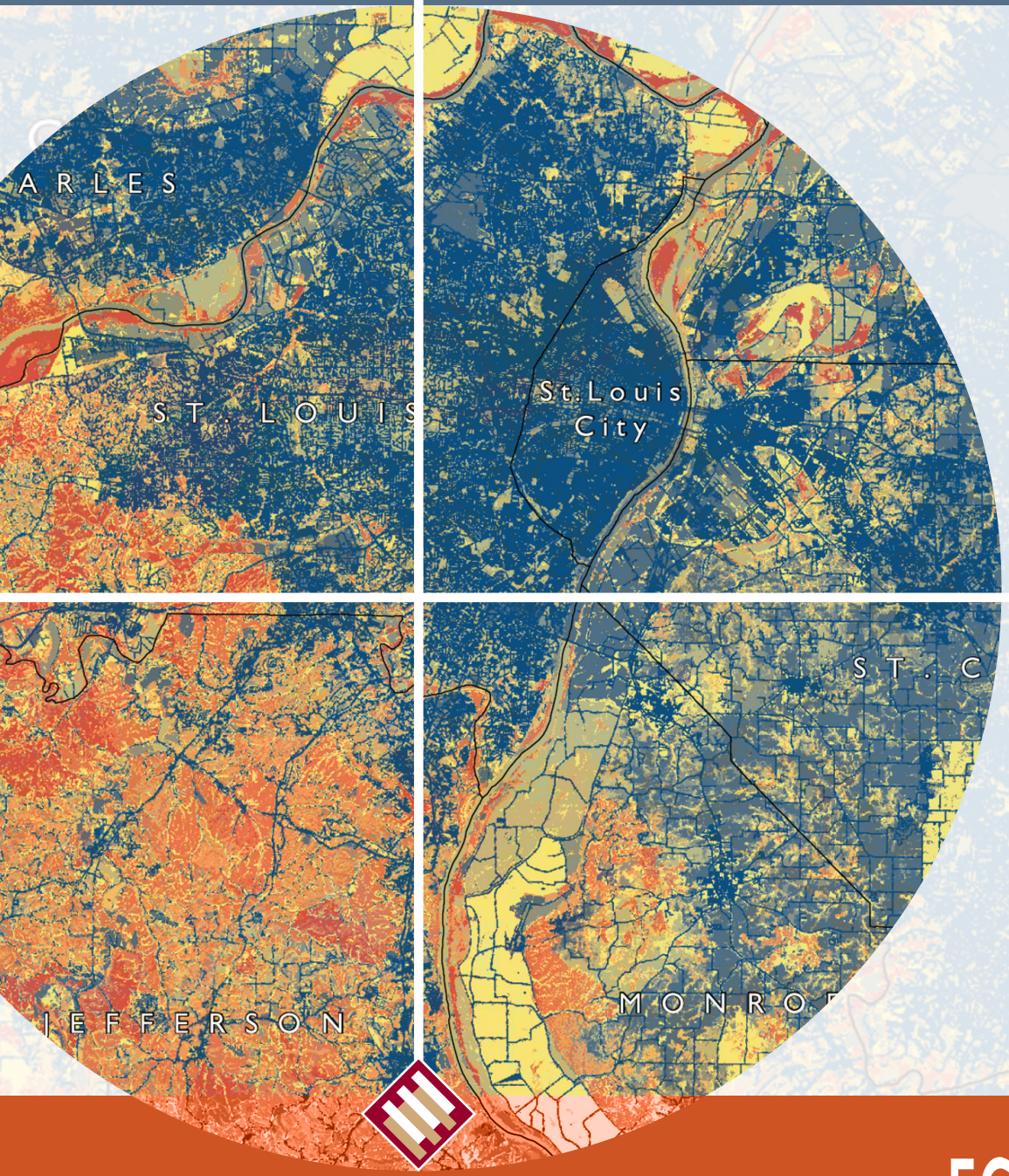
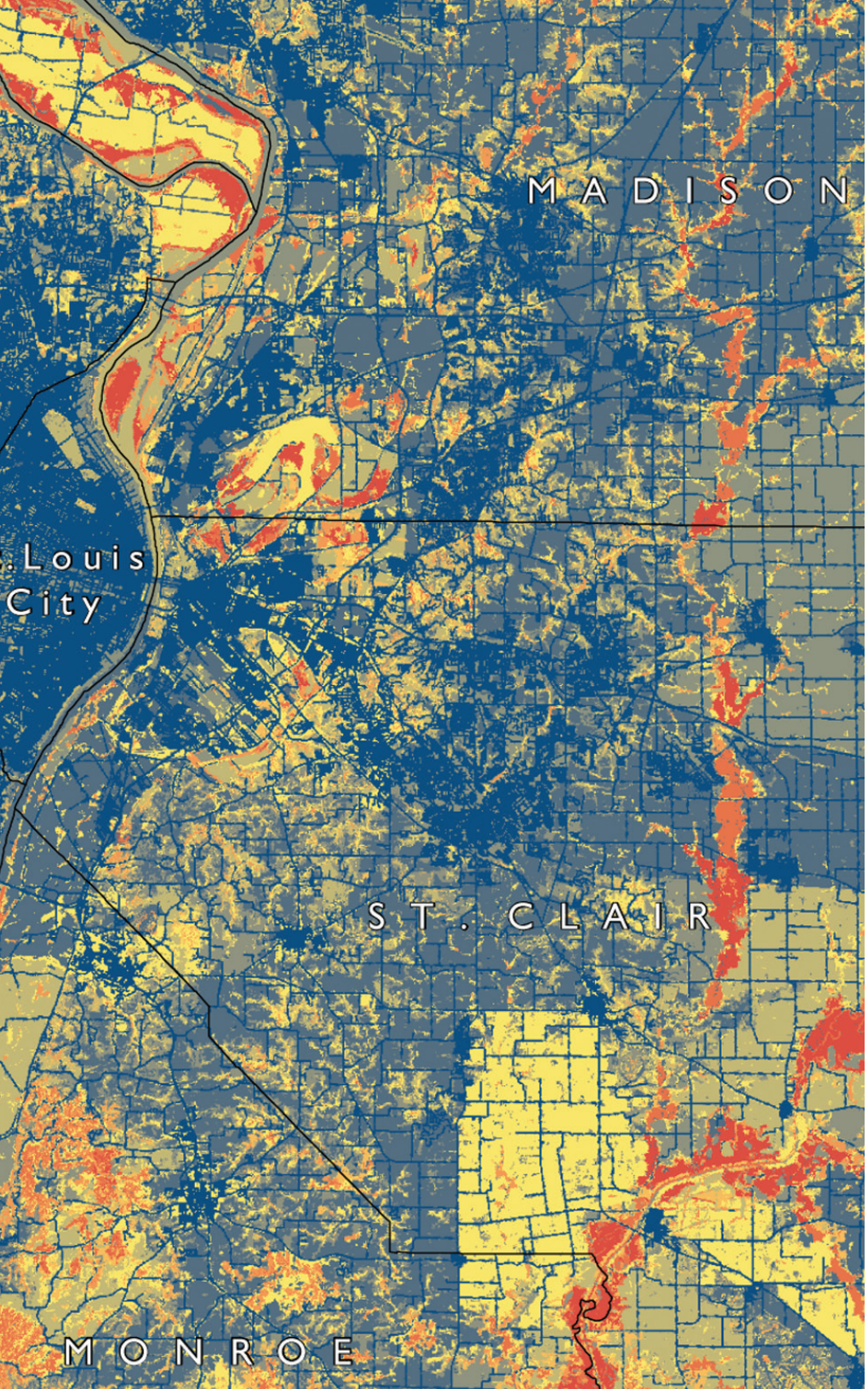


EAST-WEST GATEWAY
Council of Governments

Creating Solutions Across Jurisdictional Boundaries

ECOLOGICAL DATA INVENTORY

JUNE 2019



ACKNOWLEDGEMENTS

The work that provided the basis of this publication was supported, in part, by a grant provided from the U.S. Department of Transportation through the Missouri Department of Transportation and the Illinois Department of Transportation. The opinions, findings, and conclusions expressed in this publication are those of the author and not necessarily those of the Missouri Highways and Transportation Commission, the Illinois Department of Transportation, the Federal Highway Administration, or the Federal Transit Administration.

The report is the product of several years of research and consultation between local stakeholders and federal agencies. Previous efforts to document ecological data in the St. Louis region guided these efforts.

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WHY AN ECOLOGICAL DATA INVENTORY?

Environmental and transportation agencies are changing how they do business. Transportation agencies at all levels are committed to earlier consultation and planning-level environmental analysis, avoiding and minimizing impacts, identifying conservation investments, and helping recover species and restore watersheds. Furthermore, communities are becoming more interested in connecting to nature to enjoy the economic, environmental, and social benefits associated with healthy natural resources. In order to do that, planners, community development professionals, and natural resource managers can use data such as maps and descriptions of existing natural resources within the city, county, or other geography of interest to understand the context of where it is located in the natural world. Understanding the elements and functions of the natural world provides decision-makers with scientifically justifiable reasons for the management recommendations they make.

This report seeks to highlight a variety of ecological data developments undertaken by East-West Gateway Council of Governments (EWG) and its local, regional, state, and federal partners. Accessing robust datasets can be a challenge for smaller organizations and our municipal partners, due to large file sizes and the data's technical nature. The goal of this report is to make these resources more accessible to regional stakeholders and the general public at large.

TABLE OF CONTENTS

WHAT IS THE ECOLOGICAL APPROACH TO INFRASTRUCTURE DEVELOPMENT?

THE ECOLOGICAL APPROACH TO INFRASTRUCTURE DEVELOPMENT (Ecological Initiative) is a planning effort to link transportation and environmental decision-making. In 2008, EWG started the Ecological Initiative and partnered with the Missouri Resource Assessment Partnership (MoRAP) at the University of Missouri-Columbia to expand consultation with natural resource agencies and to build a geospatial dataset to streamline the transportation planning process and advance conservation goals through the availability of high quality fine-resolution ecological data. An extensive network of federal, state, and regional/local agencies was established. This network was instrumental in the development of a regional-scale ecological data tool that identifies the region's most ecologically significant natural resources.

The Ecological Initiative focuses on the region's ecologically significant natural resources, while using mapping technology to help better inform transportation planning decisions. The resulting datasets provide environmental data for conservation, mitigation, and restoration, as well as useful information on the location and extent of ecologically significant areas. Consultation with resource agencies is a core component of the Ecological Initiative and was key to the development of science-based, defensible ecological significance datasets that reflected input from all the resource management and regulatory agencies involved.

Protecting and enhancing environmental assets is important to the overall public health and well-being of the St. Louis region. Avoiding or minimizing environmental impacts early in the transportation planning process can lead to significant cost reductions and a streamlined environmental review process. Early avoidance can advance projects while preserving and restoring wildlife habitat, improving water quality, protecting cultural and historical resources, and reducing stormwater and flooding issues. The greater availability of these datasets will result in more agencies accessing the data and using the data as a key early planning tool to both avoid environmental impacts and enhance the ecological assets in the region.

PARTNERSHIP & COLLABORATION

Transportation

The Ecological Initiative's geospatial datasets have been applied in the development of *Connected2045*, the region's long-range transportation plan, as well as large- and small-scale corridor studies. The datasets raise awareness of potential ecological impacts of transportation projects early in the planning process, identify opportunities for conservation area expansion and linkage, and provide a mechanism to guide mitigation efforts towards wetland locations of greatest restoration potential. By doing so, conservation efforts are enhanced amidst a streamlined transportation planning process.

In 1969, Congress passed the National Environmental Policy Act (NEPA) in response to growing public concern for the environment. NEPA establishes a national policy to protect the environment, which includes the assessment of potential environmental impacts of all major federal actions. State departments of transportation (DOTs) are required to evaluate a project's potential environmental impact on natural resources such as floodplains, wetlands, sensitive species, farmland, air and water quality, and wildlife habitats. The Ecological Initiative encourages discussion and consultation on natural resources at a "pre-NEPA" level to enhance an agency's ability to avoid environmental impacts very early in the planning process. Avoiding an impact is much more cost efficient as opposed to costs associated with mitigating an impact. If an impact is unavoidable, strategic investment of mitigation funds can enhance key restoration priorities. Early and ongoing consultation with natural resource agencies from planning and construction to operations and maintenance will result in the efficient delivery of projects, while protecting and enhancing the region's environmental priorities.

Missouri Resource Assessment Partnership

In 2008, EWG created a partnership with MoRAP at the University of Missouri-Columbia to develop a Regional Ecological Framework (REF) that takes an ecosystem-level planning approach to avoid, minimize, and mitigate the environmental impacts of existing and future infrastructure investments. MoRAP is a consortium of partners from state and federal agencies, and nongovernmental conservation organizations who take a coordinated approach to digital data development, analysis, and delivery of natural resource inventory and assessments. This partnership has proven to be invaluable. Since that time, EWG and MoRAP have worked together in collaboration with federal and state resource agencies to map ecologically significant areas in the city of St. Louis and the seven-county, bi-state region, and to support mitigation planning at both landscape and site-specific scales. This data served as a planning tool for linking transportation and environmental decision-making by providing a consistent tool for all agencies to use to drive ecological evaluation and mitigation planning.

In FY2010, in coordination with resource agency partners, EWG and MoRAP undertook the initial technical work of gathering data and conceptualizing research methods. Preliminary concepts, methods, and current vegetation mapping results were presented to partners on multiple occasions. During those meetings, new data sources important to ecological significance were identified and previous mapping methods were adjusted. Initial ecological significance data summaries and modeling results were presented at a second set of meetings. These meetings provided an opportunity for partners to ask important questions related to data development. Partners reviewed initial results at those meetings and provided input to inform adjustments based on professional knowledge of the region. From there, MoRAP proceeded to map the current vegetation in the region, generate an ecological significance model, and establish a ranking algorithm. In 2017, MoRAP, in coordination with EWG staff, completed the Urban Land Cover dataset. The Urban Land Cover dataset, highlighted in Chapter 2, is a refined land cover dataset for the Urbanized Areas in the St. Louis region. The geospatial datasets can be accessed in the Appendix of this document and located on the EWG website at www.ewgateway.org/eco.

The Ecological Data Inventory's main responsibility seeks to highlight much of the work completed by EWG and MoRAP as part of the Ecological Initiative.

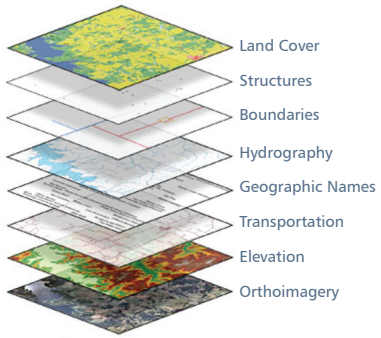
BiodiverseCity St. Louis

BiodiverseCity St. Louis is a growing network of organizations and individuals throughout the greater St. Louis region who share a stake in improving quality of life for all, through actions that welcome nature into our urban, suburban, and rural communities. BiodiverseCity St. Louis stakeholders provided input on the structure of the inventory, contributed ideas for application of the data, and leveraged local government planning stakeholders to gather feedback.

The Ecological Data Inventory will serve as the data foundation for BiodiverseCity St. Louis initiatives by providing foundational data layers to inform the aspirational vision of a more connected and biodiverse region. It not only is designed to aid urban planners, municipalities, counties, and developers in maximizing the benefits of biodiversity for their respective communities, it is also designed to equip citizens with a greater understanding and appreciation of local biodiversity in ways that strengthen place-based connections; promote healthy, active, nature-rich living; and advance a culture of community-driven land stewardship.

ECOLOGICAL DATA INVENTORY

THE ECOLOGICAL DATA INVENTORY is a catalog of existing geospatial datasets that are available to the public at no cost. While it may seem counterintuitive to share digital resources in a static document, this format allows users of all skill levels to discover curated data with visualizations and case studies. The data presented in this inventory is intended for use in Geographic Information System (GIS) software such as Esri's ArcGIS products or the free, open source QGIS application. GIS software allows users to combine a variety of geospatial data layers to create maps, perform database queries and analyze features of the landscape. However, in this document format anyone can visually assess the datasets and consider partnering with GIS users to apply the information to their own ecological planning challenges.



Datasets featured in this inventory can be combined with many other types of geospatial information in GIS software.

Datasets in this document were chosen for their applicability to the land use and transportation planning process at various scales. Some datasets are low in resolution but cover a vast area, e.g., the National Land Cover Database. Conversely, some files are very detailed to support fine-scale analysis but have only been developed for a limited extent. For each item in the Ecological Data Inventory you will see at least two visualizations of the data on the same page, along with a brief description of the dataset's title, source, extent, and recommended scales for use. Detailed notes for accessing the files are included in the Appendix (online only).

The items in this inventory have varying extents, or geographic boundaries, since they were developed to meet the analysis needs of the federal, state, or regional agencies that created them. The full extent of data coverage is noted on each page. For federal or state datasets, the map view may be limited to the St. Louis Combined Statistical Area (17 counties) or St. Louis region (seven counties and the city of St. Louis), even though the data is available for a wider area. The St. Louis area's location within Missouri and Illinois creates some differences in data availability from state agency sources. If data is available for one state but not the other, it will be noted on the map page.

For most datasets, the main map view provides an overall picture of the region while the pair of small square maps provide a visual reference to the resolution and spatial accuracy of the data. Each of the small squares is zoomed in to show a 40-acre area (the edges of the square are .25 miles long) so users can see how the data looks at a site-specific scale. In each pair, the square image on the right is a 2015 aerial photo and the square image on the left shows the data layer in the exact same location. For a few datasets you will see multiple visualizations of the same dataset to portray the variety of attributes or representations available within a single file. In every case, the goal is to show what the data can do to inform decisions and planning goals regardless of an individual's technical expertise.


Six Meter Land Cover
Ecological Significance
Wetland Mitigation and Restoration Importance Ranking
Urban Land Cover
Land Cover Composite
EWG Produced Data
Urban Land Cover: Great Streets and I-70 PEL
Development Pressure
Application of Ecological Significance for Project Evaluation
Wetlands and HeartLands Conservancy
Highlighted Case Studies
National Land Cover Database
Ecological Site Descriptions
Missouri Ecological Site Descriptions
Protected Lands
Conservation Opportunity Areas
Threatened or Endangered Species Data
Ecoregions
Watershed Boundary Dataset
Assessed and Impaired Waters (305B and 303D)
National Hydrography Dataset
Flood Hazard Zones
LiDAR Availability and Elevation
Soil Survey Geographic Database
National/State Data

1

LAND COVER

1

CONTENTS IN THIS SECTION

NATIONAL LAND COVER DATABASE (2011)

30 METER

What is it?

The National Land Cover Database (NLCD) serves as the definitive Landsat-based, 30-meter resolution, land cover database for the United States. NLCD provides spatial reference and descriptive data for characteristics of the land surface such as thematic class (for example, urban, agriculture, and forest), percent impervious surface coverage, and percent tree canopy cover. The database is designed to provide five-year cyclical updates of U.S. land cover and associated changes.

NLCD products are created by the Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC is a group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale for a wide variety of environmental, land management, and modeling applications. As with two previous NLCD land cover products, NLCD 2011 keeps the same 16-class land cover classification scheme that has been applied consistently across the United States.

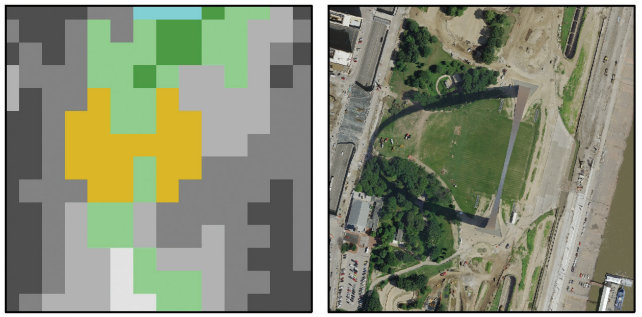
NLCD offers a seamless, consistent data product across a vast area and is ideal for identifying generalized land cover types and tracking changes over time. It is less useful for fine-scale analysis due to the limited resolution. Each 30-meter pixel can only be identified as one type of land cover even though a variety of land cover types may occur within that 30-meter square area. This is particularly apparent in urban locations where the details of small parks, lawns, and street trees are identified simply as "developed," indistinguishable from paved surfaces and buildings.

How can it be used?

Land cover information is critical for local, state, and federal managers and officials to assist them with issues such as modeling nutrient and pesticide runoff, land use planning, telecommunications, and deriving landscape pattern metrics.

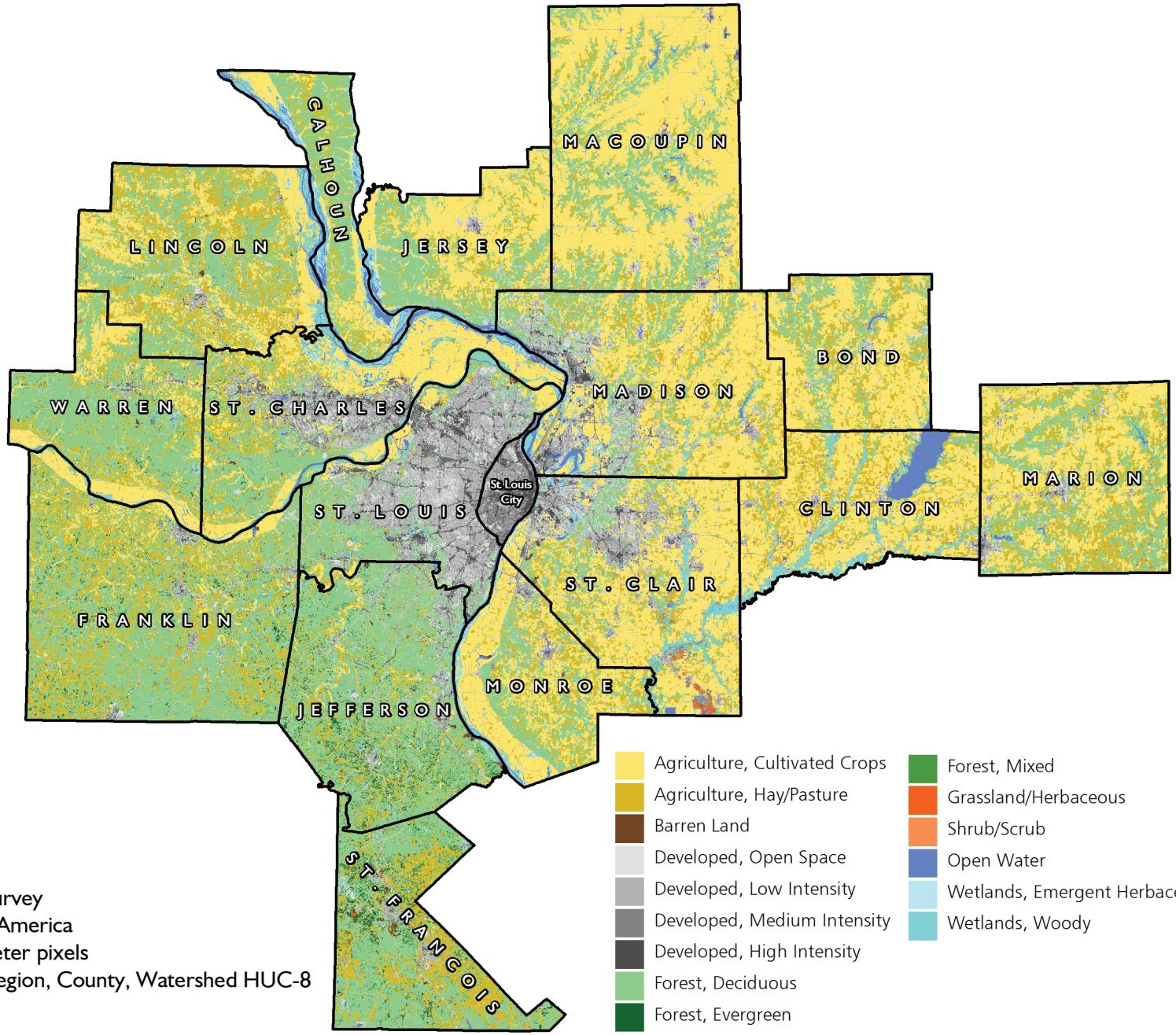
NLCD supports a wide variety of federal, state, local, and nongovernmental applications that seek to assess ecosystem status and health, understand the spatial patterns of biodiversity, predict effects of climate change, and develop land management policy.

User Tip: NLCD is built for broadly tracking land cover change over time



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

NATIONAL LAND COVER DATABASE



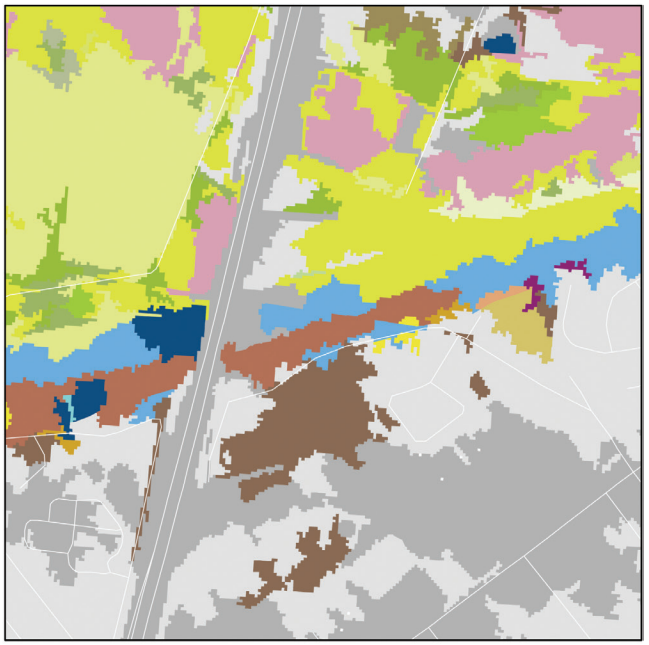
Source: US Geological Survey
Extent: United States of America
Raster Resolution: 30-meter pixels
Recommended Scales: Region, County, Watershed HUC-8
Date: 2011

SIX METER

What is it?

In 2010, MoRAP, in coordination with EWG, produced a current vegetation map of the St. Louis region as part of an effort to define ecological significance as it pertains to transportation-related infrastructure projects. This product used satellite remote sensing in concert with air photos and information from digital soils maps. The map is five times more detailed (65 classes versus 12), with 25 times the spatial resolution (6m versus 30m) of the standard national land cover map produced by the United States Geological Survey (USGS).

This interpretive guide is designed to either stand alone as a statistical representation of the current vegetation of the study area, or to accompany a GIS data layer of the current vegetation of the region, which is also available from EWG or from MoRAP.



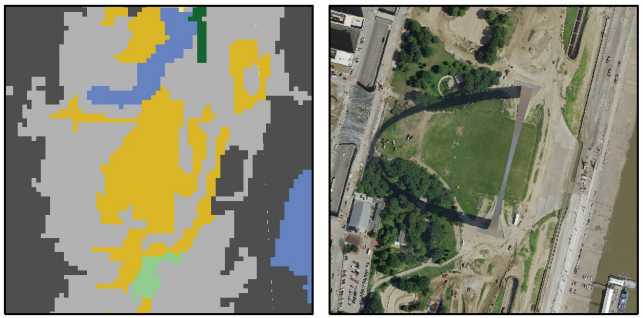
Vegetation Name

- Urban High Intensity
- Urban Low Intensity
- Cropland
- Cultural/Disturbance: Upland Loess and Till Grassland
- Disturbance or Successional Upland Grassland
- Bottomland Forest: Pin Oak/Bur Oak-Swamp White Oak/Pecan Forest
- Bottomland Forest: Sycamore, Cottonwood, Elm, Ash Hackberry Riverfront Forest
- Bottomland: Buttonbush/Black Willow-Water Locust Woody Wetland
- Bottomland: Herbaceous Vegetation
- Bottomland: Successional Deciduous Woodland and Shrubland
- Bottomland: Successional Eastern Redcedar Sparse Woodland and Shrubland
- Bottomland: Successional Eastern Redcedar Woodland
- Bottomland: Successional Eastern Redcedar-Deciduous Mixed Woodland and Forest
- Bottomland: Successional or Disturbance Woodland and Forest
- Ozark Highlands: Limestone/Dolomite Cliff/Talus Complex
- Ozark Highlands: Loess and Till Backslope White Oak/Black Oak-Hickory Woodland and Forest
- Ozark Highlands: Loess and Till Upland Post Oak/White Oak-Black Oak Woodland
- Ozark Highlands: Mesic Backslope and Valley Red Oak/White Oak-Sugar Maple/Basswood Forest
- Successional Upland Deciduous Sparse Woodland and Shrubland
- Successional Upland Eastern Redcedar Evergreen Sparse Woodland and Shrubland
- Successional Upland Eastern Redcedar Evergreen Woodland and Forest
- Successional Upland Eastern Redcedar-Deciduous Mixed Woodland and Forest
- Herbaceous-dominated Wetlands (non-riverine)
- Woody-dominated Wetland (non-riverine)
- Open Water
- Barren or Sparsely Vegetated

Location: Interstate 55 crossing the Meramec River - border of Southern St Louis County and Northern Jefferson County, Missouri.

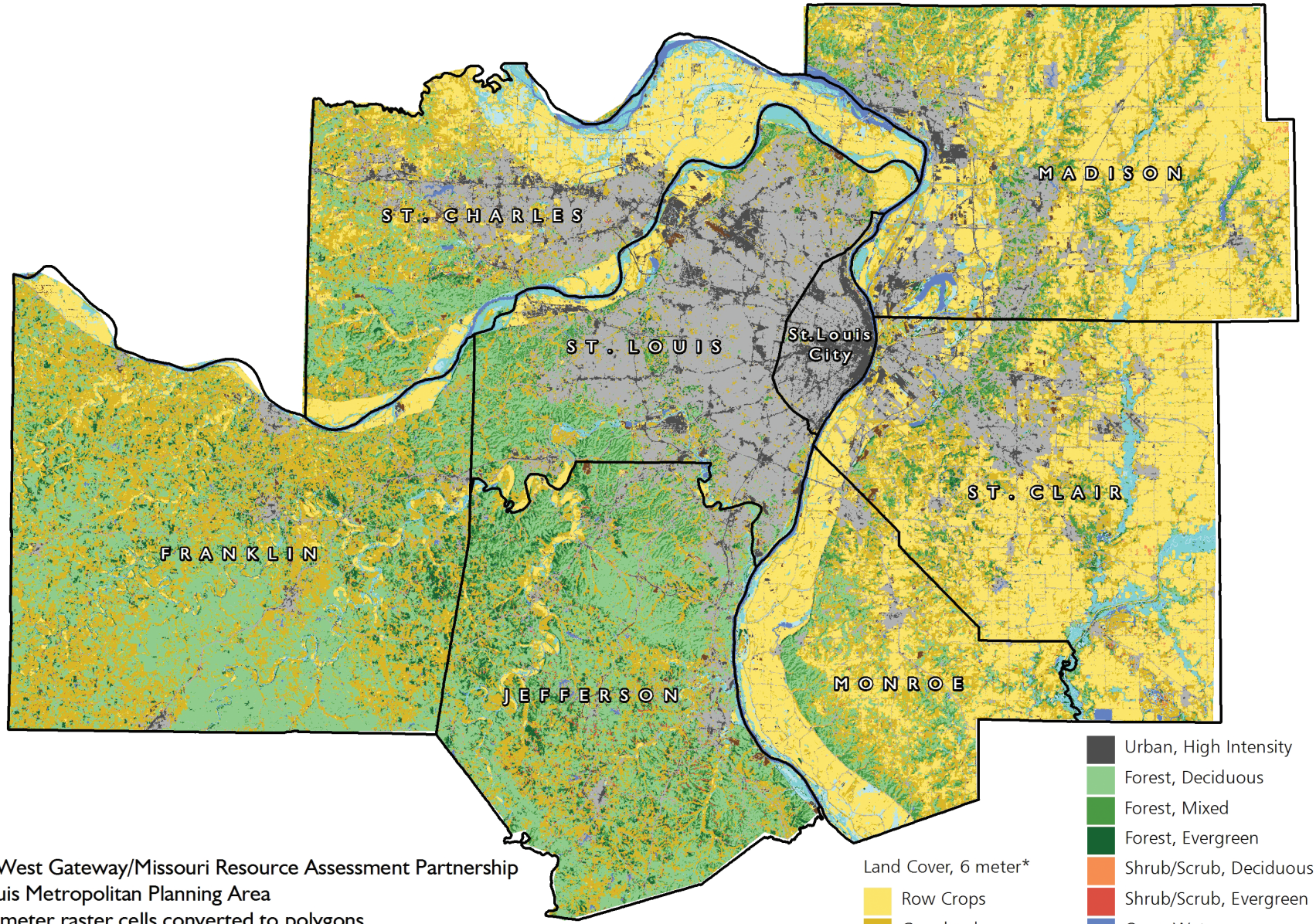
How can it be used?

This dataset is ideal for understanding the diversity of vegetation types on a site. Landowners and site managers can use it as a starting point for planning vegetation management activities. Conservation organizations can use it to seek out unusual or highly desirable natural communities for land-sharing or land-saving prioritization. Planners and development strategists can look for potential ecological impacts of proposed projects very early in the planning process.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

LAND COVER & NATURAL COMMUNITIES



Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St Louis Metropolitan Planning Area
Resolution: 6 meter raster cells converted to polygons
Recommended Scales: Sub-watershed, City,
Sites > 40 acres
Date: 2010

** 65 classes grouped into 13 classes for display*

ONE METER

What is it?

This one-meter Urban Land Cover dataset provides a closer look at conditions in developed areas of the St. Louis region in seven basic categories. While the NLCD (see pages 8 and 9) serves many applications at the regional, state, and national level, at the municipal and parcel level, the dataset fails to accurately depict the true land cover for a given area. The six-meter land cover dataset (see page 10) offers great detail on vegetation types in suburban and rural areas but lacks granularity in the urban areas of the region. With that in mind, EWG, and their contracted partners at MoRAP, teamed up to create a new land cover dataset. This new dataset is for areas of developed land (Urbanized Areas) across the entirety of the St. Louis metropolitan area.

User Tip: This is the highest-resolution data available for land cover, though it only covers the urban portions of the region.

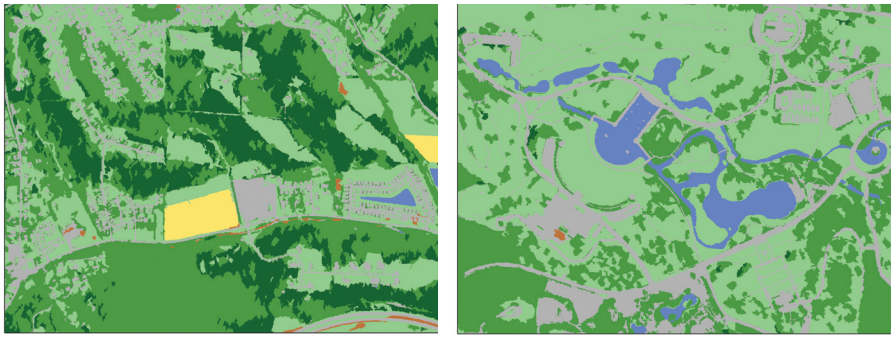
There are seven land use/land cover categories for classification:

1. Urban/Impervious—roof tops, paved roads, paved lots
2. Open Water
3. Row Crops—croplands that were not fallow in both dates of imagery
4. Grassland—includes lawns, fescue fields, forb-dominated areas
5. Evergreen Woody Vegetation (e.g. eastern red cedar, planted pine)
6. Deciduous Woody Vegetation (e.g. oak, elm, ash, hackberry, etc.)
7. Barren/Sparsely Vegetated—unpaved lots, new developments, fields fallow in both dates of imagery.

How can it be used?

This dataset was applied and referenced in several transportation corridor projects in the St. Louis region, such as Missouri Department of Transportation's (MoDOT) Interstate 70 Planning and Environmental Linkages (PEL) Study, the Forest Park Great Streets Study. The data can also be used to better help model stormwater runoff or identify ideal tree planting locations.

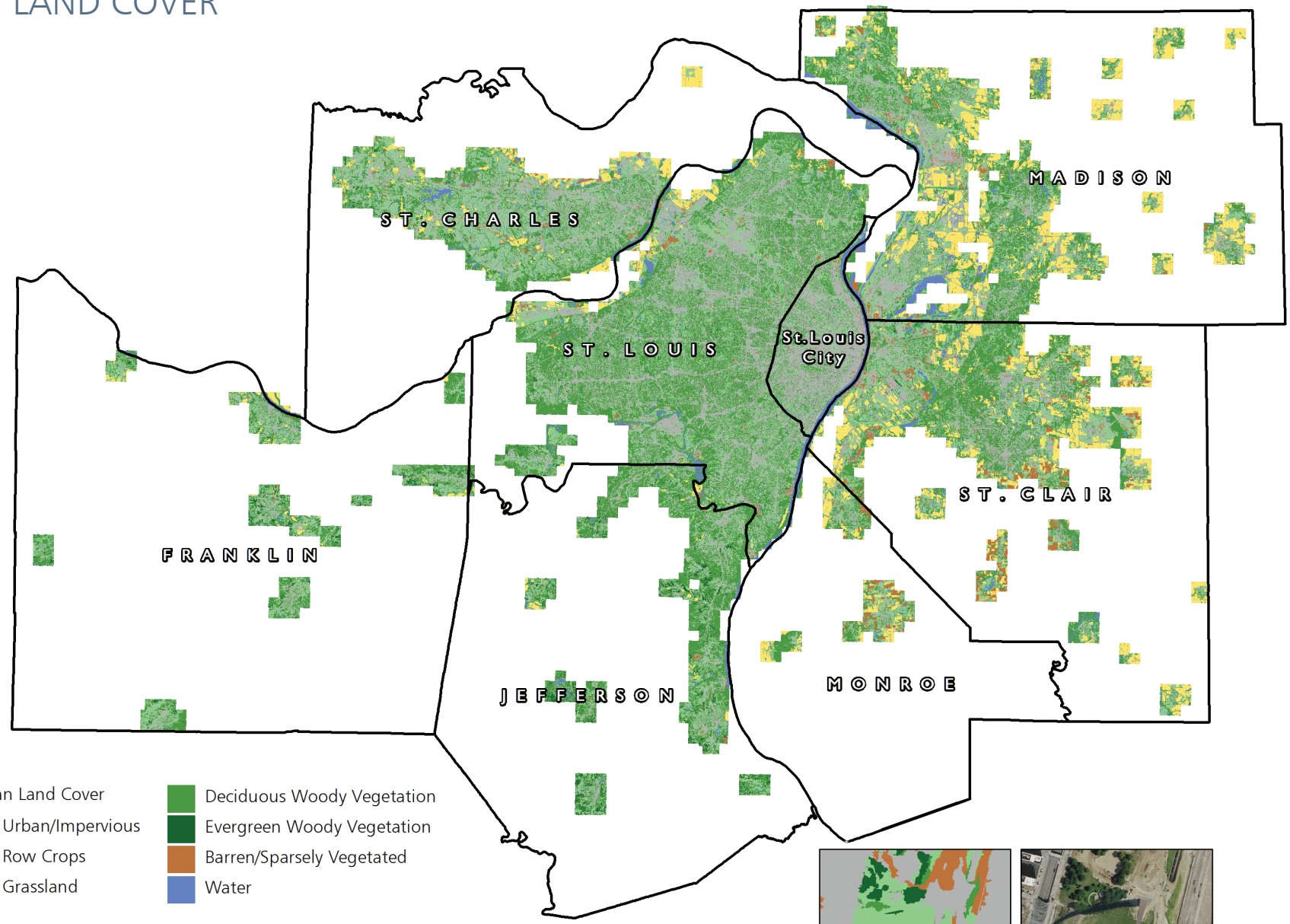
User Tip: This methodology prioritized vegetation over impervious surfaces, so any place where trees overhang buildings or roads, it is shown as vegetation.



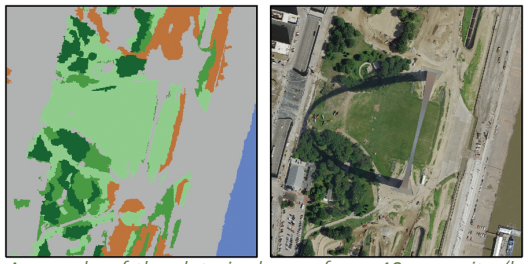
Evergreen Woody Vegetation

Water

URBAN LAND COVER



Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: Urbanized patches within the St Louis Metropolitan Planning Area
Raster Resolution: 1 meter (polygons also available)
Recommended Scales: Sub-watershed, City, Sites > 40 acres
Date: 2017



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

SIX-METER + ONE-METER

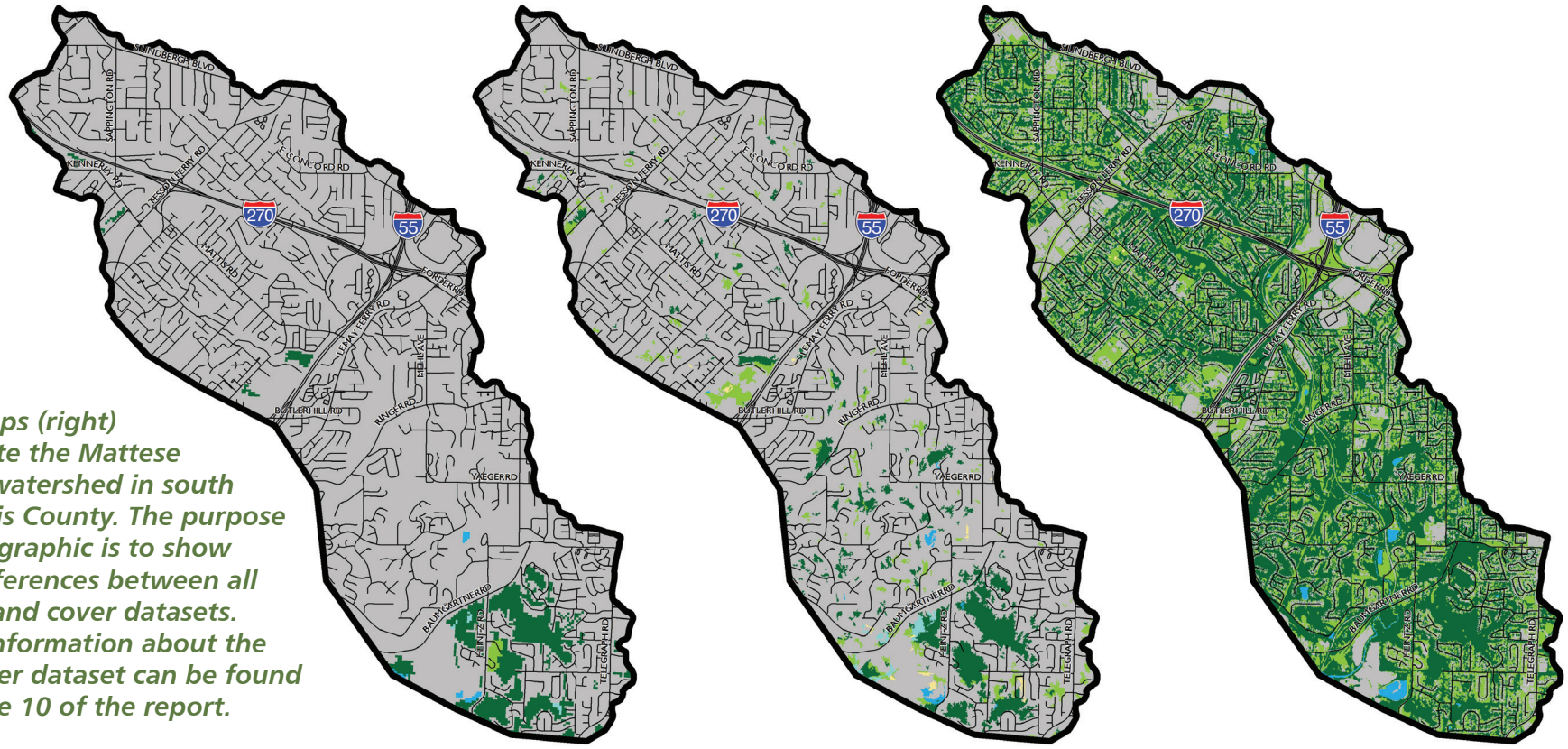
What is it?

The map visualization on page 15 combines two land cover datasets, presented previously, to show the most detailed, complete picture of the land cover conditions in the region in very basic categories. The one-meter urban land cover and the six-meter land cover are layered together so the detailed urban land cover fills in the areas that were undifferentiated in the six-meter file. The detailed land cover classes from the six-meter file are grouped and simplified to match the categories of the one-meter file.

How can it be used?

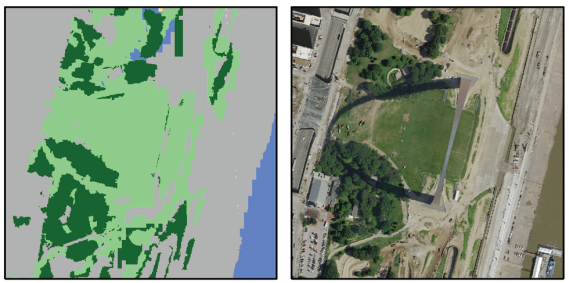
The mixed resolution and simplified classification of this visualization makes it most useful for big-picture planning rather than geostatistical analysis. Users can identify green corridors for habitat connectivity planning or seek out neighborhoods that lack vegetated areas for stormwater management.

The maps (right) illustrate the Mattese Creek watershed in south St. Louis County. The purpose of this graphic is to show the differences between all three land cover datasets. More information about the 30-meter dataset can be found on page 10 of the report.



30-meter ***Six-meter*** ***One-meter***

LAND COVER (COMPOSITE OF TWO DATASETS)



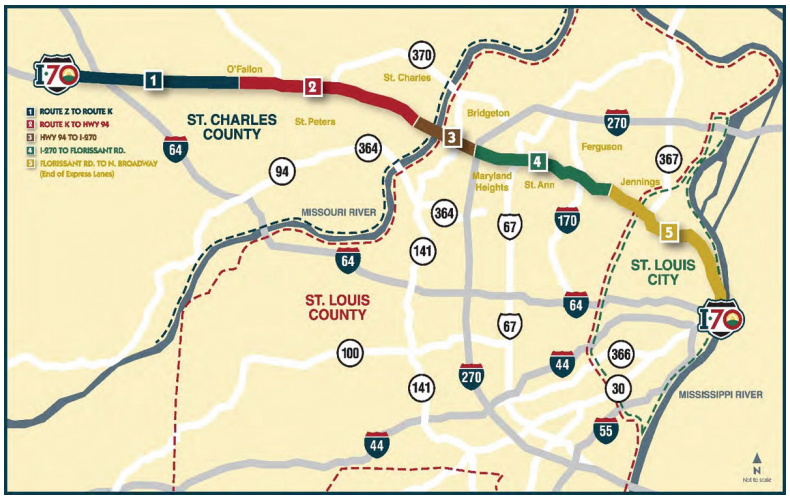
A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St Louis Metropolitan Planning Area
Raster Resolution: 1 meter, 6 meter
Recommended Scales: County, Sub-watershed, City, Sites > 100 acres
Date: 2017. 2010

CASE STUDY: EAST-WEST GATEWAY AND URBAN LAND COVER

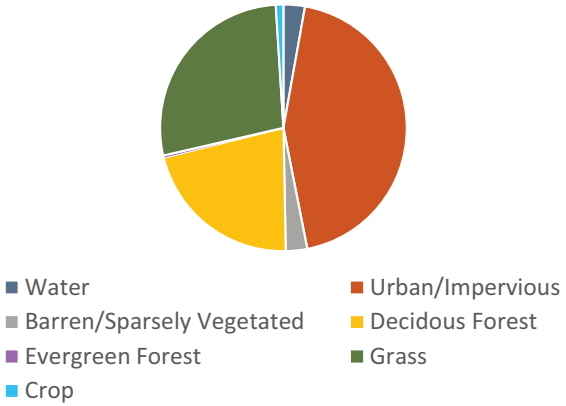
I-70 Planning and Environmental Linkages Study

MoDOT, in partnership with EWG and Bi-State Development (Metro), initiated the I-70 PEL Study to set a vision and strategic plan for the future of the Interstate 70 (I-70) corridor in the St. Louis region. The study area includes an approximately 40-mile section of I-70 from Wentzville (Route Z) to the end of the express lanes near North Broadway in the city of St. Louis. The study area was divided into five total segments based on similarities in surrounding land use and corridor function, such as areas where traffic patterns changed from suburban to a more urban nature.

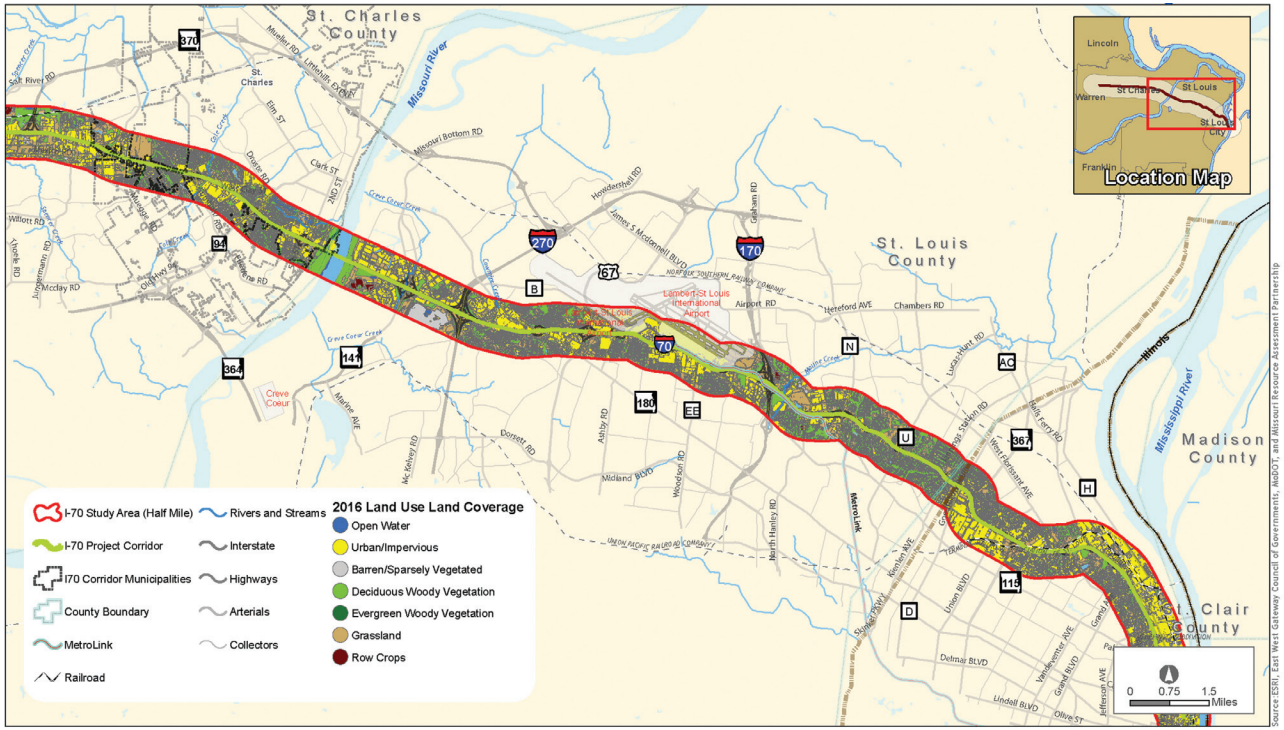


The objective of the land cover project was to produce a high spatial resolution Land Use/Landcover dataset (Urban Land Cover) along the I-70 corridor. The improved spatial resolution of the data allows for a more accurate representation of vegetation and impervious surface adjacent to I-70 within the study area, as compared to the thirty- meter and six-meter land cover data. The study area for land cover project encircles a half-mile buffer on each side of the I-70 corridor.

PERCENT LAND COVER—TOTAL STUDY AREA



URBAN LAND COVER FOR I-70



I-70 PEL Study - *MoDOT*

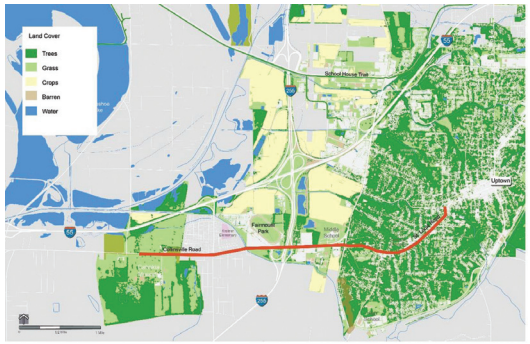
Great Streets Initiative—Collinsville, Illinois

The project area can be categorized as the "upland" area east of State Route 157 and the "bottoms" west of State Route 157. The land cover of the uplands has a large amount of tree cover, especially within the drainage ways between residential streets. The tree cover along St. Louis Road is limited because of the lack of street trees and commercial properties with little to no tree coverage. Trees along St. Louis Road are primarily found on residential properties. The land cover "bottoms" west of State Route 157 is primarily grass and cropland. Pockets of woodland occur, especially closer to Cahokia Mounds. Urban Land Cover for the project only includes areas within the city limits of Collinsville. State Park Place and other unincorporated areas are not included.

Great Streets Initiative—Forest Park, City of St. Louis, Missouri

Passive open space in Forest Park is comprised of upland and bottomland forests, open grassy meadows and lakes and lagoons. The passive areas surround and connect the park's active spaces and cultural institutions. The natural areas remain partly isolated from one another, however the passive zones are critical to support wildlife corridors and habitat, provide mature vegetation as well as to provide recreational demands such as paddle boating, bird watching, paddle boarding, fishing, and hiking. The natural areas within the park serve to cleanse and infiltrate stormwater, improve air quality, reduce erosion, and cool temperatures. As Great Streets goals are implemented throughout and around the park's perimeter, the opportunity to connect these forested and passive areas—through path connections or habitat connections—should be considered.

LAND COVER AND IMPERVIOUS SURFACE COVERAGE MAPS—CITY OF COLLINSVILLE, ILLINOIS



Graphic created by i5 Group.

LAND COVER AND TOPOGRAPHY—FOREST PARK, ST. LOUIS, MISSOURI

Graphic created by Design Workshop.

MISSOURI ECOLOGICAL SITE DESCRIPTIONS

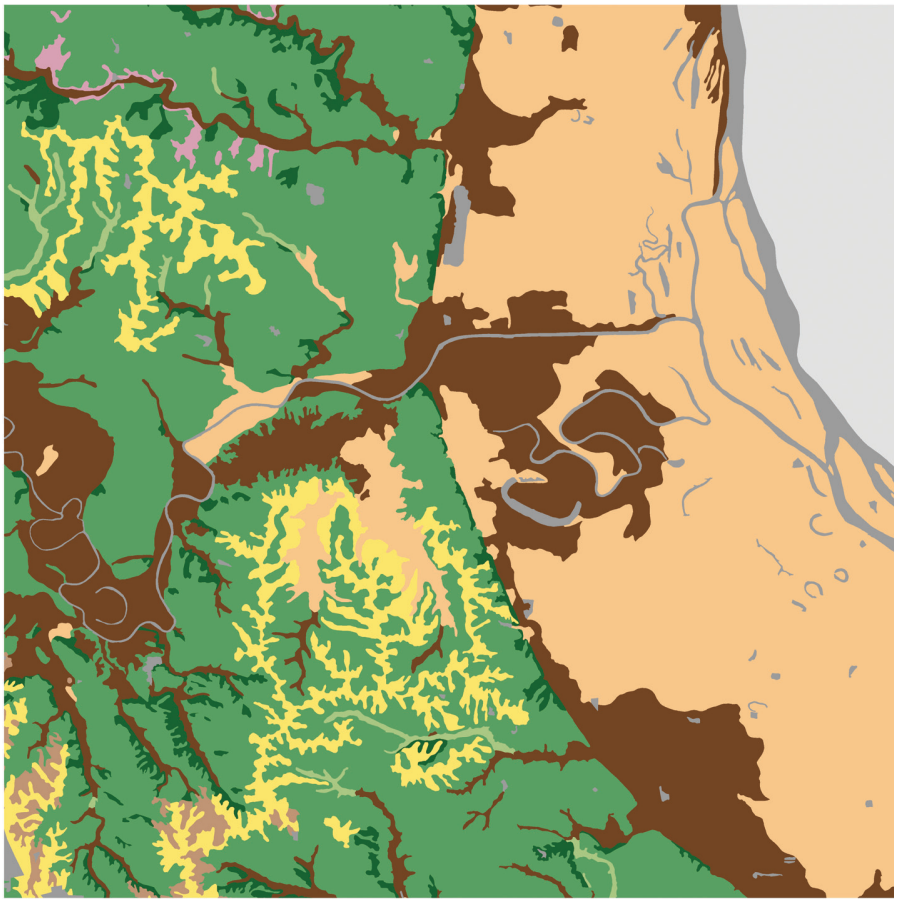
What is it?

Ecological site descriptions provide detailed information about the characteristics and function of ecological sites and can be used to guide policy and land management decisions. An ecological site is a distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land. They are unique in their ability to produce a distinctive type of vegetation and in their ability to respond similarly to management actions and natural disturbances. The organizational structure for ecological sites places all sites into two groups: forestland and rangeland. Each group is further divided into subgroups that share soil, landform, and vegetation characteristics. Natural Resources Conservation Service (NRCS), in conjunction with Missouri Department of Conservation (MDC), has mapped all of the ecological sites in the state. Information for the state of Illinois is currently under development.

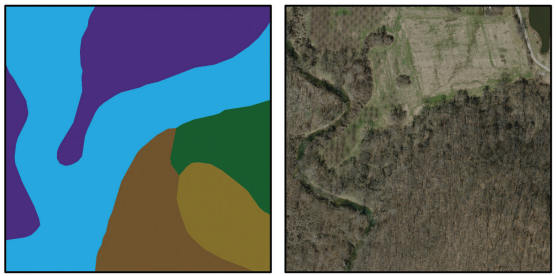
How can it be used?

Ecological site description reports inform planners on land suitability for different land uses. They also inform the user of the land's ability to respond to disturbance and produce certain types of vegetation. Ecological site descriptions are especially useful for deciding how to manage large areas of open space. They can guide recommendations for management and re-establishment of appropriate vegetation.

Decision makers can use ecological site descriptions to produce maps and fine-grained land cover classification charts that provide a scientific basis for land use and policy recommendations. They can also use ecological site descriptors to customize community planning efforts by basing them on site characteristics instead of, or in addition to, land use and density considerations.

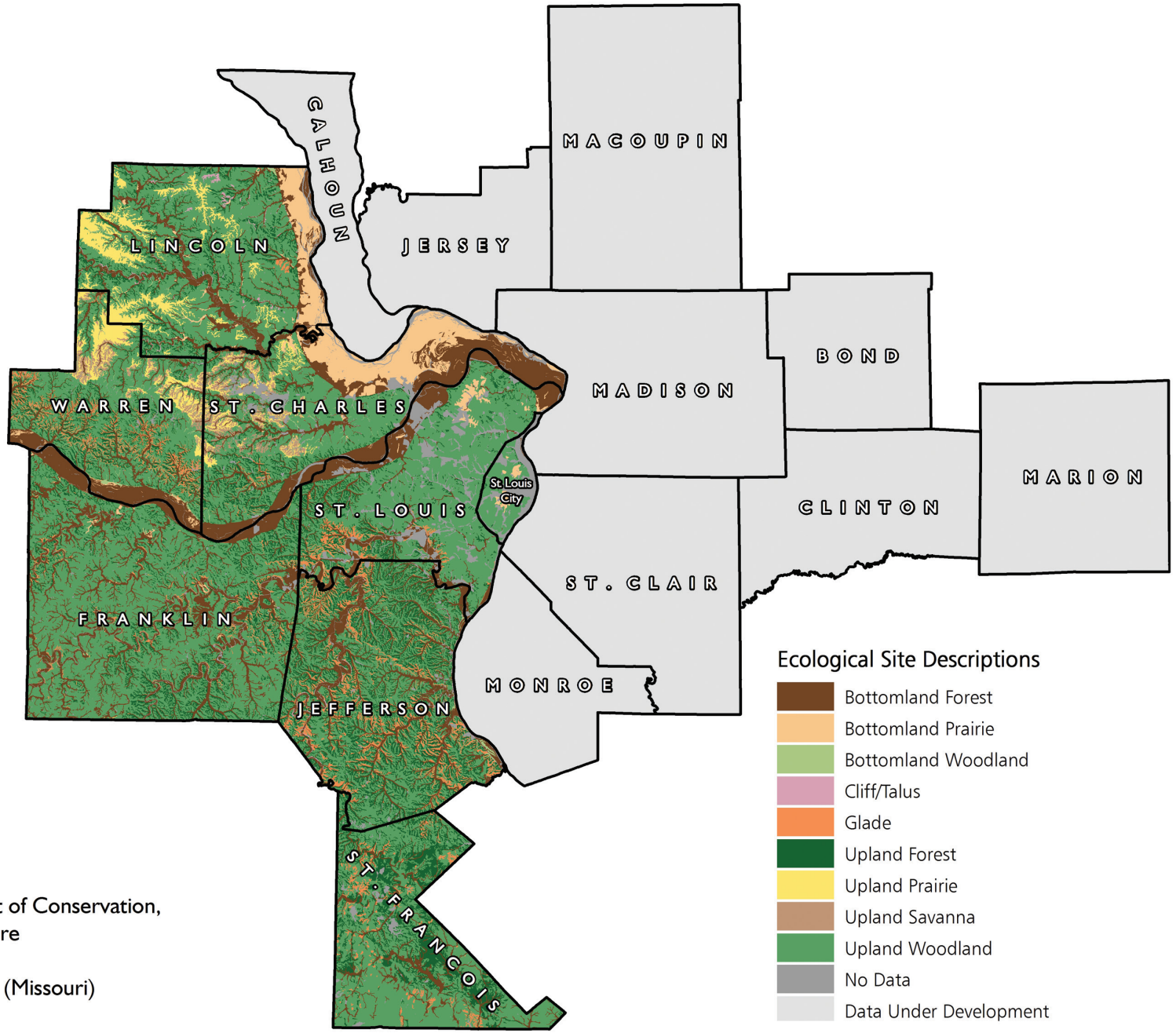


Location: Border of North Central St. Charles County and Southeast Lincoln County, Missouri



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

ECOLOGICAL SITE DESCRIPTIONS



Source: Missouri Department of Conservation,
U.S. Department of Agriculture
Extent: State of Missouri
Recommended Scale: Region (Missouri)
Date: 2015

2

ECOLOGICAL SIGNIFICANCE

2

CONTENTS IN THIS SECTION

ECOLOGICAL SIGNIFICANCE

What is it?

The regional ecological significance data layer ranked individual patches of natural and semi-natural vegetation within the EWG region. A variety of governmental and nongovernmental organizations in Missouri and Illinois have provided assessments of ecological significance previously, but the results of these are not comparable across the region. This dataset created new current vegetation maps and used the most consistent available data on variables important to ecological significance in order to provide a standardized, scientifically sound ecological significance data layer for the EWG planning region.

The criteria for determining ecological significance was based on assertions that natural and semi-natural vegetation is more important than cultural vegetation or urban land cover; that larger patches are more functional for long-term ecosystems viability and therefore more important than smaller patches; that both landscapes and communities and species elements of natural diversity are important; and that public lands and adjacent areas are important in that they offer increased potential for maintenance or creation of large functional landscapes. Eight tiers of importance were identified primarily by creating selection sets of vegetation patches based on attributes such as patch size, area of significance communities, and occurrences of rare species. In addition, riverine conservation assessments for Missouri and Illinois stood on their own, and aquatic conservation opportunity areas and biologically significant streams were considered of maximum ecological significance.

How can it be used?

The ecological significance data layer provides a uniform, scientifically sound evaluation of ecological significance for use in both reactive (e.g. mitigation of needed development) and proactive planning efforts (e.g. planning for transportation corridors; development of parks and conservation easements).

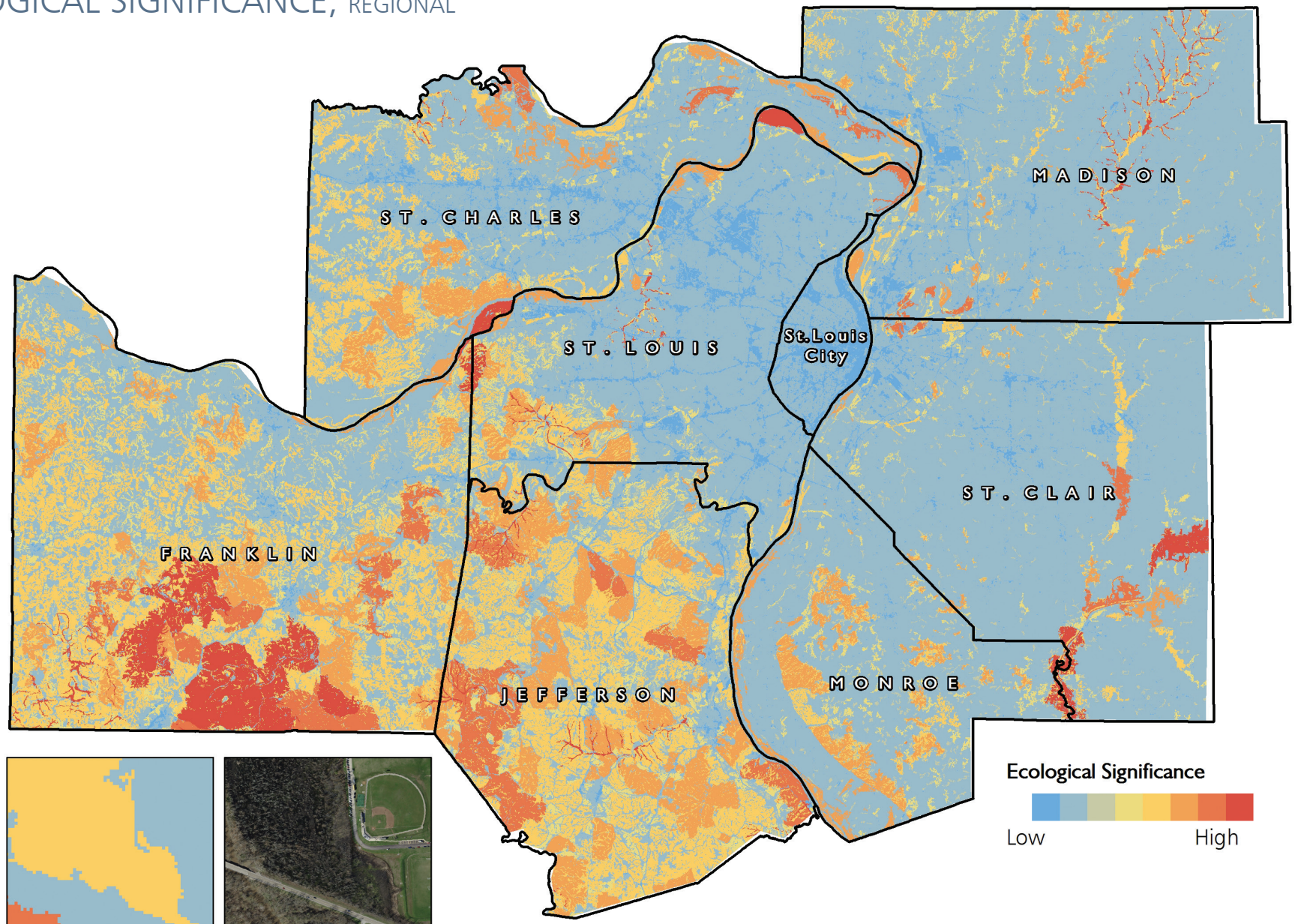
The ecological significance data layers are most appropriate for use at a regional or county level of resolution. Several issues limit utility at finer resolutions including, 1) the accuracy of input data such as current vegetation; 2) any given spot may be more or less important than these results show, since we do not have perfect knowledge of local conditions; 3) conditions such as urban development are constantly changing; 4) our knowledge of elements of natural diversity such as the location of rare species is constantly changing; and 5) the meaning of quantitative values assigned to ranking tiers is open to interpretation. Last, the perceived significance of a given spot depends on the assessment region. For example, the patterns of significance ranks vary when only Illinois or only Missouri are analyzed. This type of variation in perceived significance holds true when smaller areas such as counties or watersheds are analyzed as compared with larger areas such as states or regions.

This dataset can be used to evaluate the land, prioritize conservation and restoration efforts, encourage stewardship of key community types, and evaluate proposed projects.

"Undeveloped areas within the EWG region continue to be rapidly converted to urban land uses. Between 2001 and 2011, approximately 32 square miles of forest were converted to other land cover types. During the same period, agricultural land decreased by approximately 37.5 square miles. Developed land increased by approximately 67 square miles. In addition, the remaining land cover patches have been reduced in size on average. The overall prospect for natural resource conservation has been reduced over time and this is likely to continue. All currently remaining natural and semi-natural patches are at some level of risk from urban encroachment."

—Source: Missouri Resource Assessment Partnership.

ECOLOGICAL SIGNIFICANCE, REGIONAL



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St. Louis Metropolitan Planning Area
Recommended Scales: Region, County, Watershed HUC-8
Date: 2010

ECOLOGICAL SIGNIFICANCE FOR PROJECT EVALUATION

What is it?

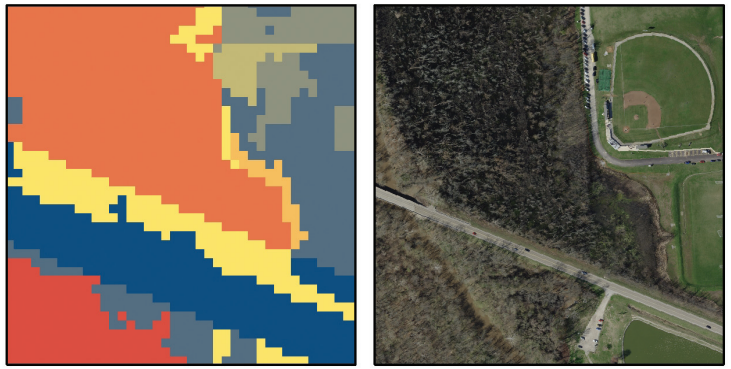
Ecological significance data developed in 2010 emphasized the importance of functional landscape patches of semi-natural and natural vegetation, and the results are most appropriate for use when setting priorities on a regional scale. Many project-based decisions must be made at a finer scale of resolution. MoRAP developed project-level ecological significance data to address this need.

The spatial grain size of the project-level significance data is greater than that of the regional ecological significance data. Scores are applied to all mapped current vegetation types (community types) to define project-level significance, whereas regional significance was mapped based on patches of natural and semi-natural vegetation made up of several or many individual mapped vegetation types that were combined or collapsed together. Many of the same input datasets generated for regional ecological significance evaluation were used to generate project-level significance, including current land cover and community importance ranking, rare species locations and status, public lands, and the final results of the regional analysis itself.

How is it used?

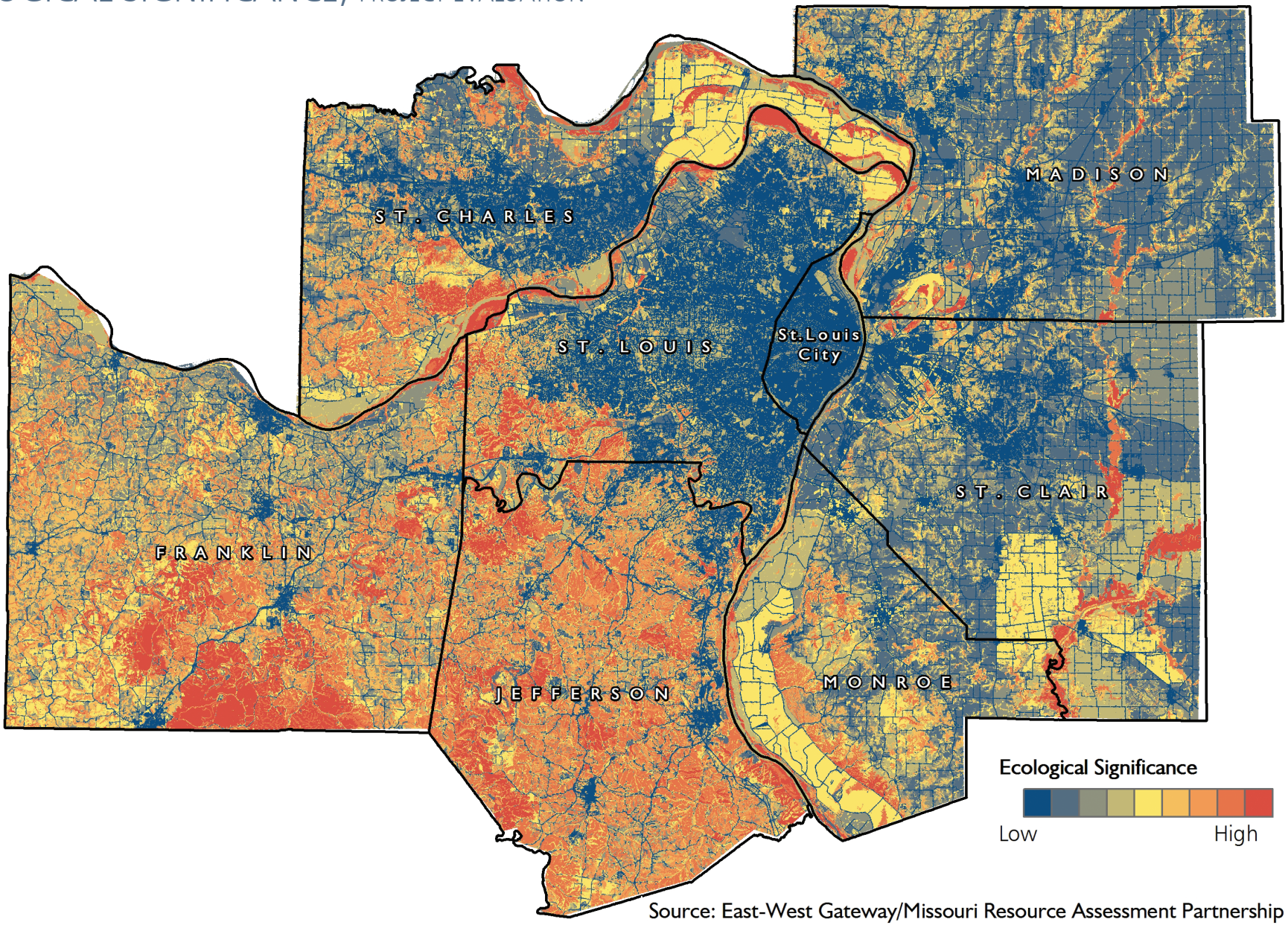
Ecological significance data can be used to help score proposed projects in a point-based matrix. Projects can be scored for many factors, including sustainability. While EWG's long-range transportation plan utilized the ecological significance rankings as points for scoring transportation projects, this dataset can be applied to any project-based scoring criteria.

For the EWG example, the first step to translate ecological significance rankings into project scores is to protect the areas of highest significance, even if they have a very small footprint. To do so, each proposed project is buffered by .25 miles and checked to see if any patches within the buffer are valued eight or nine. If no eight or nine patches are found, the project moves to Step 2. If a value of eight is present, the project is scored zero and does not move on to Step 2. The second step is to protect large chunks of mid- to high-value by computing an average value in the project area. Each proposed project is buffered by one mile and an average value is calculated in the buffered area. The higher the ecological significance value, the lower the project score. For example, if the average ecological significance value in a one-mile buffer is 2.1, the project receives two points in the scoring matrix.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

ECOLOGICAL SIGNIFICANCE, PROJECT EVALUATION



Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St Louis Metropolitan Planning Area
Raster Resolution: 6 meter
Recommended Scales: County, Sub-Watershed, City, Sites > 100 Acres
Date: 2010

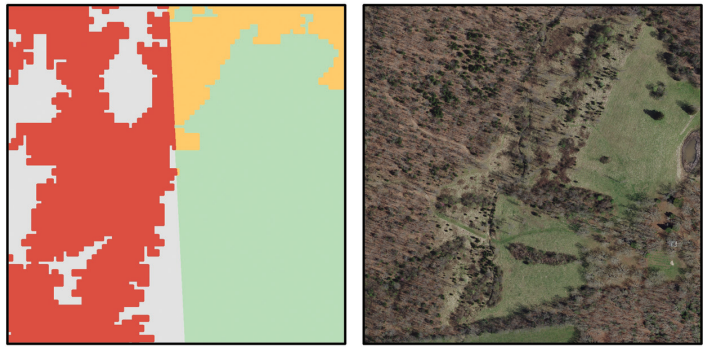
CASE STUDY: DEVELOPMENT PRESSURE

What is it?

Development pressure is a measure of where development is projected to occur, combined with identification of areas of high ecological significance. These are areas where existing ecological resources may be threatened by land use change in the future. EWG's staff forecasts potential development and land use change to support long-range transportation planning. The 30-year forecasts are based on projected demographic trends and land use plans. The forecasts for locations of land use change are broadly defined and should be understood as very rough estimations that are likely to change over time. Areas of high ecological significance are selected from the Regional Ecological Significance layer found on page 24. The map depicts areas of both high ecological significance and likely development in red, while areas of high value but low development pressure are shown in orange. The map shows areas of low significance shown in either green or gray, with gray symbolizing areas of projected development.

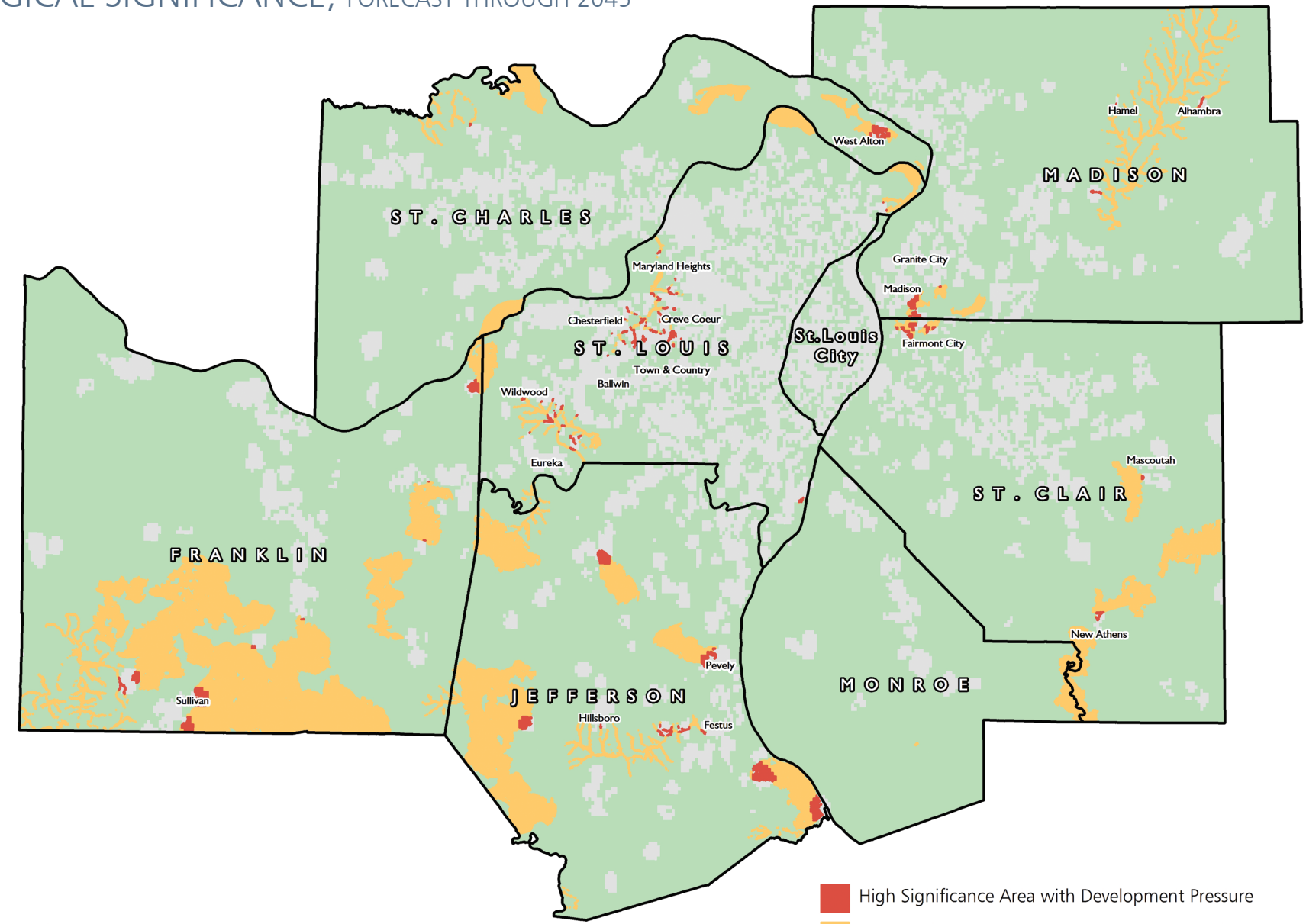
How is it used?

Mapping a development forecast in conjunction with ecological significance reveals areas where conflicting priorities may need to be addressed. Proactive conversations with landowners to discuss tools for balancing economic benefits and ecological benefits, such as conservation easements, can be started long before development reaches the identified areas. A development pressure map can be included in the earliest phases of transportation or greenfield land use planning to steer development toward areas of low ecological significance. Infrastructure investments can be conceptually planned to avoid areas of high ecological significance many years in advance of the required formal environmental impact assessments, potentially avoiding project delays and reducing mitigation costs.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

DEVELOPMENT PRESSURE ON AREAS OF HIGHEST ECOLOGICAL SIGNIFICANCE, FORECAST THROUGH 2045



Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St. Louis Metropolitan Planning Area
Recommended Scales: Region, County, Watershed HUC-8
Date: 2010; 2019

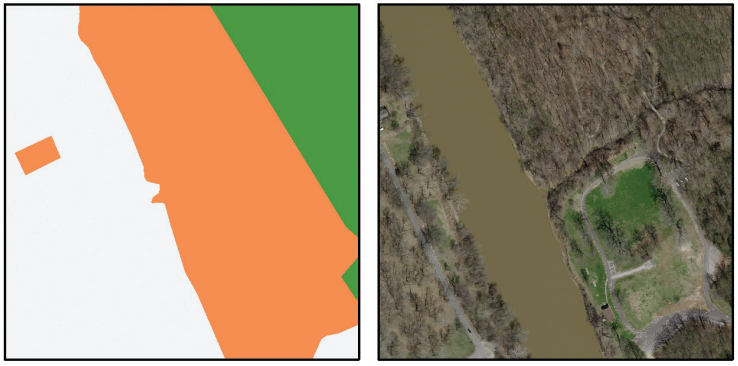
PROTECTED LANDS

What is it?

The Protected Areas Database of the United States (PAD-US) is the official inventory of public parks and other protected open space. It is a spatial GIS database covering over three billion acres, owned and managed by thousands of agencies, nonprofits, and land trusts. PAD-US was established in 2008 and is managed by the United States Geological Survey (USGS) Gap Analysis Program. Over 200,000 park and protected area units are currently tracked in PAD-US. Each unit includes managing or owning agency name, total size in acres, and other core attributes. The spatial data in PAD-US represents public lands held in trust by thousands of national, state, regional, and local governments, as well as nonprofit conservation organizations. PAD-US also includes conservation easement data from the National Conservation Easement Database (NCED) and National Oceanic Atmospheric Administration-defined Marine Protected Areas.

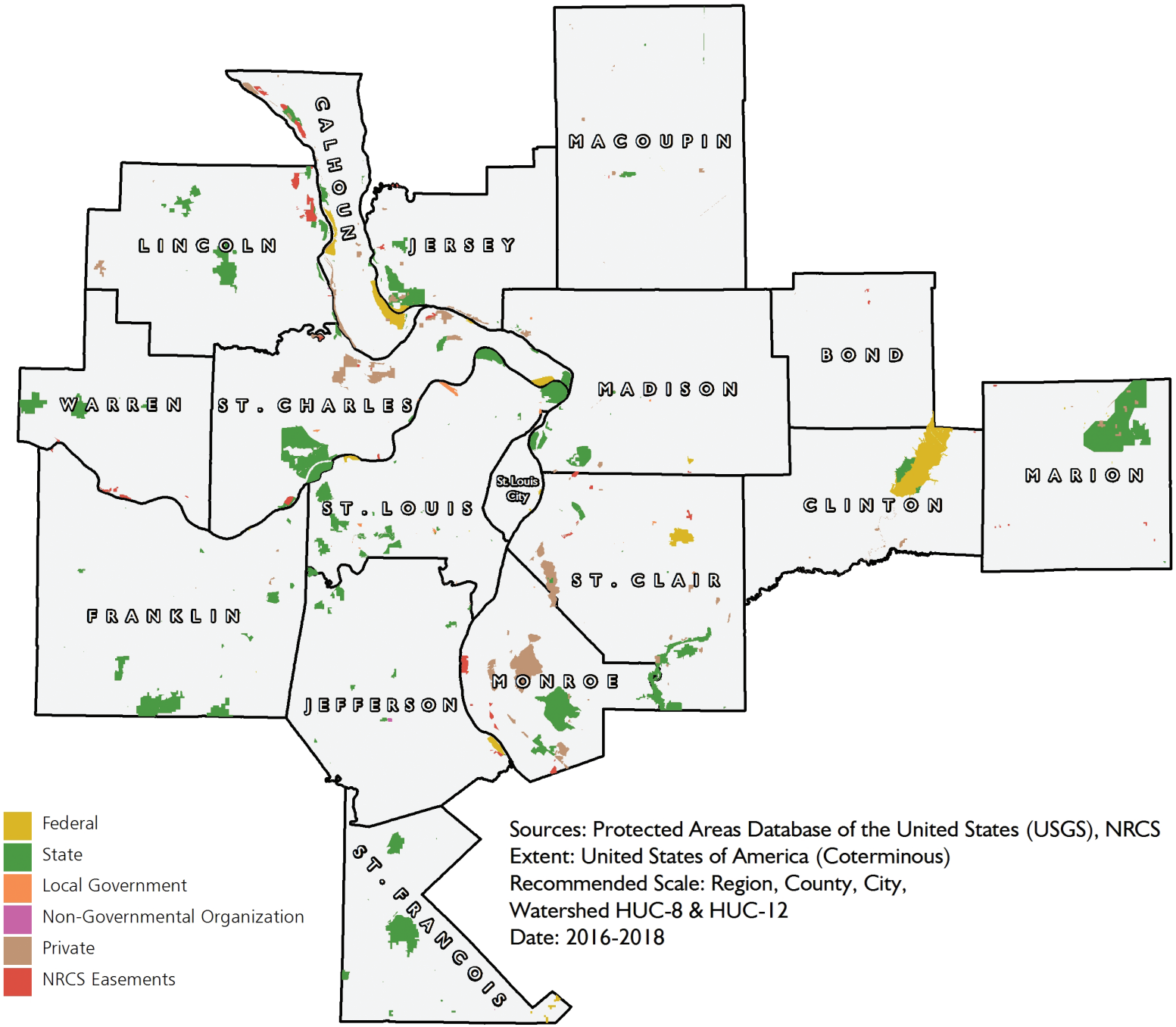
How can it be used?

The PAD-US can help people find every type of outdoor recreation opportunity, near and far from home, whether with a smartphone, a printed guide, or through web and social media. It can support local economic development through improved parks information that helps build tourism businesses, supports outdoor recreation suppliers and guides, aids local real estate agents, and provides other job opportunities. Using the PAD-US can protect biodiversity by focusing programs to conserve plant and wildlife species in particular regions before they become threatened or endangered. Using the data can also improve public health by enabling policy makers and researchers to learn more about parks and people nationally and in local areas, and to design programs that encourage active living to address obesity and other challenges. Incorporating the data into decision making can ensure sound development of road, energy, and other infrastructure by providing analysis of the most appropriate sites for conservation or mitigation.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

PROTECTED LANDS



CONSERVATION OPPORTUNITY AREAS

What is it?

Illinois Conservation Opportunity Areas

Illinois' Wildlife Action Plan includes an initial set of Conservation Opportunity Areas (COAs) that are priority areas for conserving Illinois' Species in Greatest Need of Conservation (SGNC). COAs are defined as locations:

- with significant existing or potential wildlife and habitat resources
- where partners are willing to plan, implement, and evaluate conservation actions
- where financial and human resources are available
- where conservation is motivated by an agreed-upon conservation purpose and set of objectives

The data for these sites includes the opportunities and priorities for conservation within them. While COAs have special importance in conserving Illinois' SGNC, not all of the species occur within this set of locations, and restricting conservation actions to these areas will not necessarily maintain viable populations or meet the objectives outlined in Illinois' Wildlife Action Plan.

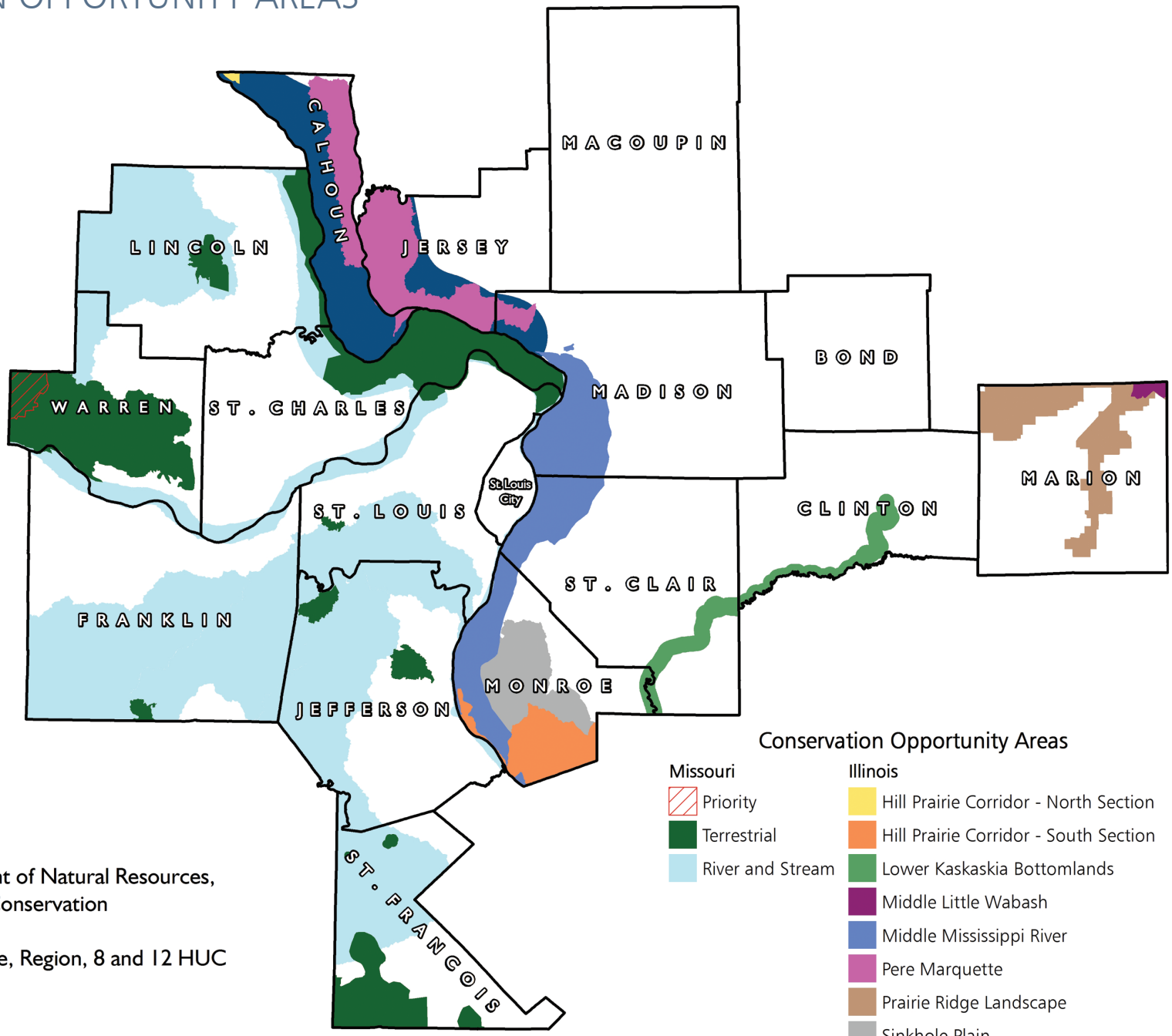
Missouri Conservation Opportunity Areas

Missouri's State Wildlife Action Plan identifies conservation opportunity areas which represent the greatest opportunities for sustainable conservation of Missouri's habitat systems and the species they support. The approach, simply stated, was to identify all conservation opportunities on the Missouri landscape, isolate those areas of greatest conservation opportunity, and then better focus conservation efforts to guide strategic decision-making regarding conservation actions within the COAs.

How can it be used?

The various needs of these COAs, and associated species and habitats, require coordination and communication among partners to help ensure the most efficient use of resources and proper implementation of best management practices. COAs can support critical transportation planning functions by assisting local conservation partners with planning and implementing activities within the COAs.

CONSERVATION OPPORTUNITY AREAS



Source: Illinois Department of Natural Resources, Missouri Department of Conservation
Extent: Statewide
Recommended Scale: State, Region, 8 and 12 HUC Watersheds, County
Date: 2013-2015

THREATENED OR ENDANGERED SPECIES DATA

What is it?

Missouri data

The Missouri Natural Heritage Program (MONHP) receives biological data from the Missouri Natural Features Inventory, field biologists, universities, scientific literature, herbaria, and other individuals and organizations. This information provides an understanding of the abundance, distribution, condition, and conservation needs of these sensitive elements. There are currently more than 18,000 element occurrence records of more than 800 sensitive species and natural community types in Missouri.

Species and natural communities are evaluated and ranked on the basis of their global and statewide status. These ranks are revised as new information becomes available; changes in ranking can be the result of changes in species populations or in changes in our knowledge of the species.

How can it be used?

The MONHP identifies species and natural communities of conservation concern in each Missouri county. You can use this database to get accurate and current information for conservation planning, environmental review, scientific research, land acquisition, and planning for economic development.

Illinois data

The Illinois Endangered Species Protection Board reviews and revises the Illinois List of Endangered and Threatened Species as warranted and no less often than every five years.

The criteria for listing a species in Illinois is as follows:

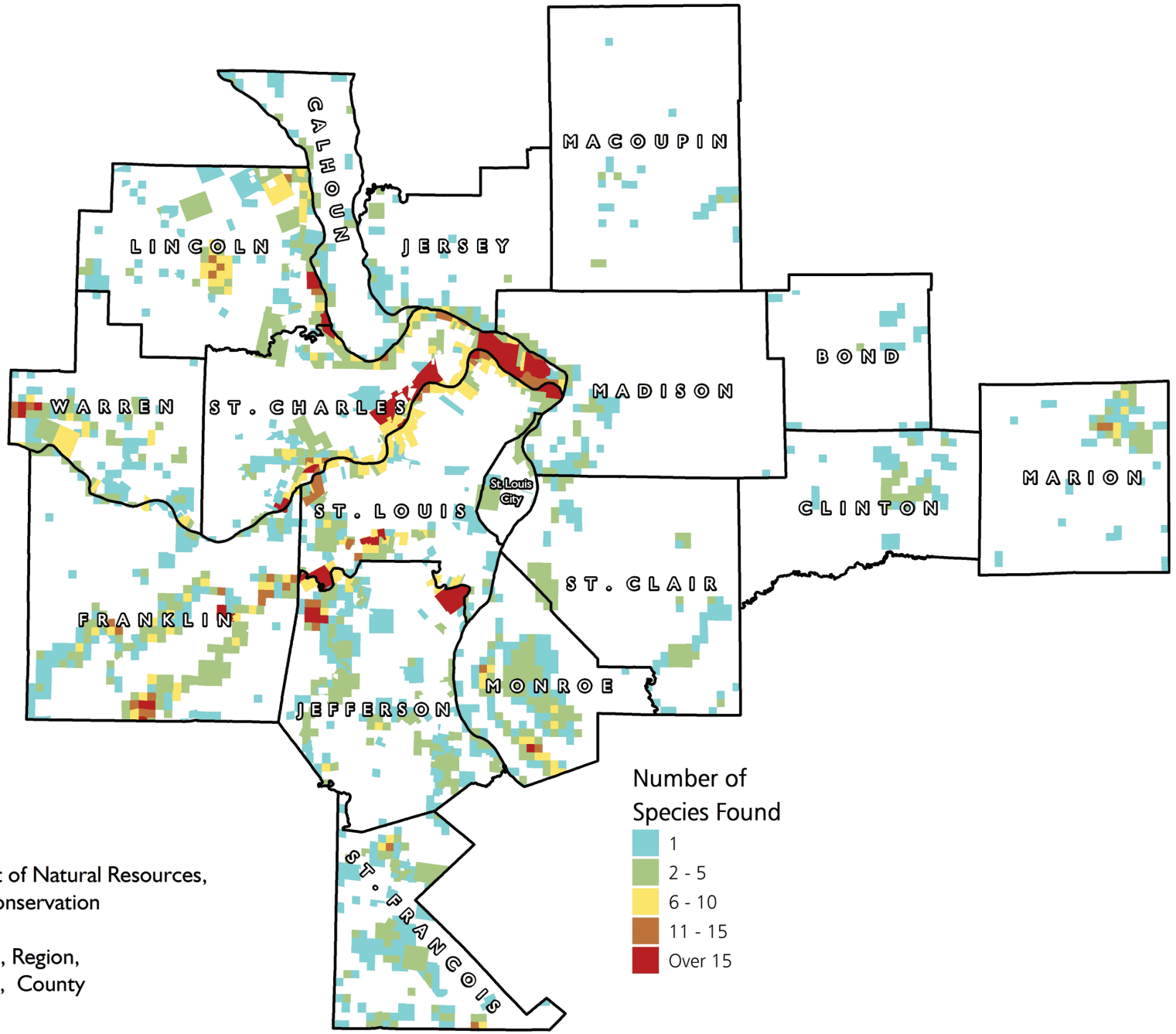
- Species or subspecies designated as federally endangered or threatened
- Species proposed for federal endangered or threatened status that occur in Illinois
- Species that formerly were widespread in Illinois but have been nearly extirpated from the state due to habitat destruction, collecting, or other pressures resulting from the development of Illinois
- Species that exhibit very restricted geographic ranges of which Illinois is a part
- Species that exhibit restricted habitats or low populations in Illinois
- Species that are significant disjuncts in Illinois, i.e., the Illinois population is far removed from the rest of the species' range.

How can it be used?

The Illinois Nature Preserves Commission uses this information to assist private and public landowners in protecting high quality natural areas and habitats of endangered and threatened species.

A Natural Heritage Review provides information about species and natural communities of conservation concern, public lands, and sensitive resources that could be affected by development projects. A Natural Heritage Review Report is not a site clearance letter. Incorporating information from the Missouri Natural Heritage Program into project plans is an important step in helping reduce unnecessary impacts to Missouri's sensitive natural resources. The absence of data for a given geographic area is not a guarantee that sensitive species or features are not present—only an on-site survey can determine the presence or absence of natural heritage resources.

THREATENED OR ENDANGERED SPECIES



Source: Illinois Department of Natural Resources, Missouri Department of Conservation
Extent: Statewide
Recommended Scale: State, Region, 8 and 12 HUC Watersheds, County
Date: 2018

ECOREGIONS

What is it?

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

The Ecoregions project is a federal effort to develop a common framework of ecological regions. Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies that have been used to develop the most commonly used existing ecoregion-type frameworks.

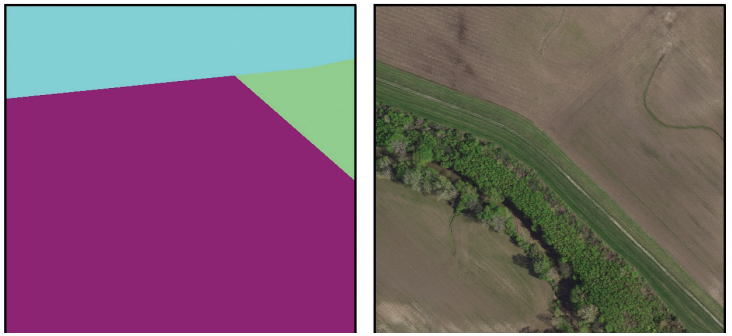
A Roman numeral hierarchical scheme has been adopted for different levels for ecological regions. **Level I** is the coarsest level, dividing North America into 15 ecological regions. **Level II** divides the continent into 50 regions (Commission for Environmental Cooperation Working Group, 1997). At **Level III**, the continental United States contains 105 regions, whereas the conterminous United States has 85 (U.S. Environmental Protection Agency, 2011). **Level IV** Ecoregions are further subdivisions of Level III Ecoregions.

How can it be used?

These general-purpose regions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernmental organizations that are responsible for different types of resources within the same geographical areas.

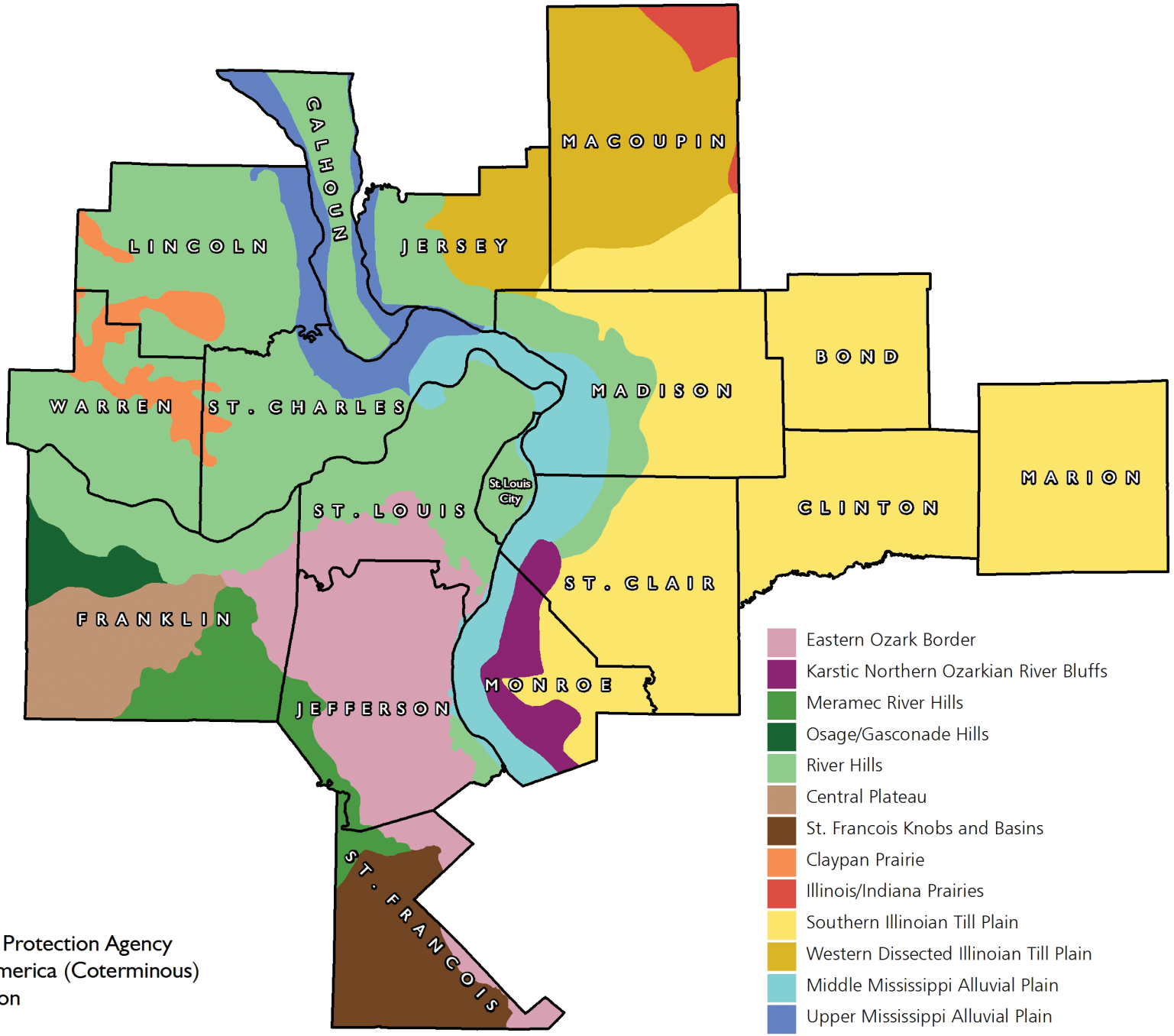
Ecoregions are directly applicable to the immediate needs of state agencies, including the development of biological criteria and water quality standards, and the establishment of management goals for nonpoint-source pollution. They are also relevant to integrated ecosystem management, an ultimate goal of most federal and state resource management agencies.

The approach used to compile this map is based on the premise that ecological regions can be identified through the analysis of patterns of biotic and abiotic phenomena, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

ECOREGIONS LEVEL IV



Source: US Environmental Protection Agency
Extent: United States of America (Coterminous)
Recommended Scale: Region
Date: 2013

3

3

WATER AND WETLANDS

CONTENTS IN THIS SECTION

WATERSHED BOUNDARY DATASET

What is it?

A watershed is an area of land that drains rain or snow water into one location such as a stream, lake, or wetland. These water bodies supply our drinking water, water for agriculture and manufacturing, offer opportunities for recreation, and provide habitat to numerous plants and animals.

The watershed boundary will, more or less, follow the highest ridgeline around the stream channels and meet at the bottom or lowest point of the land where water flows out of the watershed, the mouth of the waterway. Much of the water comes from rainfall and stormwater runoff. Alterations to the land—mining, agriculture, roadways, urban development, and the activities of people within a watershed—affect the quality and quantity of stormwater. Naturally elevated areas usually separate from other watersheds by naturally elevated areas.

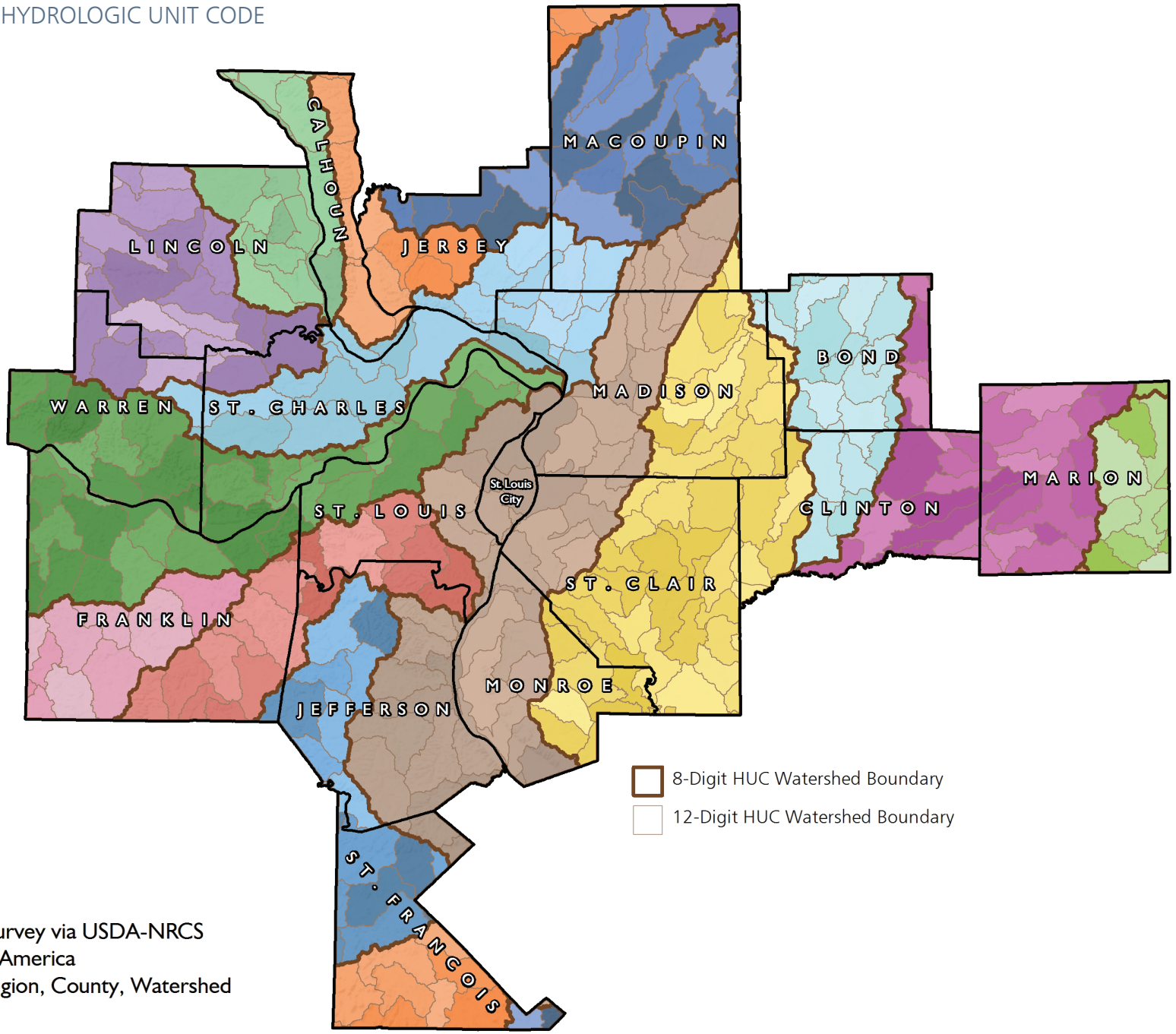
How can it be used?

Watersheds are important because the surface water features and stormwater runoff within a watershed ultimately drain to other bodies of water. It is essential to consider these downstream impacts when developing and implementing water quality protection and restoration actions. Watershed boundaries can be considered units of management since watershed management is ultimately land use management. Mapping watershed boundaries helps to identify potential sources of pollution, helps to identify monitoring sites, provides information to educate the local community about potential pollution sources and the stressors affecting a stream and its watershed, and provides a blueprint for possible community restoration efforts or green infrastructure projects.

A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

WATERSHED BOUNDARY DATASET

8-DIGIT AND 12-DIGIT HYDROLOGIC UNIT CODE



Source: US Geological Survey via USDA-NRCS
Extent: United States of America
Recommended Scale: Region, County, Watershed
Date: 2017

ASSESSED AND IMPAIRED WATERS (305B & 303D)

What is it?

The federal Clean Water Act requires states to assess their streams, rivers, and lakes to see if they meet water quality standards. The states of Missouri and Illinois monitor the blue water bodies on the map to determine if they meet water quality standards that have been set by each state. The red water bodies are those that have been assessed as not meeting one or more water quality standards, and are therefore considered polluted or impaired. The state reports what contaminant(s) is causing the water body to be impaired. Impaired means that the water body does not support one or more of its intended uses. This could mean that the water is not suitable to drink, swim in, or to consume the fish that are caught there.

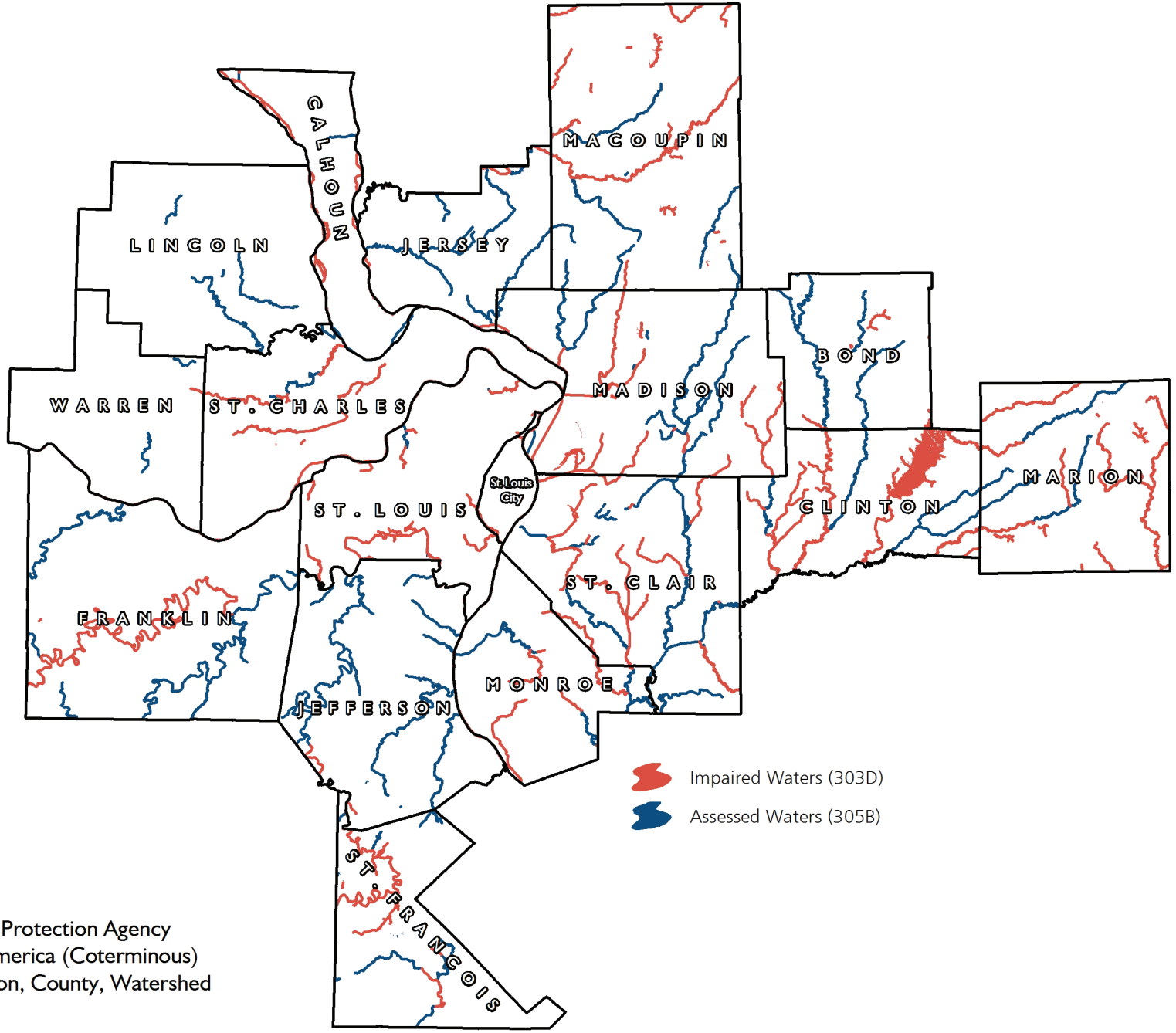
How can it be used?

The location of polluted water bodies and knowing what the pollutant(s) is can be used in watershed planning, stormwater planning, and community planning to prioritize the types and locations of best management practices for reducing runoff carrying contaminants to streams and rivers. Restoring water bodies so that they meet water quality standards again is important for those rivers or lakes that are sources of drinking water to help reduce the cost of water treatment. In many cases, water bodies are polluted by contaminants that can harm humans if they come into contact with the water. Restoring water quality in these water bodies will ensure residents can recreate safely and enjoy the lakes, rivers, and streams that are part of their community.

The Missouri Department of Natural Resources and the Illinois Environmental Protection Agency provide grant funding through the Clean Water Act Section 319 Nonpoint Source Pollution Management Program. This program provides funding to agencies or organizations to undertake projects that improve the water quality of a water body that is not meeting water quality standards and is on a state's Section 303(d) List of Impaired Waters. In order to receive Section 319 funding for such projects, a watershed management plan (WMP) must be developed that demonstrates how projects will reduce a particular contaminant and bring a water body into compliance with water quality standards.

EWG developed the Lower Meramec Watershed Management Plan, which identified projects to reduce the pollutant load in streams that drain to the Meramec River and projects that will demonstrate the benefits of riparian restoration on water quality. HeartLands Conservancy has produced several WMPs in the Illinois counties of Madison and St. Clair, and has been successful in applying 319 implementation funds towards specific projects that reduce contaminants in local waterways.

ASSESSED AND IMPAIRED WATERS 305D AND 303D



Source: US Environmental Protection Agency
Extent: United States of America (Coterminous)
Recommended Scale: Region, County, Watershed
Date: 2015

WETLAND MAPPING AND RANKING IN THE BOTTOMLANDS

What is it?

These datasets used Light Detection and Ranging-based (LiDAR) elevation and vegetation height, air photos, and satellite data to further define land cover type and digital soils to map existing wetland patches within the Missouri River, Mississippi River, Meramec River, and Upper Silver Creek floodplains. Wetlands were ranked for mitigation and restoration importance, meaning all areas over bottomland soils were ranked as having either potential wetland mitigation value or potential wetland restoration value. Cropland, barren, or sparsely vegetated land and open water were ranked in terms of potential for restoration, and all other existing vegetation types were ranked in terms of potential for mitigation.

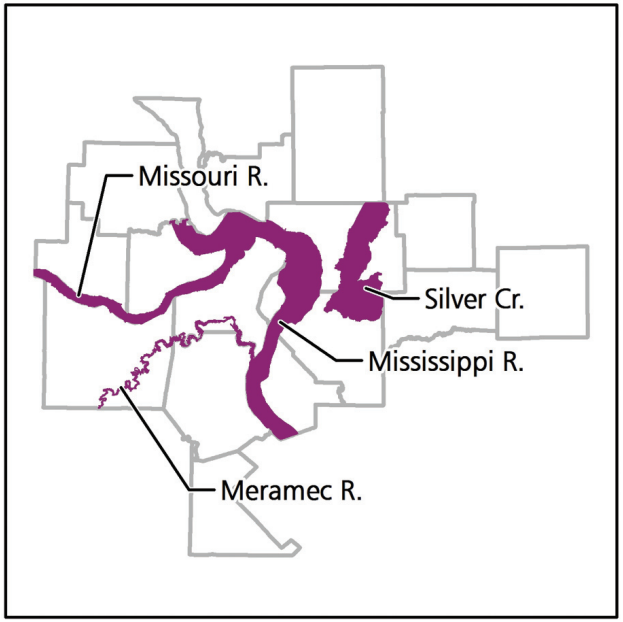
Wetland patches were defined based on patches formed by the aggregation of all wetlands and all non-wetland vegetation touching existing wetlands. Mitigation ranks were based on wetland patch size, diversity, and distance to public lands or urban lands. Restoration ranks were based on water regime (essentially a feasibility index for restoring wetlands) and distance to existing wetlands or public lands.

The U.S. Fish and Wildlife Service (USFWS) is the principle U.S. federal agency tasked with providing information to the public on status and trends of our national wetlands. The USFWS's National Wetlands Inventory (NWI) is a publicly available resource that provides detailed information on the abundance, characteristics, and distribution of U.S. wetlands. While EWG data does not have the same coverage extent of the NWI, the data is newer and the quality is more refined.

How can it be used?

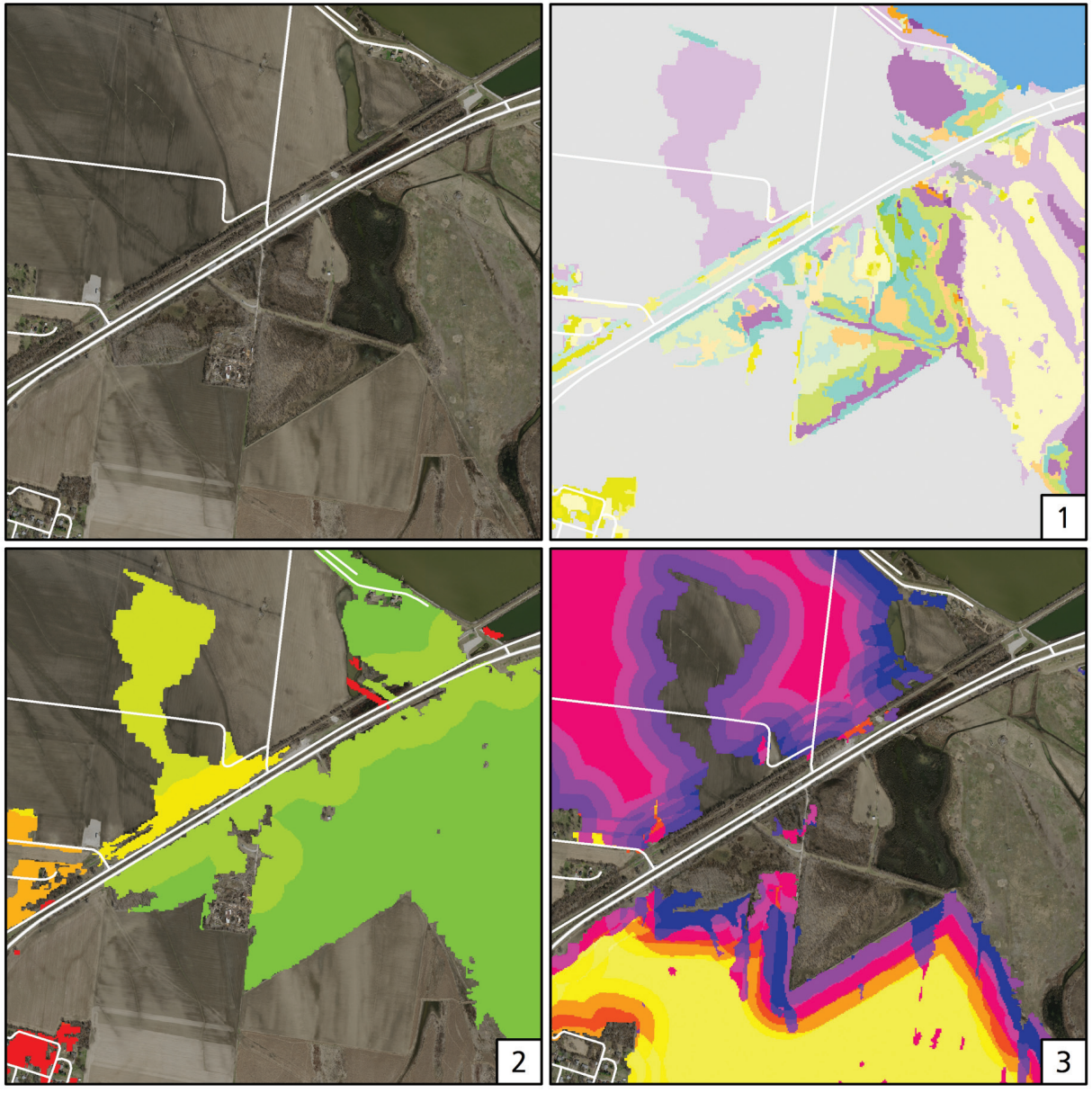
Activities that disturb wetlands, streams, and other waters are regulated, and authorized impacts must be permitted under Section 404 of the Clean Water Act. Permits require compensatory mitigation or authorized impacts. Existing wetlands must be conserved, or non-wetland areas must be restored, as part of the permitting process. For this reason, this dataset which refines the location, wetland type, and ecological significance of wetlands in the EWG region can be used to assess and recommend mitigation or restoration projects—either as part of the permitting process or as part of community-driven efforts to improve biodiversity and ecosystem services provided by wetland complexes.

Planners, conservation agencies, and developers will find the dataset useful for determining wetland complexes within the study areas that are suitable for protecting/conserving (or not) because of their high mitigation importance ranking. The dataset also determines wetland complexes within the study areas that are suitable for restoration (or not) because of their high restoration importance ranking.



Wetland Importance and Restoration areas mapped by EWG

WETLANDS



1) Wetland Type, 2013

- Deciduous Forested Wetland, Permanently Flooded-PFO1H
- Deciduous Forested Wetland, Seasonally Flooded-PFO1C
- Deciduous Forested Wetland, Temporarily Flooded-PFO1A
- Deciduous Short Shrub/Scrub Wetland, Permanently Flooded-PSSS1H
- Deciduous Short Shrub/Scrub Wetland, Seasonally Flooded-PSSS1C
- Deciduous Short Shrub/Scrub Wetland, Temporarily Flooded-PSSS1A
- Deciduous Tall Shrub/Scrub Wetland, Permanently Flooded-PTSS1H
- Deciduous Tall Shrub/Scrub Wetland, Seasonally Flooded-PTSS1C
- Deciduous Tall Shrub/Scrub Wetland, Temporarily Flooded-PTSS1A
- Emergent Marsh, Permanently Flooded-PEM1H
- Emergent Marsh, Seasonally Flooded-PEM1C
- Emergent Marsh, Temporarily Flooded-PEM1A
- Upland Forested Vegetation-UFO
- Upalnd Tall Shrub/Scrub-UTSS
- Upland Short Shrub/Scrub-USSS
- Upland Herbaceous Vegetation-UEM
- Barren Pondshore-PUBH
- Not Natural Vegetation-N
- River Water-RH2

2) Wetland Importance

High — Low

3) Wetland Restoration

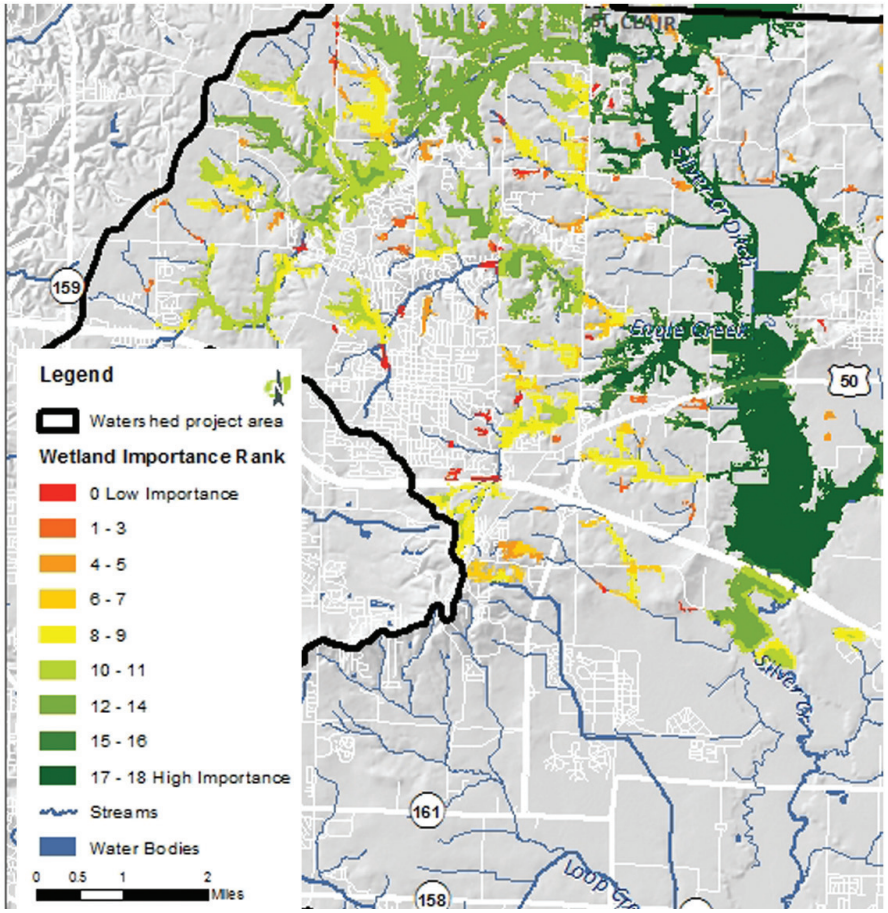
High — Low

Source: MoRAP
Extent: East-West Gateway Region
Recommended Scale: Region, County, City
Date: 2013

CASE STUDY: WETLANDS-HEARTLANDS CONSERVANCY

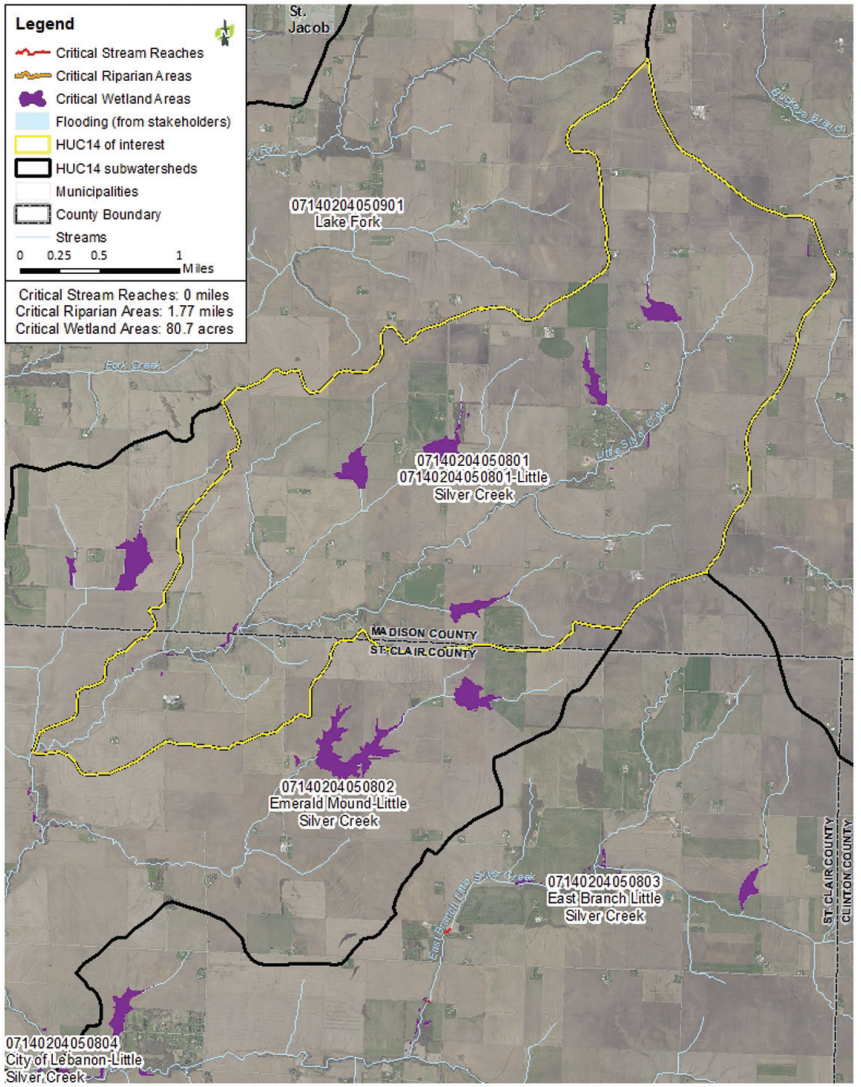
The Silver Creek in Illinois drains to the Kaskaskia River, the confluence in the southern part of St. Clair County. HeartLands Conservancy produced watershed plans for two sections of the creek, Upper Silver Creek in Madison County and Lower Silver Creek in St. Clair County, to analyze the watershed and make recommendations toward improving water quality. Since localized flooding is an issue in the watershed, the plans provided recommendations to address flooding and for stormwater management.

WETLANDS IMPORTANCE RANK



User Tip: Wetlands are highly effective at filtering pollutants from surface water, in addition to providing flood storage and wildlife benefits.

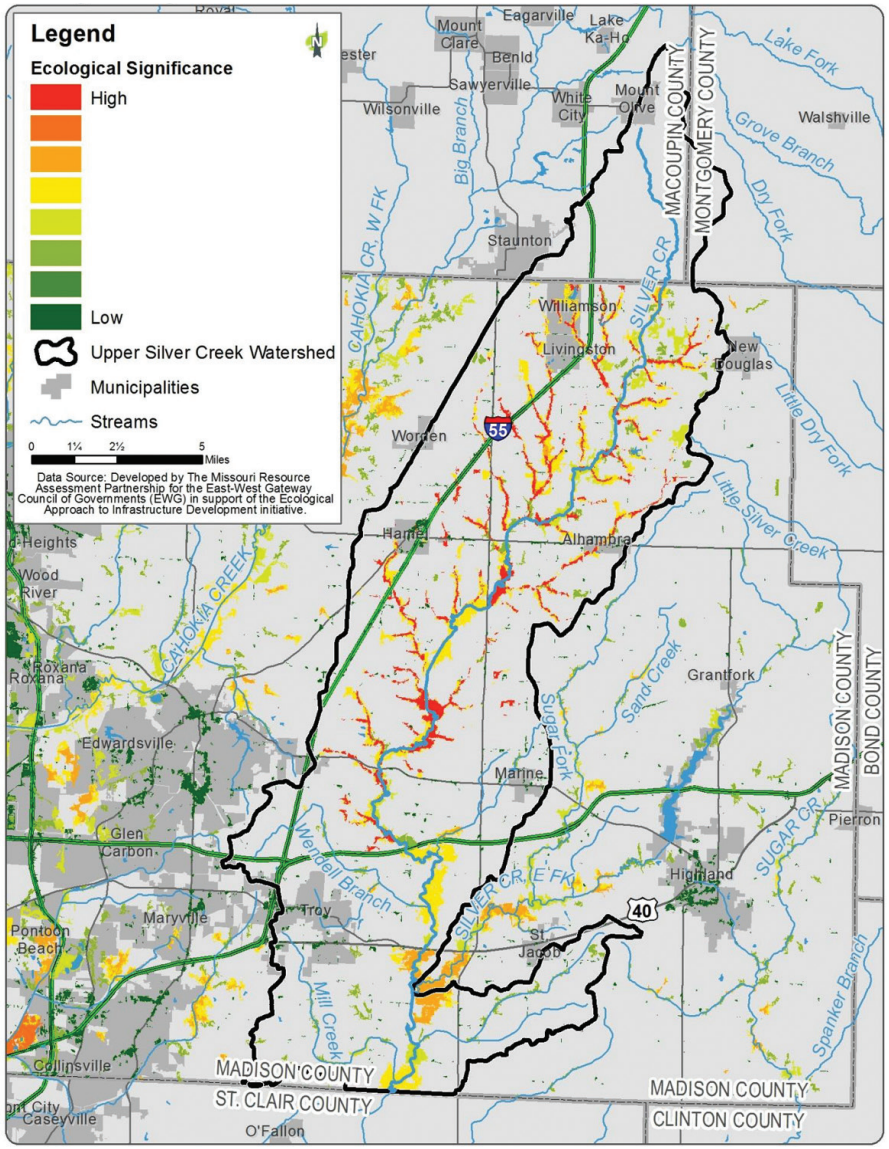
LOWER SILVER CREEK



The wetlands data was one of two primary data tools used to identify riparian areas and critical wetlands areas that are highly suitable for restoration. Given that the wetlands data uses proximity to existing wetlands as part of its criteria for ranking, areas with high restoration rank are typically in or close to the stream corridor. Locations in the corridor with a high restoration rank were included as critical wetland areas in the plans. In the Lower Silver Creek plan, the wetlands data was used at both the study area scale, HUC 10, as well as a finer scale, HUC 14. At the HUC 14 scale, specific wetland area sites were identified, such as the 80.7 acres of critical wetlands in five locations on tributaries to Lower Silver Creek. In a watershed plan, critical areas are locations to focus activity that will reduce the pollutant load in the impaired water body.

The plan also used the ecological significance data as part of its Watershed Resource Inventory. Areas of high ecological significance were identified in the Silver Creek corridor, in particular several major tributaries and the wetland bottom areas where East Fork Silver Creek enters Sliver Creek. The inventory data was used to identify and prioritize Best Management Practices (BMPs) for project implementation. These BMPs will be applied to critical areas identified in the plan with the expectation that they will lead to improved water quality in the impaired water body.

ECOLOGICAL SIGNIFICANCE



NATIONAL HYDROGRAPHY DATASET

What is it?

The National Hydrography Dataset (NHD) is a comprehensive dataset that represents the surface water of the United States using features such as:

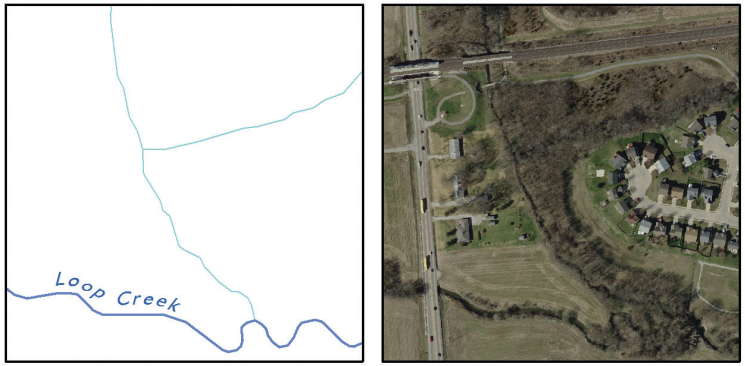
- streams, rivers
- lakes, ponds, reservoirs
- swamp/marsh
- canals
- coastline
- glaciers

The NHD contains a unique identification system and geometric network. By utilizing unique attributes and the network of the NHD, it is possible to study spatial relationships, such as how a toxic spill upstream might affect a fish population or drinking water downstream.

How can it be used?

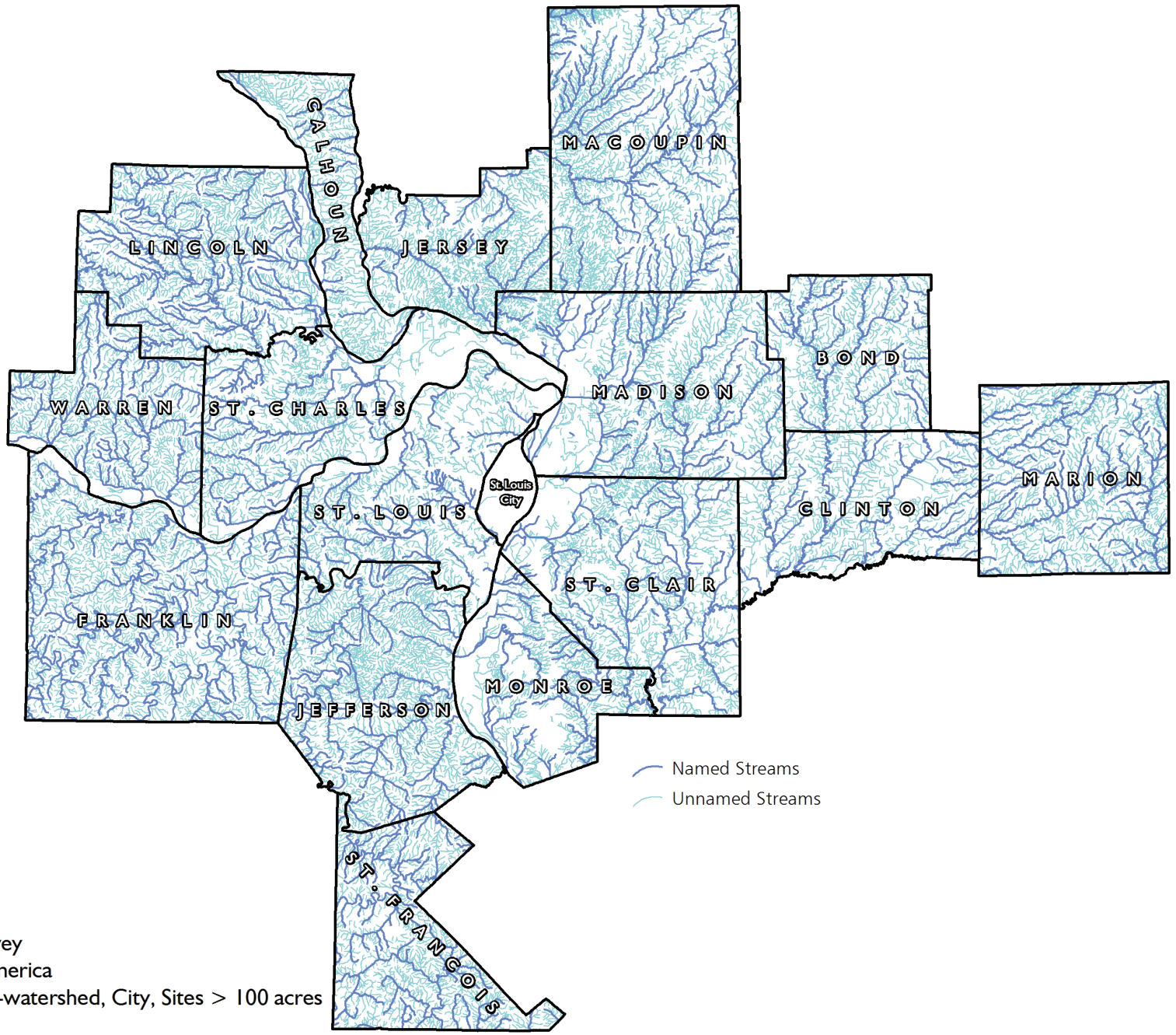
One of the great features of the NHD is the ability to perform upstream and downstream traces on the flowline network. Because the NHD flowline feature class takes advantage of a geometric network, a user can specify a point on a NHD flowline and perform a trace upstream or downstream to select all NHD flowline features using GIS.

Tracing can be very useful to determine streams that could be impacted by a potentially hazardous event upstream. For example, if an oil spill occurred at a known location, the user can place a trace initiation point at the location of the spill, and then determine locations downstream that could potentially be contaminated. Or, a trace upstream could identify all streams and tributaries that flow into a specific point.



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

NATIONAL HYDROGRAPHY DATASET HIGH RESOLUTION



Source: US Geological Survey
Extent: United States of America
Recommended Scales: Sub-watershed, City, Sites > 100 acres
Date: February 2018

FLOOD HAZARD ZONES

What is it?

The Federal Emergency Management Administration (FEMA) Flood Map Service Center is the official public source for flood hazard information produced in support of the National Flood Insurance Program.

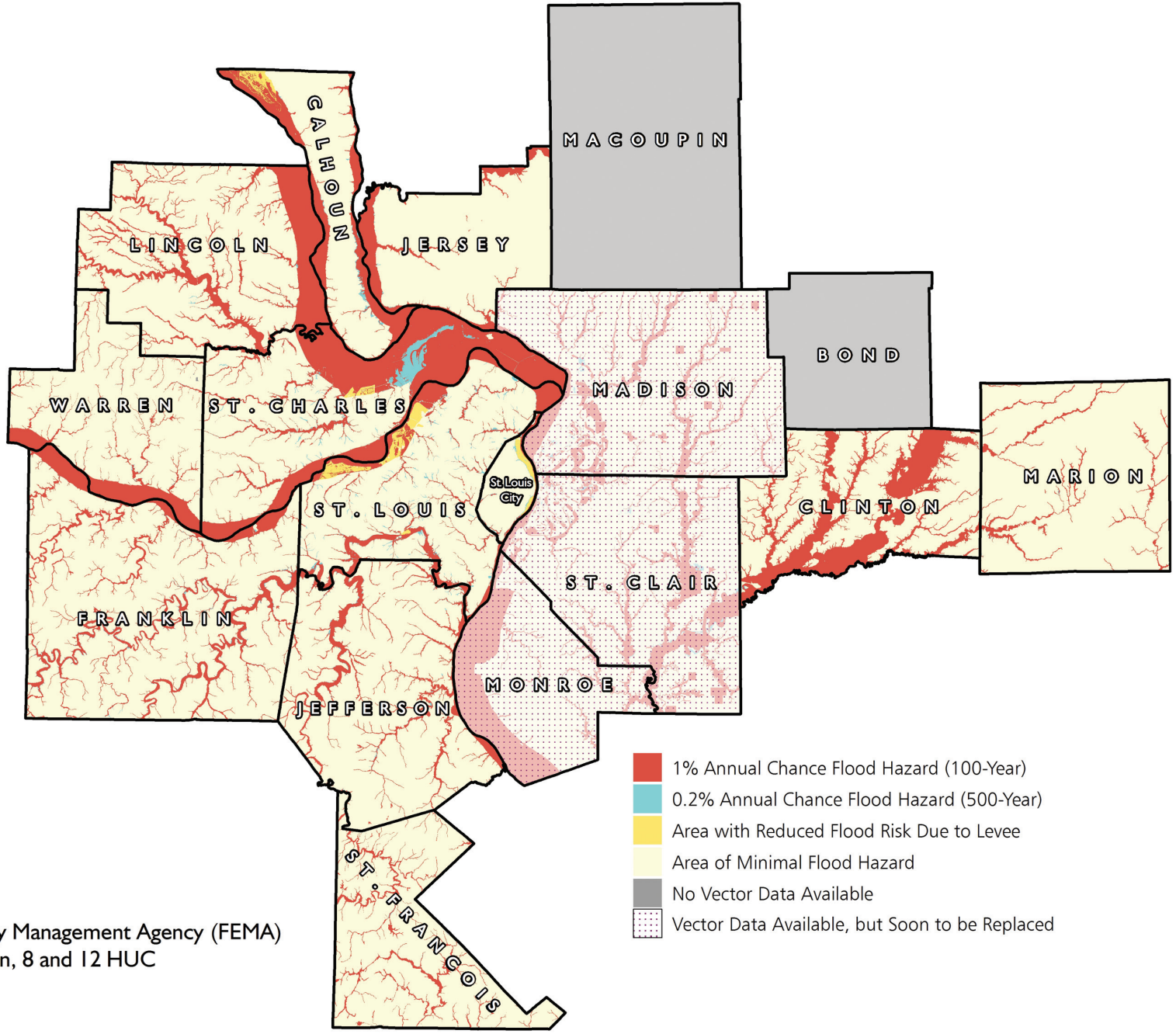
Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). A SFHA is defined as the area that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1 percent annual chance flood is also referred to as the base flood or 100-year flood. Moderate flood hazard areas are the areas between the limits of the base flood and the 0.2 percent annual chance (or 500-year) flood. The areas of minimal flood hazard are the areas outside the SFHA and higher than the elevation of the 0.2 percent annual chance flood.

How can it be used?

Localities use the FEMA Flood Map Service Center to find their official flood map, access a range of other flood hazard products, and take advantage of tools for better understanding flood risk in their communities.

NASA satellite photo shows swollen rivers in the St. Louis area. This image was obtained in August 1993 (during the height of the Flood of 1993). The Great Flood also forced the evacuation of approximately 54,000 people and destroyed or damaged approximately 50,000 homes. Losses were estimated at 15 to 20 billion dollars.

FEMA FLOOD HAZARD ZONES



Sources: Federal Emergency Management Agency (FEMA)
Recommended Scale: Region, 8 and 12 HUC Watersheds, County, City
Date: Varies by county

4




GEOLOGY & SOILS

4

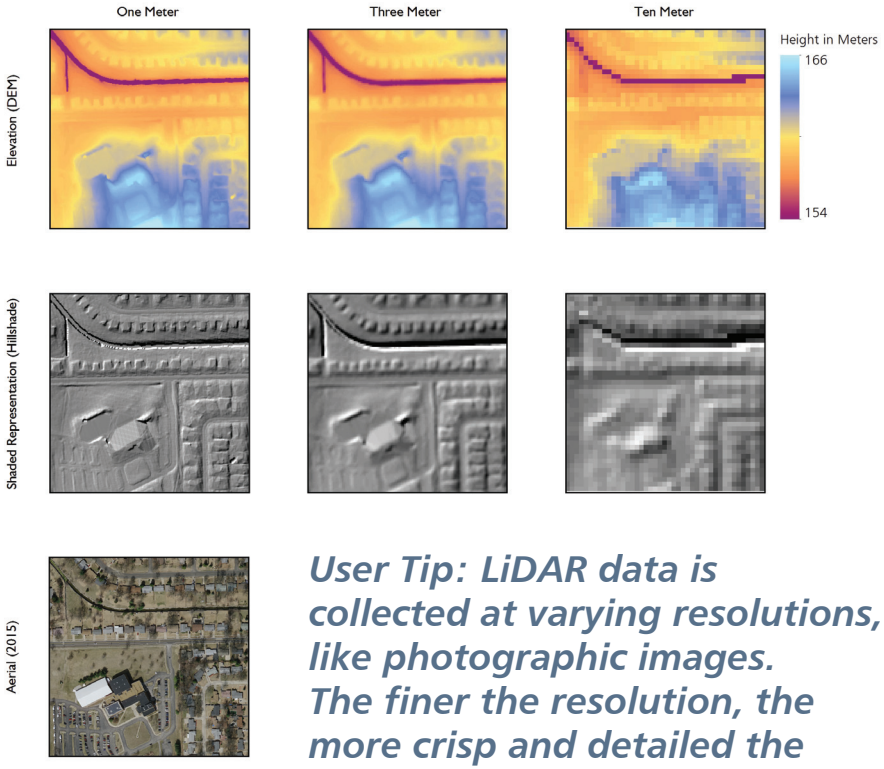
CONTENTS IN THIS SECTION

LIDAR AVAILABILITY BY ACQUISITION YEAR

What is it?

LiDAR, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses—combined with other data recorded by the airborne system—generate precise, three-dimensional (3-D) information about the shape of the Earth and its surface characteristics.

A LiDAR instrument principally consists of a laser, a scanner, and a specialized Global Positioning System (GPS) receiver. LIDAR data is often collected by air.

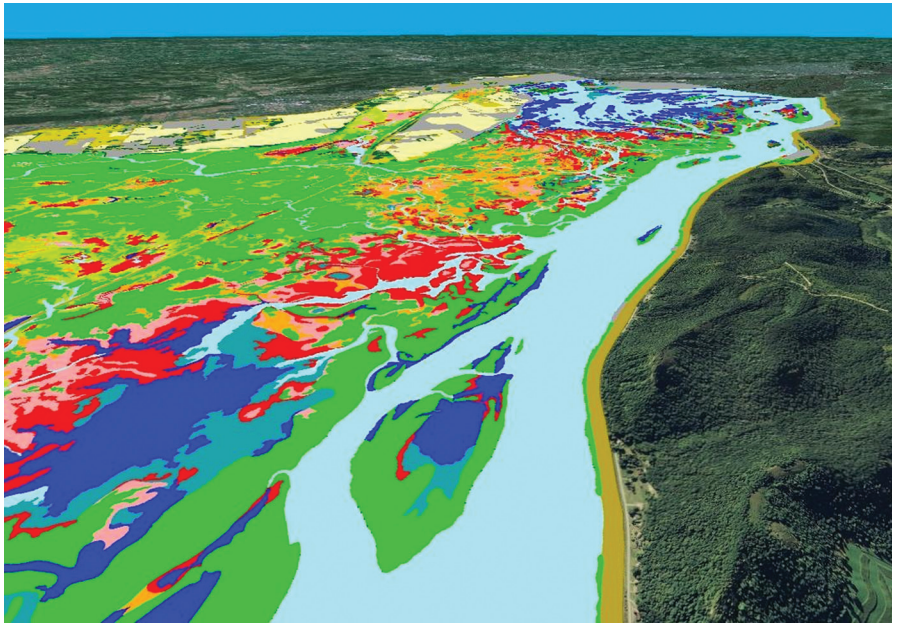


User Tip: LiDAR data is collected at varying resolutions, like photographic images. The finer the resolution, the more crisp and detailed the resulting Digital Elevation Model (and derived products like hillshade and slope maps) will be.

How can it be used?

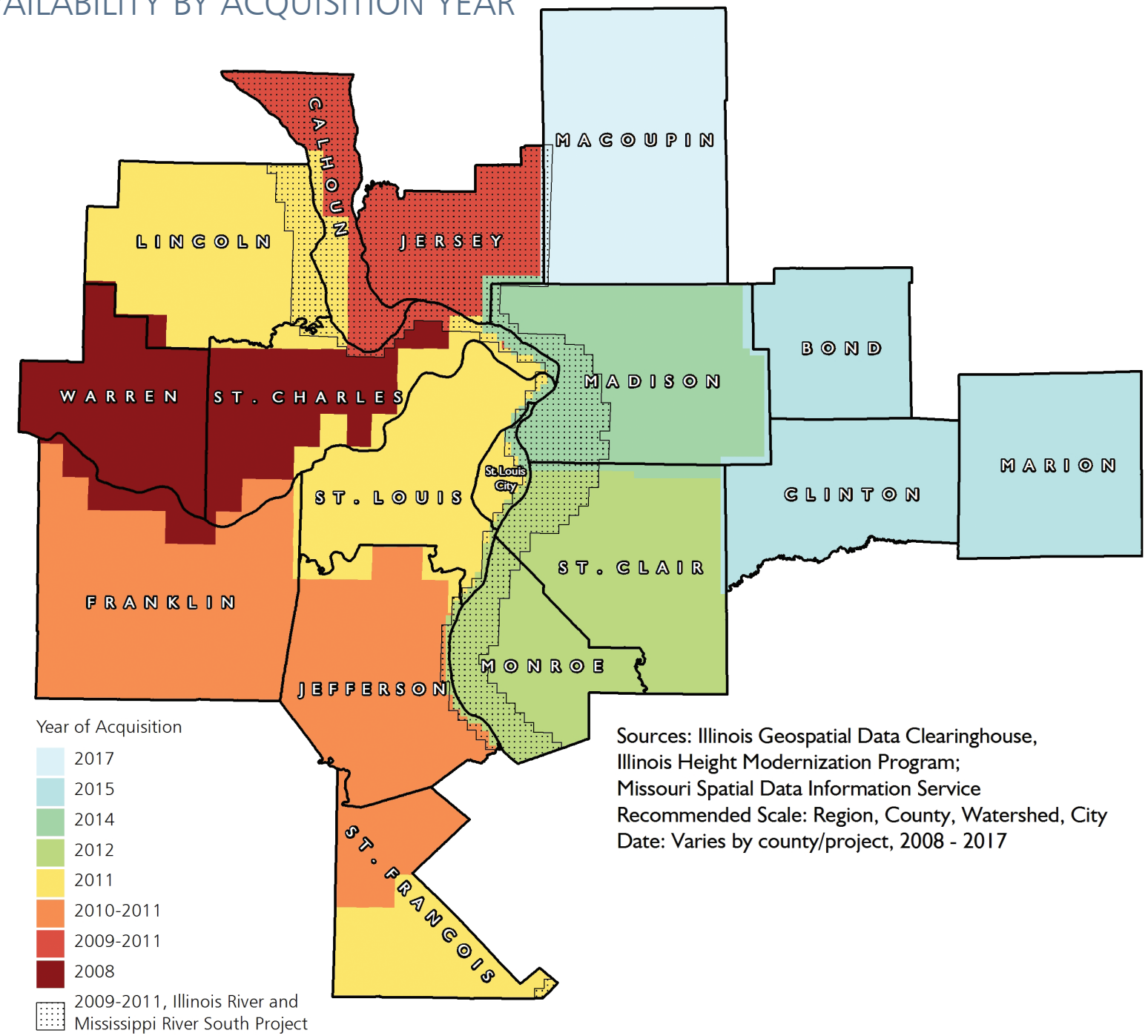
Typically, users utilize LIDAR-generated products to examine both natural (vegetation height) and manmade environments (bridges). LiDAR data supports activities such as inundation and storm surge modeling, hydrodynamic modeling, shoreline mapping, emergency response, hydrographic surveying, and coastal vulnerability analysis.

To help offset costs, St. Louis communities typically pool resources to obtain LiDAR for their community. Recent examples of using LiDAR include the Land Cover dataset and various homeland security initiatives. For the St. Louis region, LiDAR availability varies by county.



Lidar data for the Upper Mississippi River.

LIDAR DATA AVAILABILITY BY ACQUISITION YEAR



Sources: Illinois Geospatial Data Clearinghouse,
Illinois Height Modernization Program;
Missouri Spatial Data Information Service
Recommended Scale: Region, County, Watershed, City
Date: Varies by county/project, 2008 - 2017

ELEVATION

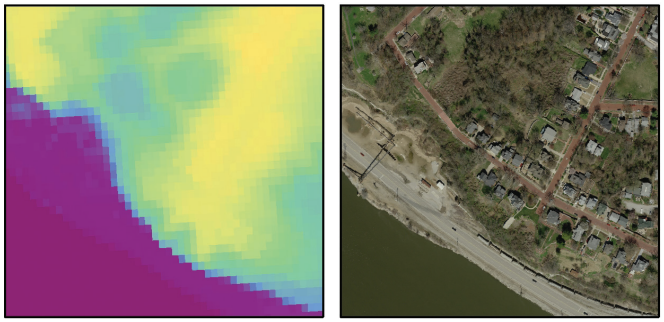
What is it?

A Digital Elevation Model (DEM) is digital cartographic/geographic data in raster form. The terrain elevations for ground positions are sampled at regularly spaced horizontal intervals. Densely sampled elevation data can be used to create detailed landform representations of the bare earth or it may include structures and vegetation heights. DEMs are created using LiDAR, which samples millions of elevation heights by sending out pulses of light and measuring the time required for the light to bounce off a surface and return to a sensor. The millions of elevation measurements are interpolated to create representations of features on the Earth's surface.

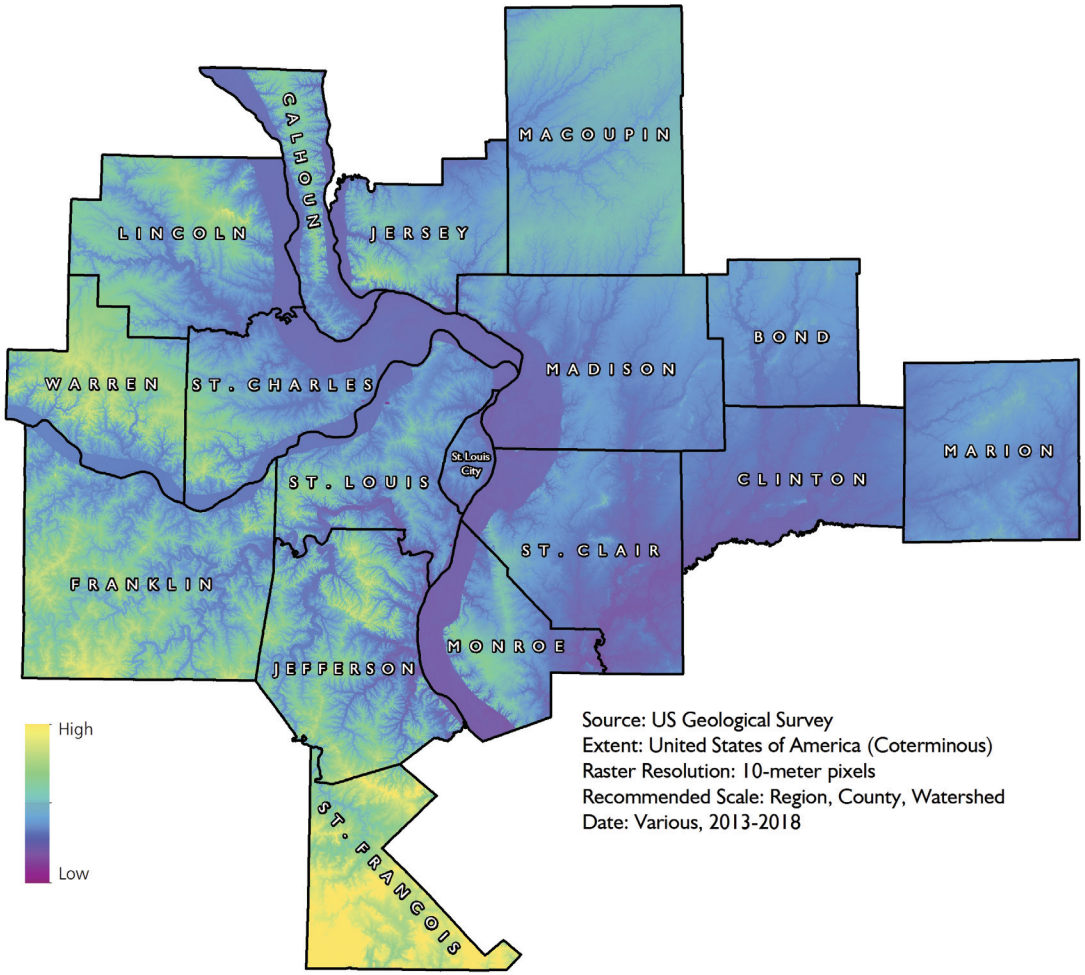
How can it be used?

Analysis tools can be run on DEMs to calculate new surfaces such as slope and aspect, which can inform discussions and planning models for development suitability or vegetation restoration. DEMs can also be used to study surface properties such as visibility (viewshed) and water flow or even construct 3-D models.

DIGITAL ELEVATION MODEL



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

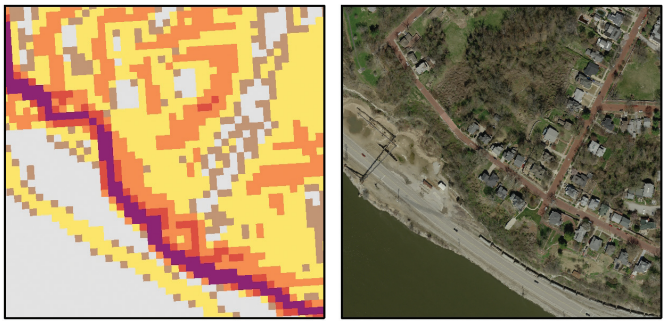


Source: US Geological Survey
Extent: United States of America (Coterminous)
Raster Resolution: 10-meter pixels
Recommended Scale: Region, County, Watershed
Date: Various, 2013-2018

What is it?

This slope map is an example of a product that can be derived from a DEM. Each pixel on the map represents the results of a calculation performed on the DEM. In this case, slope is calculated by comparing the recorded elevation of adjacent pixels in the DEM. The difference between adjacent pixels is represented as the slope angle in degrees. Slope can be an important consideration when choosing sites for development or calculating the potential for runoff and soil erosion.

DIGITAL ELEVATION MODEL-SLOPE



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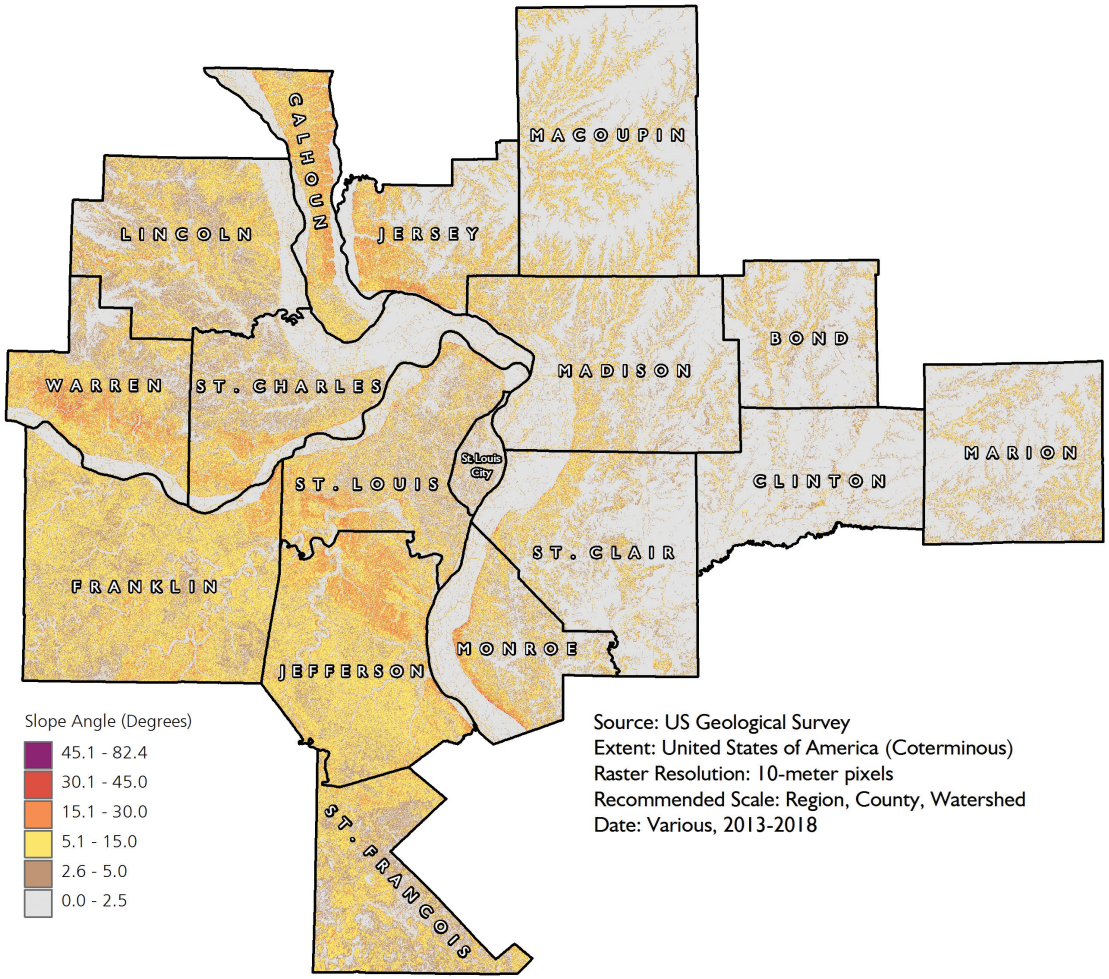


SOILS SURVEY GEOGRAPHIC DATABASE RESOURCES

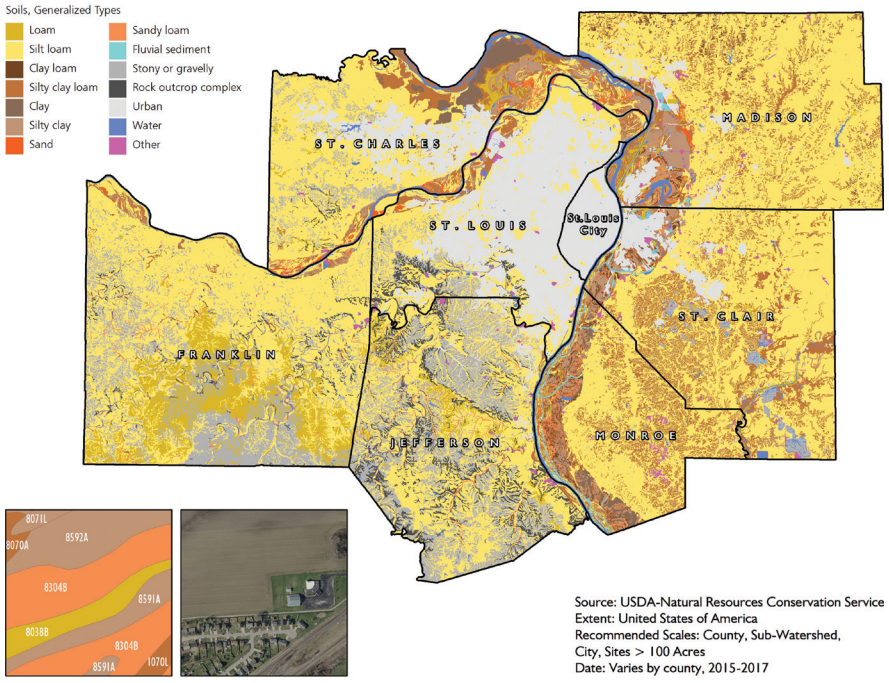
The Soil Survey Geographic database (SSURGO) contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. The information can be displayed in tables or as maps and is available for most areas in the United States. The information was gathered by walking over the land and observing the soil. Many soil samples were analyzed in laboratories. The maps outline areas called map units. The map units describe soils and other components that have unique properties, interpretations, and productivity. The mapping is intended for natural resource planning and management by landowners, townships, and counties. Some knowledge of soils data and map scale is necessary to avoid misunderstandings.

The maps are linked in the database to information about the component soils and their properties for each map unit. Each map unit may contain one to three major components and some minor components. The map units are typically named for the major components. Examples of information available from the database include available water capacity, soil reaction, electrical conductivity, and frequency of flooding; yields for cropland, woodland, rangeland, and pastureland; and limitations affecting recreational development, building site development, and other engineering uses.

Soil by Type

Soils are classified based on their texture, a product of the proportions of coarse sand, silt, and fine clay particles present in each soil type. In this map, soil types are grouped into general categories to illustrate the locations of floodplain silty clays, fertile loams, and rocky soils. While the soil maps portray each soil map unit as a polygon with clear edges it is important to remember that soils often transition gradually from one type to another.

SOILS, GENERALIZED TYPES

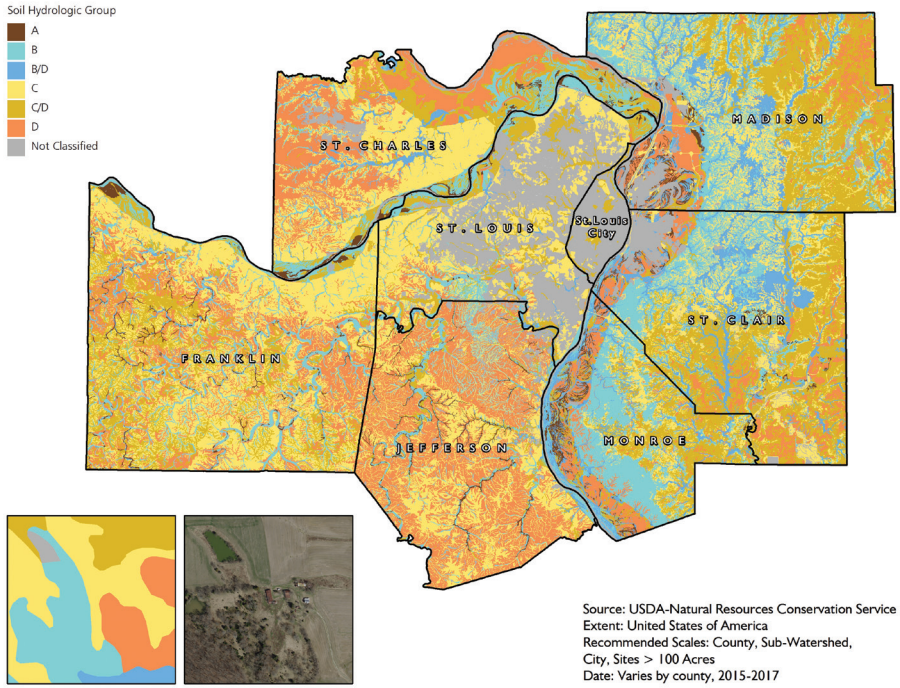


A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

Soils—Hydrologic Group

Soils were originally assigned to hydrologic soil groups based on measured rainfall and runoff. Since the initial work was done to establish these groupings, assignment of soils to hydrologic soil groups has been based on the judgment of soil scientists. Assignments are made based on comparison of the characteristics of unclassified soil profiles with profiles of soils already placed into hydrologic soil groups. Most of the groupings are based on the premise that soils found within a climatic region that are similar in depth to a restrictive layer or water table, transmission rate of water, texture, structure, and degree of swelling when saturated, will have similar runoff responses.

SOIL HYDROLOGIC GROUP

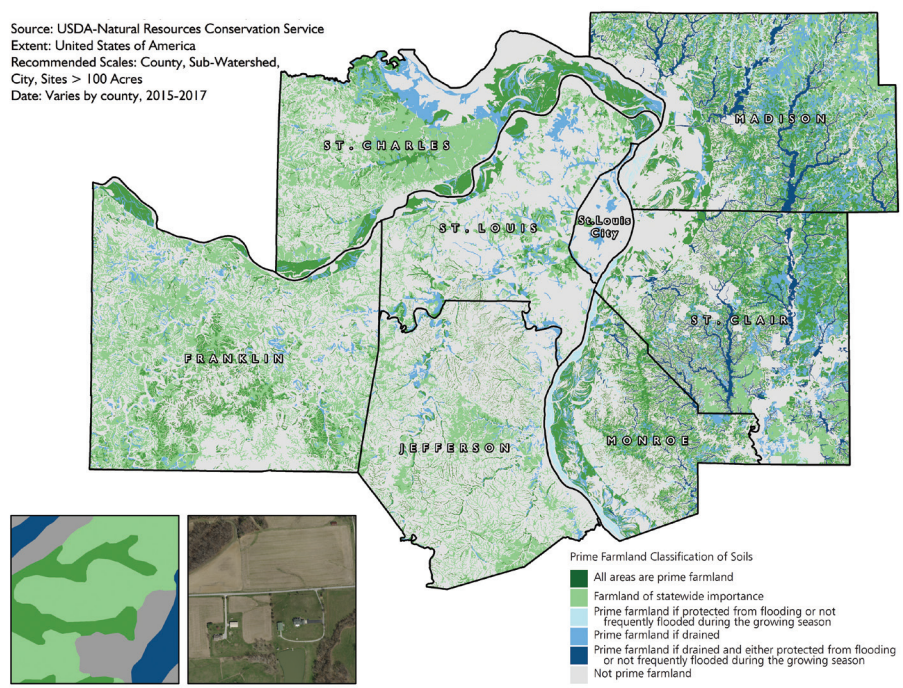


A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

Soils—Prime Farmland

Prime farmland soils are soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Prime farmland soils have the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks.

PRIME FARMLAND CLASSIFICATION OF SOILS



A sample of the data is shown for a 40-acre site (left); the same site is shown in the aerial photo (right).

WAYS TO USE THE ECOLOGICAL DATA INVENTORY

POLICY TOOLS FOR LOCAL COMMUNITIES

Ecological data presented in this report can be used to customize community planning efforts by basing decisions on the site characteristics of a particular area. While most of the following examples require a context-sensitive approach specific to one's particular community, these are examples of how a community can utilize an ecological approach to infrastructure development. For instance:

1. COMPREHENSIVE PLANS CAN ... state that the contributions of natural resources to human well-being are explicitly recognized and valued by the community and that maintaining their health is a primary objective.

Ecological Data Inventory focus layer: Ecological Significance, 30-Meter Land Cover, Protected Lands and Urban Land Cover

2. ZONING AND OVERLAY DISTRICTS CAN ... provide science-based justifications for zoning codes and could be helpful in locating special park districts.

Ecological Data Inventory focus layer: Missouri Ecological Site Descriptions and Urban Land Cover

3. UNDERSTANDING TREE CANOPY COVERAGE AND LANDSCAPING DESIGNS CAN ... help to exempt parcels within sensitive ecological areas from planting requirements that may not be reflective of the site.

Ecological Data Inventory focus layer: Ecological Significance, Land Cover Composite, and Urban Land Cover

4. CLEARING, GRADING, AND LAND DISTURBANCE PRACTICES CAN ... use soil and landform information to customize lists of approved soil erosion control practices.

Ecological Data Inventory focus layer: Elevation, Light Detection and Ranging technology, Six-Meter Land Cover, and Soil Survey Geographic Database Soils

5. A REVIEW OF LOW IMPACT DEVELOPMENT STANDARDS ... should focus on development adjacent to ecological sites with appropriate hydrological regimes from regulations that require construction of gray infrastructure for stormwater management.

Ecological Data Inventory focus layer: Development Pressure, National Hydrography Dataset, Six-Meter Land Cover, and Soil Survey Geographic Database Soils

6. FOR STREAM SETBACKS ... encourage buffer width requirements on ecological sites associated with floodplains and drainage ways adjacent to streams, in addition to a minimum distance from the stream.

Ecological Data Inventory focus layer: Assessed and Impaired Waters, Soil Survey Geographic Database Soils, Urban Land Cover, and Wetland Mapping and Ranking in the Bottomlands

7. IF LANDSCAPING IS A REQUIREMENT ... exempt parcels within sensitive ecological areas from planting requirements that may not be reflective of the site.

Ecological Data Inventory focus layer: Ecological Site Descriptions, Six-Meter Land Cover, and Urban Land Cover

Summary

The overarching purpose of the Ecological Data Inventory is to increase momentum and advance coordination of green infrastructure systems in the region. This report reiterates the need to expand the use of data as a planning tool to avoid, when possible, environmental impacts, expand conservation areas, and target mitigation dollars.

This data inventory was built on consultation, collaboration, and compromise. The data is presented for use by a wide range of users. National classifications evolve as knowledge is gained and ecological perspectives change. Following use and feedback, it is intended that in the future this inventory will again be updated to better reflect future and revised datasets.

The case studies included in this inventory illustrate the value of having an ecological data inventory for the St. Louis region that can be applied to regional projects as well as local projects. The inventory is a strategic tool for ecological assessments, research, and communication about natural resources in the region. Also, it aids in creating and implementing regional strategies to minimize and mitigate the environmental impacts of infrastructure projects. Integration of these ecological datasets into the early planning stages of projects will lead to the achievement of greater environmental benefits as well as project cost savings. As more projects incorporate ecological datasets into local and regional planning efforts, more will be learned about how environmental assets can thrive in the urban, suburban, and rural areas of the region.

East-West Gateway Council of Governments (EWG) hereby gives public notice that it is the policy of the agency to assure full compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related statutes and regulations in all programs and activities. Title VI requires that no person in the United States of America, on the grounds of race, color, or national origin, shall be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which EWG receives federal financial assistance. Any person who believes they have been aggrieved by an unlawful discriminatory practice under Title VI has a right to file a formal complaint with EWG. Any such complaint must be in writing and filed with EWG's Title VI Coordinator within one hundred eighty (180) calendar days following the date of the alleged discriminatory occurrence.
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