Ecological Approach to Infrastructure Development Initiative

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Overview of Ecological Initiative

Ecological Approach to Infrastructure Development

- Balance Conservation Amidst Planning Capacity Programs / Avoid Impacts
- Support Ecosystem Based Mitigation / Direct to Areas with Restoration Potential
- Partnership with the Missouri Resource Assessment Partnership (MoRAP)
- Develop Ecological Geo-spatial Tools
  - Regional Vegetation Data
  - Ecological Significance Ranking
  - Conservation Opportunity Areas
  - Floodplain and Wetland Mapping
  - Refined Land Cover Data for Urban Areas

Ecological Approach to Infrastructure Development

- Ecological Significance Dataset
  - Connected 2045 - Protect Air Quality and Environmental Assets
- Floodplain and Wetlands Dataset
  - Mississippi and Missouri River bottomlands
  - Meramec and Upper Silver Creek
- LiDAR used to Improve Wetland Classification
- Identified areas for Mitigation and Restoration Potential
- Index to Regulatory Wetlands
- Ranking of Wetland Importance

Partners Engaged

- US ACE, St. Louis District & Kansas City District
- US EPA, Region 5 & Region 7
- US F&W, MO & IL
- US Geological Survey
- US Dept. of Interior
- FHWA MO & IL
- Illinois and Missouri State Departments of Conservation, Natural Resource Management and Transportation
- Metropolitan Sewer District (MSD)
- Metro Transit – St. Louis
- Metro East Park and Recreation District
- Heartlands Conservancy
- Great Rivers Greenway
- The Nature Conservancy
- Open Space Council

Why An Ecological Data Inventory?

- **Main Goal** – highlight geo-spatial data created by EWG and MoRAP
- Earlier consultation and planning-level environmental analysis
- Identifying conservation investments
- Avoiding and minimizing impacts
- Make resources more accessible to regional stakeholders and the general public at large
- Help users better access the data

The Inventory

- A catalog of existing geospatial datasets that are available to the public at no cost.
- This format allows users of all skill levels to discover curated data with visualizations and case studies.
- The data is intended for use in Geographic Information System (GIS) software such as Esri's ArcGIS products or the free, open source QGIS application.
- 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.
- Conversely, some files are very detailed to support fine-scale analysis but have only been developed for a limited extent.

The Data

EWG Produced Data

- Six Meter Land Cover
- Ecological Significance
- Wetland Mitigation and Restoration Importance Ranking
- Urban Land Cover
- Land Cover Composite

Highlighted Case Studies

- Urban Land Cover: Great Streets and I-70 PEL
- Development Pressure
- Application of Ecological Significance for Project Evaluation
- Wetlands and HeartLands Conservancy

National/State Data

- 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

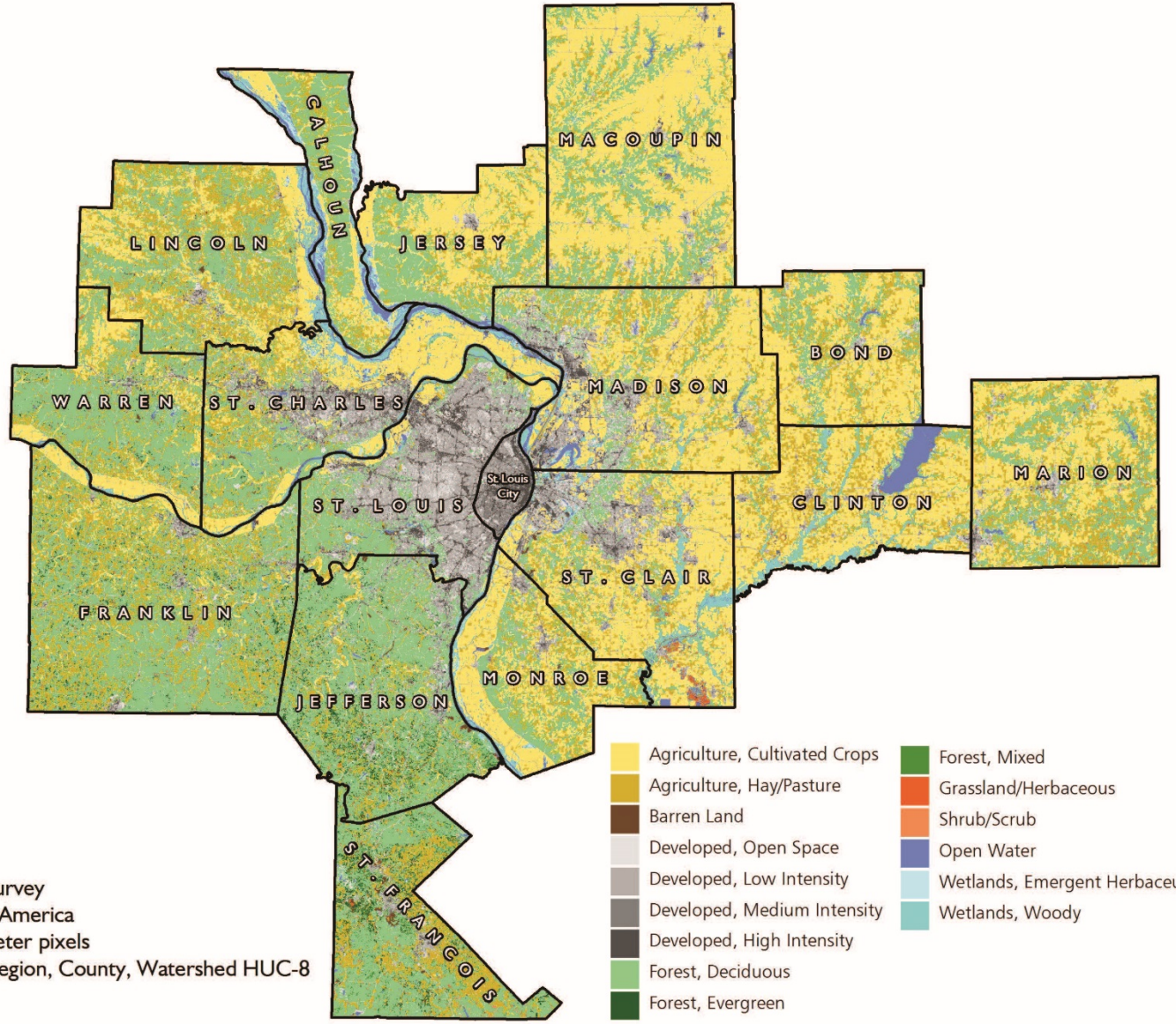
NATIONAL LAND COVER DATABASE

- Ideal for identifying generalized land cover types and tracking changes over time.

- The database is designed to provide **five-year cyclical updates** of U.S. land cover and associated changes.

As with two previous NLCD land cover products, NLCD 2011 keeps the same **16-class land cover classification** scheme

<u>How Can It Be Used:</u>
Modeling nutrient and pesticide runoff, land use planning, and telecommunications.

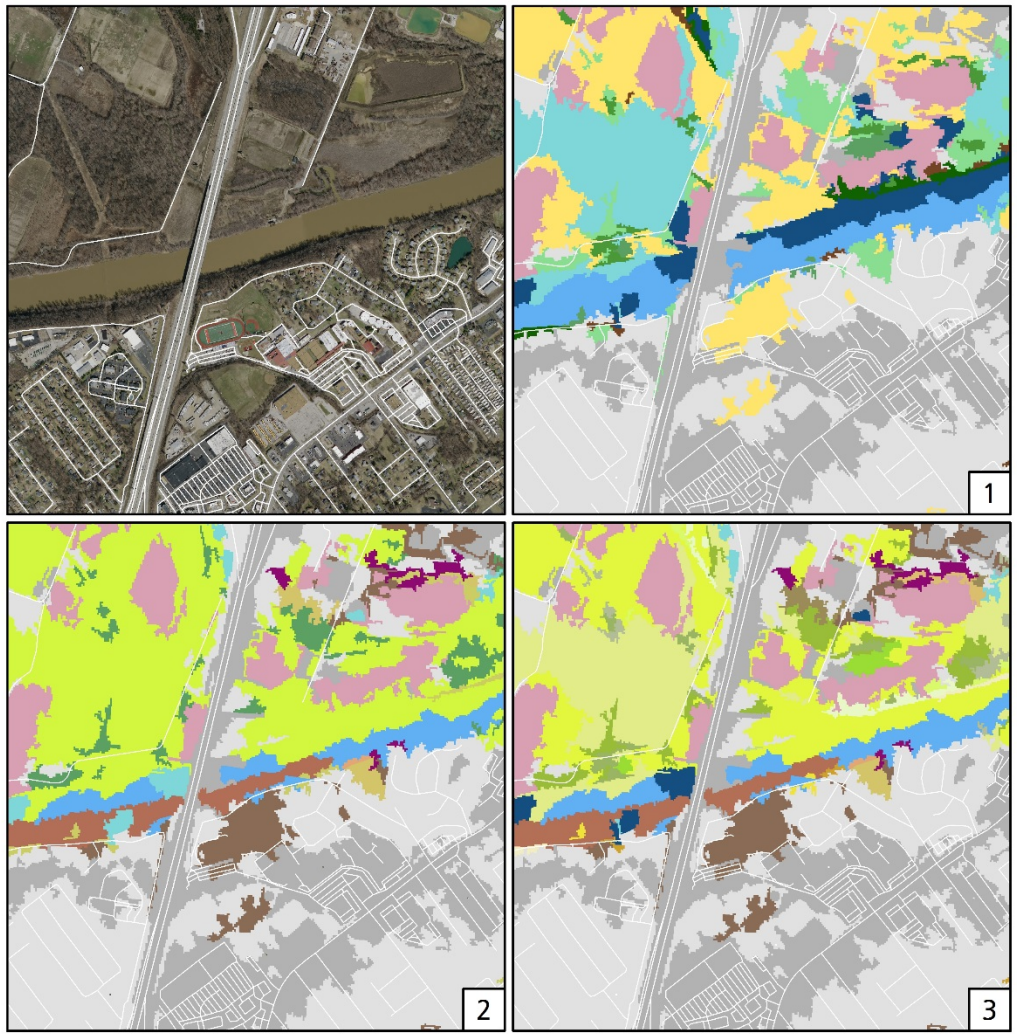


Source: US Geological Survey
Extent: United States of America
Raster Resolution: 30-meter pixels
Recommended Scales: Region, County, Watershed HUC-8
Date: 2011

ST. LOUIS REGIONAL LAND COVER (2011)

- 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.

- Product used satellite remote sensing in concert with air photos and information from digital soils maps.



3) 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

Name: Six Meter Land Cover
Source: MoRAP
Extent: East-West Gateway Region
Recommended Scale: Region, County, City
Date: 2010

1) Land Use/Land Cover Name
- High Intensity Urban
- Low Intensity Urban
- Row Crops
- Coniferous Evergreen Forest and Woodland
- Mixed Cold Deciduous / Evergreen Forest and Woodland
- Cold Deciduous Forest and Woodland
- Deciduous Woody / Herbaceous
- Evergreen Woody / Herbaceous
- Grassland
- Herbaceous-dominated Wetland
- Woody-dominated Wetland
- Open Water
- Barren / Sparsely Vegetated

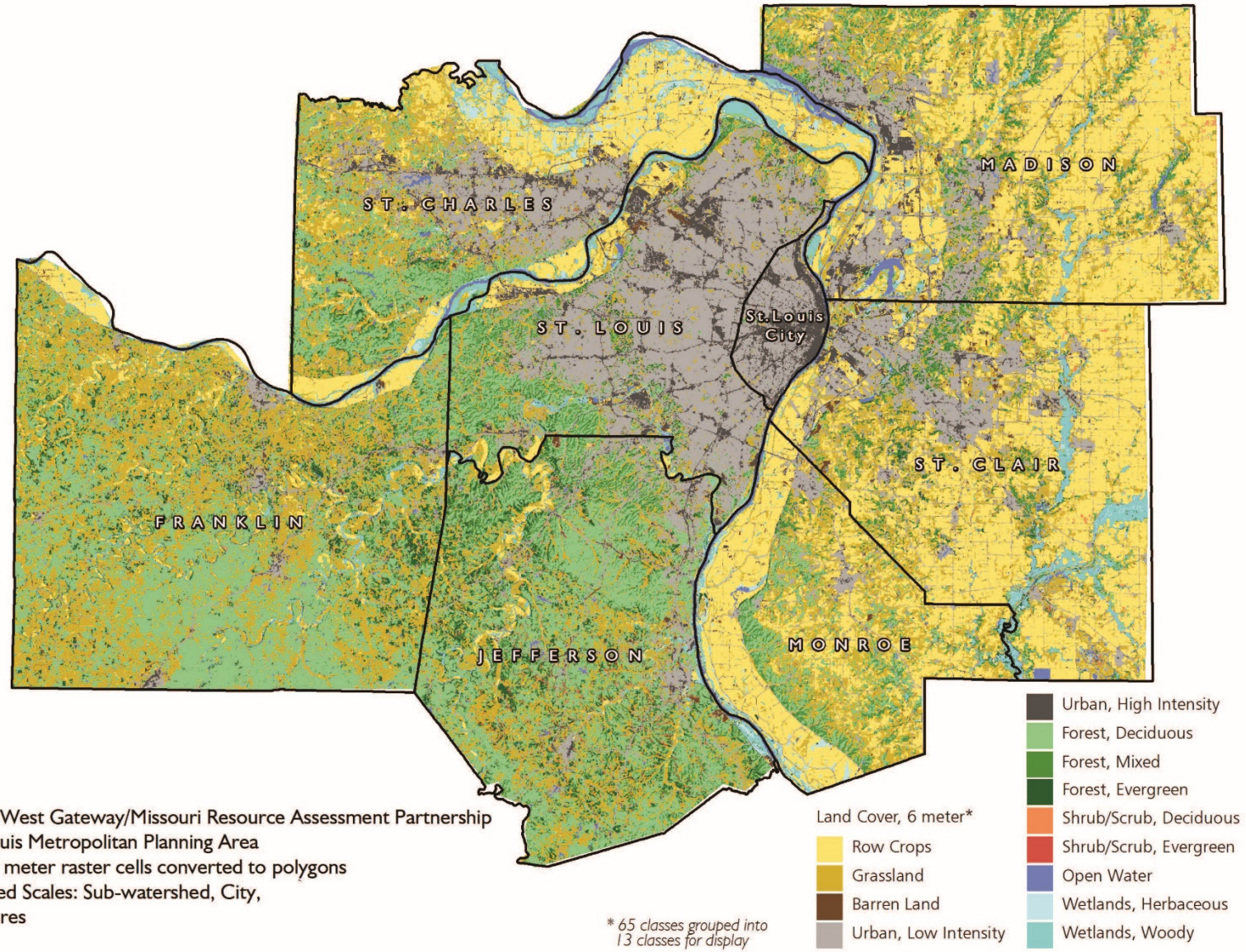
2) Vegetation Category
- Urban High Intensity
- Urban Low Intensity
- Cropland
- Cultural/Disturbance
- Disturbance or Successional
- Bottomland
- Bottomland Forest
- Ozark Highlands Limestone/Dolomite
- Ozark Highlands Loess and Till
- Ozark Highlands Oak-Maple-Basswood Forest
- Successional Upland
- Wetland (non-riverine)
- Open Water
- Barren

0 2,000
Feet

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.



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

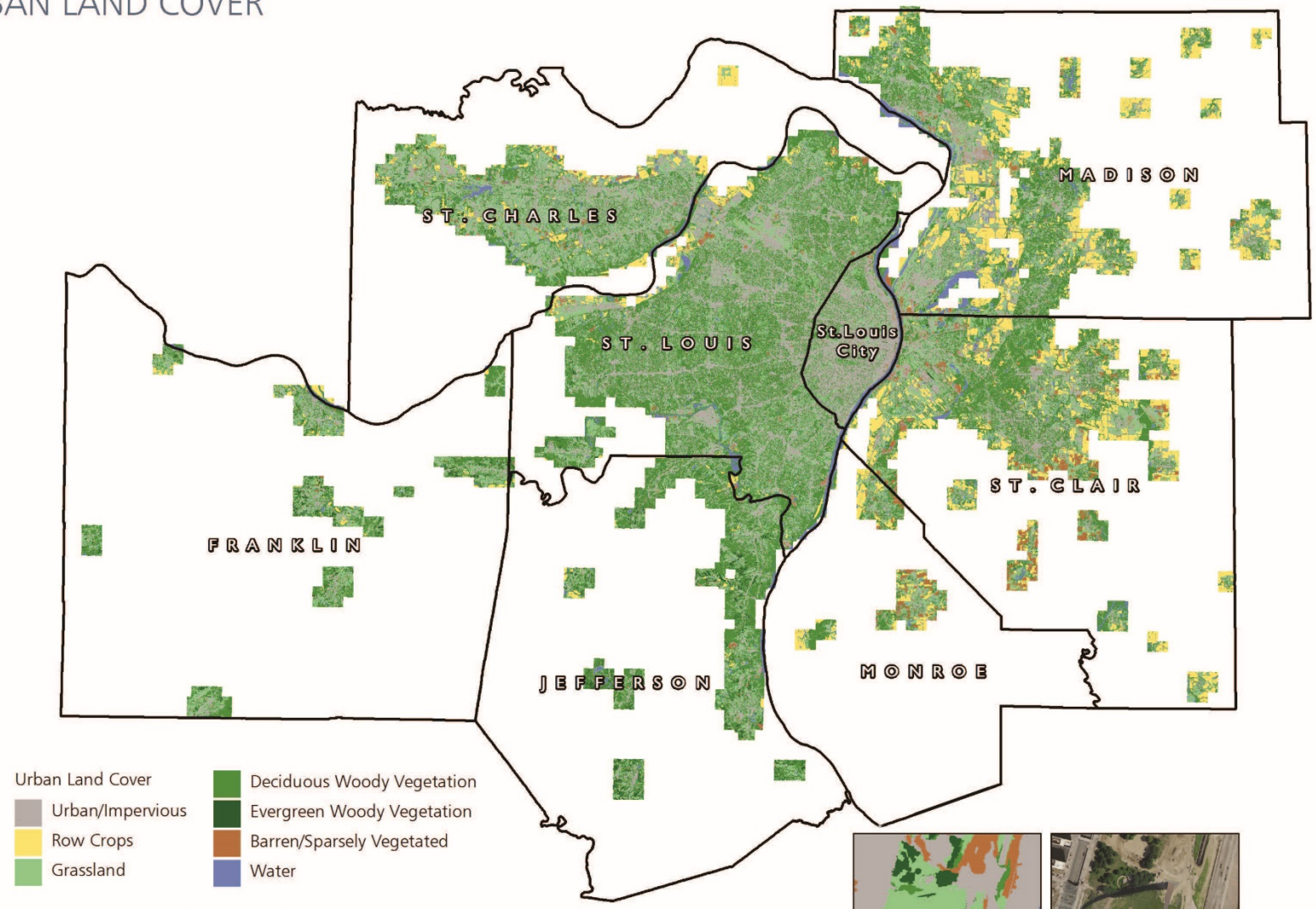
URBAN LAND COVER

- Provides a closer look at conditions in developed areas of the St. Louis region in seven basic categories.

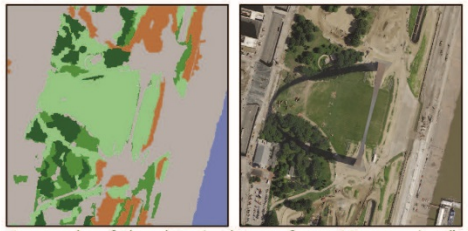
- This new dataset is for areas of developed land (Urbanized Areas) across the entirety of the St. Louis metropolitan area.

- This is the highest-resolution data available for land cover.

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



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).

I-70 Planning and Environmental Linkages Study

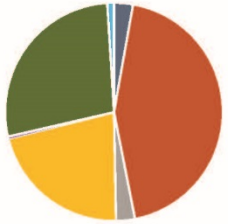
MoDOT, in partnership with EWG and Bi-State Development (Metro), initiated the I-70 PEL Study to set a vision and strategic plan for the future of the Interstate 70 (I-70) corridor in the St. Louis region. The study area includes an approximately 40-mile section of I-70 from Wentzville (Route Z) to the 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.

URBAN LAND COVER FOR I-70

I-70 PEL Study - *MoDOT*

PERCENT LAND COVER—TOTAL STUDY AREA



- Water
- Urban/Impervious
- Barren/Sparsely Vegetated
- Decidous Forest
- Evergreen Forest
- Grass
- Crop

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.

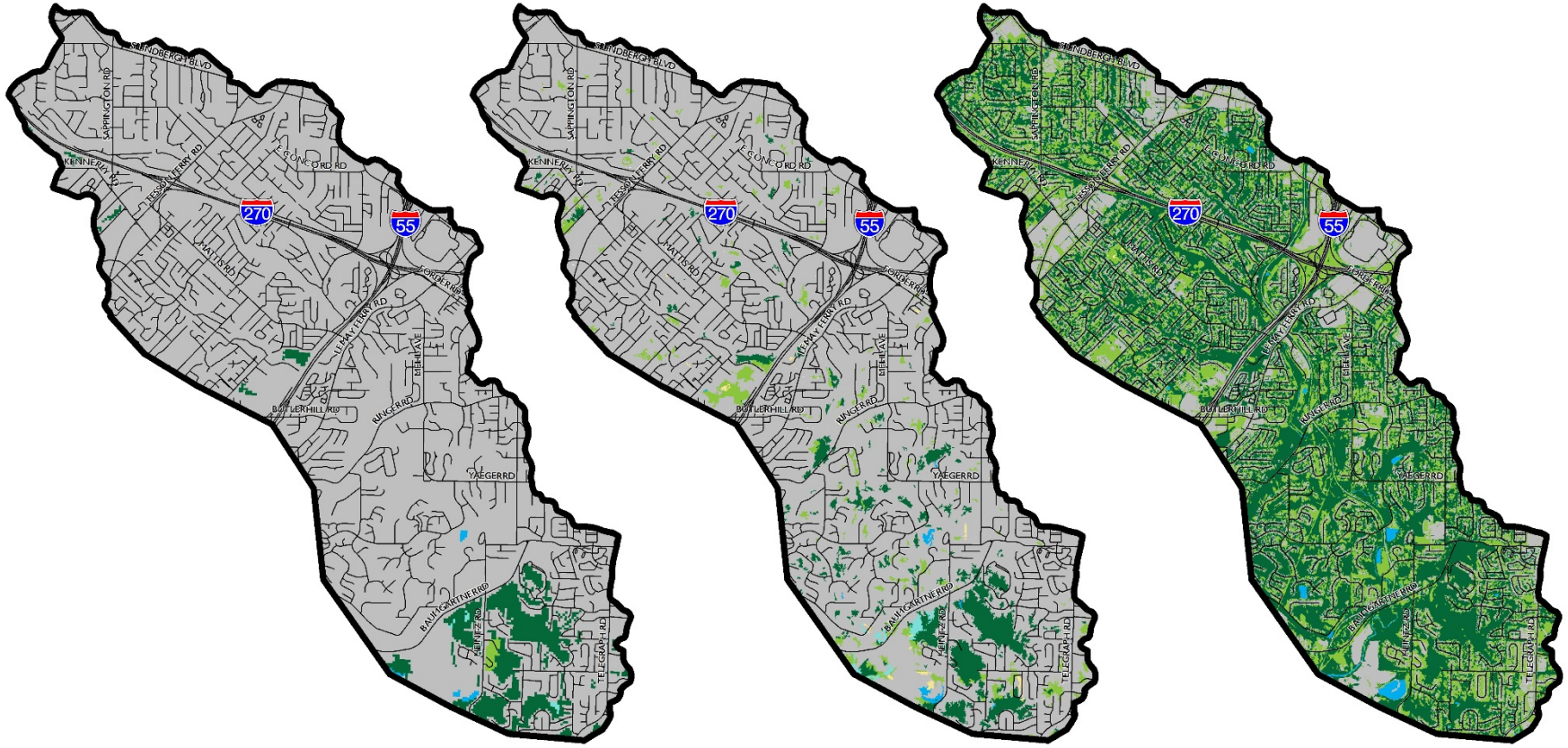
LAND COVER AND IMPERVIOUS SURFACE COVERAGE MAPS—CITY OF COLLINSVILLE, ILLINOIS

Graphic created by i5 Group.

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

Graphic created by Design Workshop.

These maps 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.



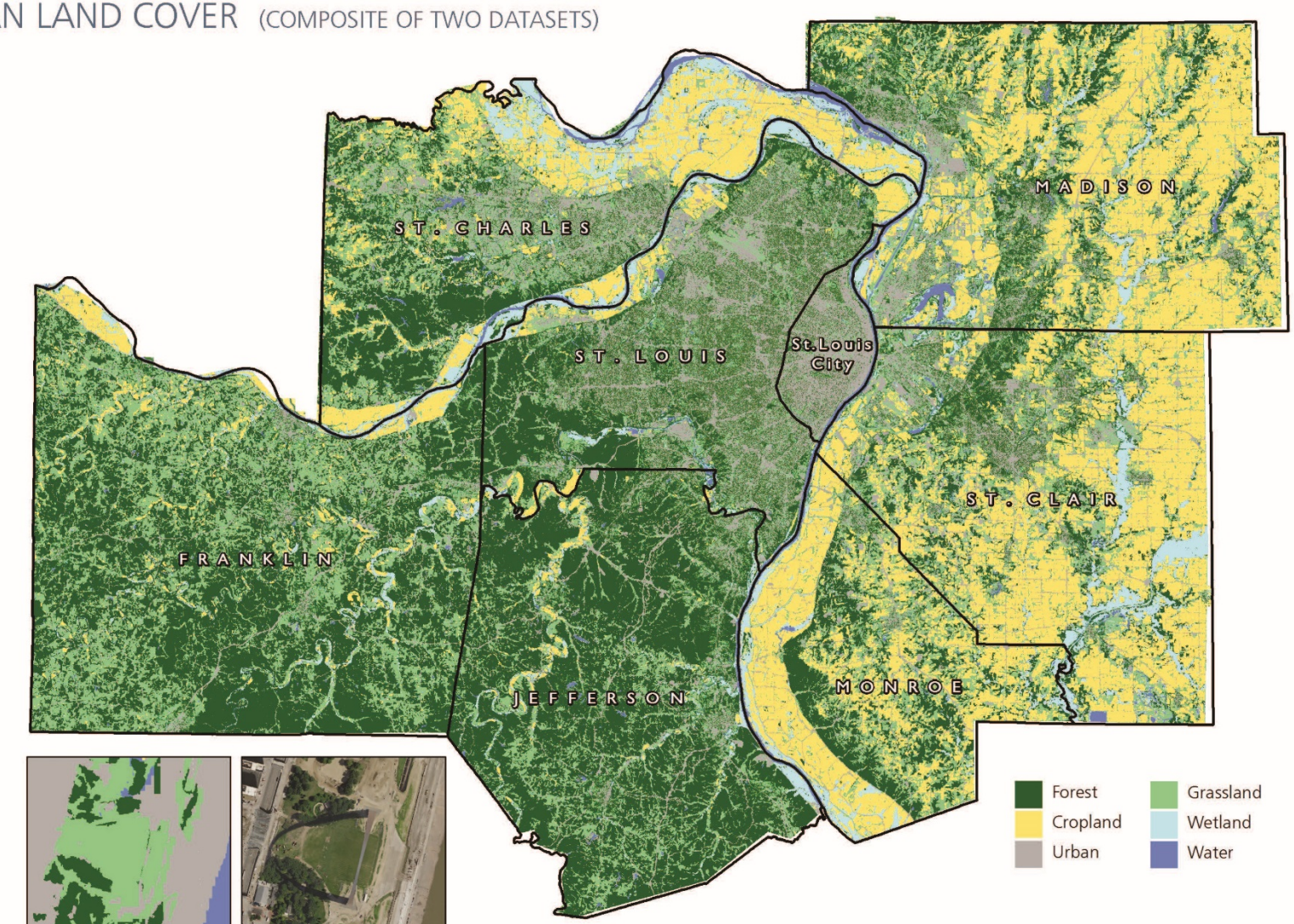
30-meter 6-meter 1-meter

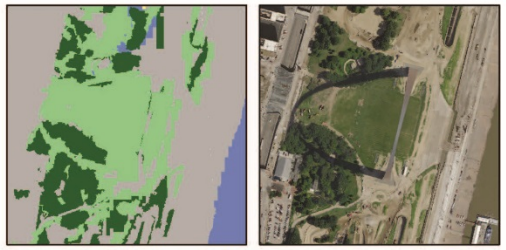
URBAN LAND COVER (COMPOSITE OF TWO DATASETS)

- 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.





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

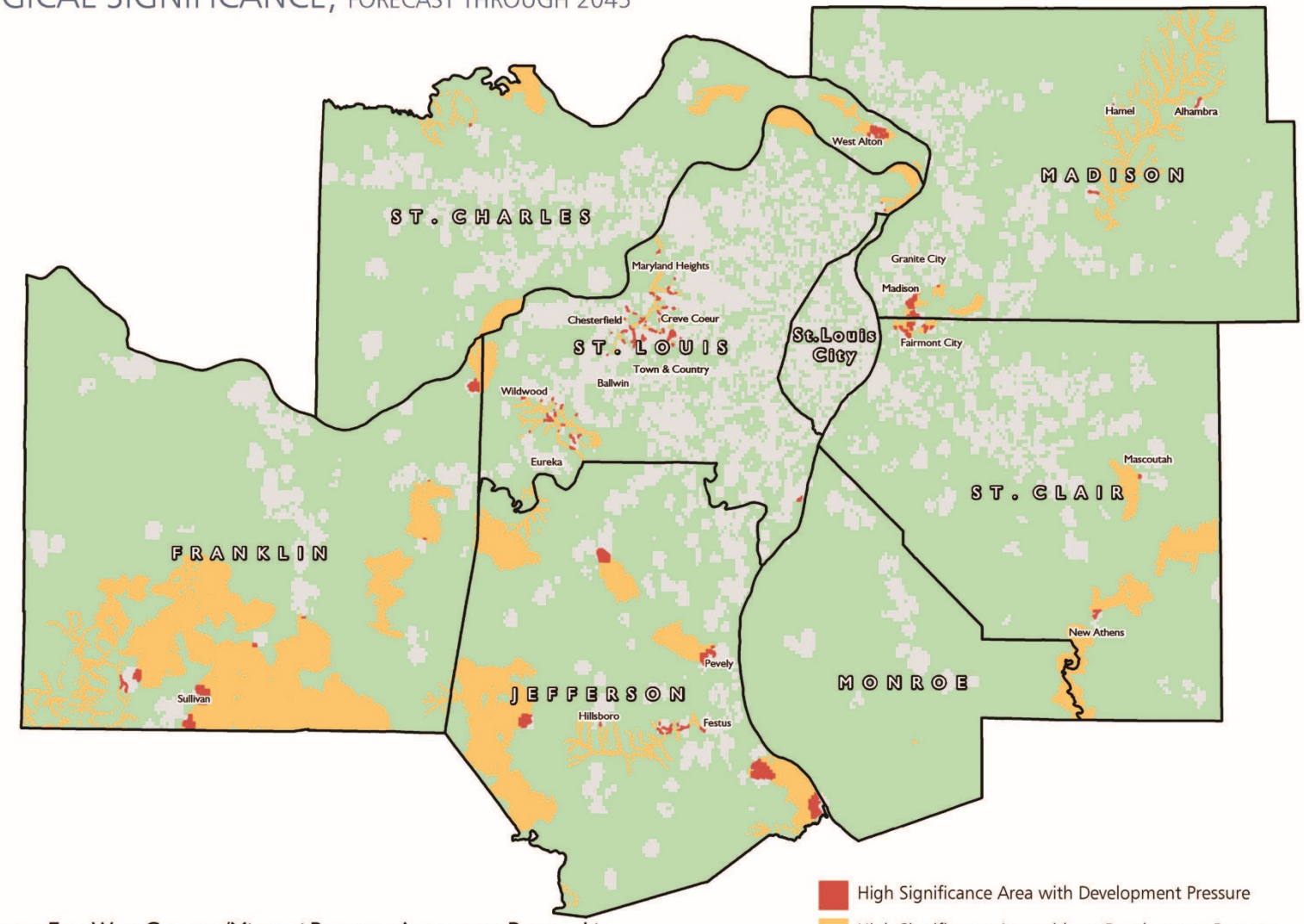
Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St. Louis Metropolitan Planning Area
Raster Resolution: 1 meter, 6 meter
Recommended Scales: County, Sub-watershed, City, Sites > 100 acres
Date: 2017. 2010

- Development pressure is a measure of where development is projected to occur, combined with identification of areas of high ecological significance.

- EWG's staff forecasts potential development and land use change to support long-range transportation planning.

- 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.

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



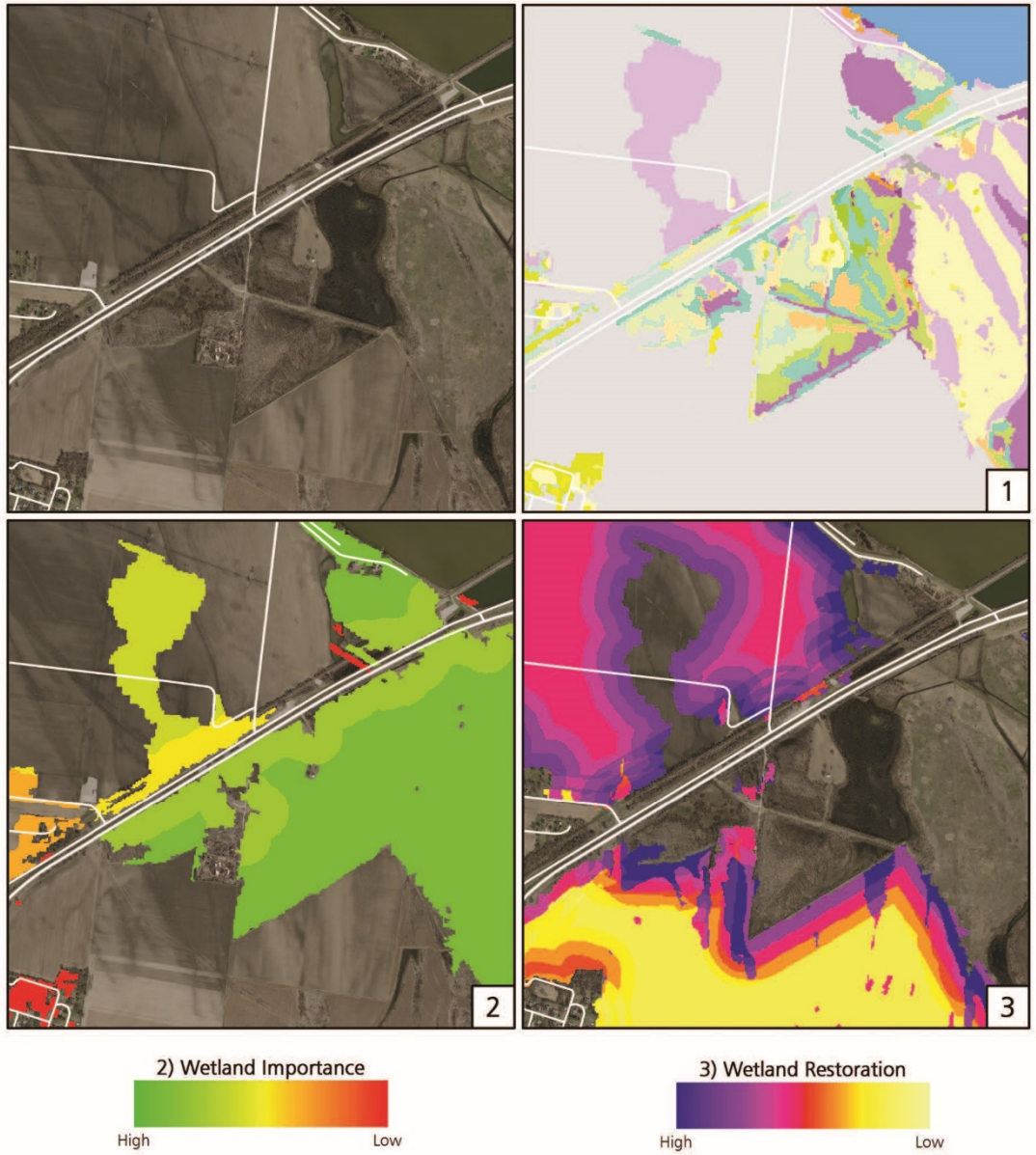
Source: East-West Gateway/Missouri Resource Assessment Partnership
Extent: St. Louis Metropolitan Planning Area
Recommended Scales: Region, County, Watershed HUC-8
Date: 2010; 2019

- High Significance Area with Development Pressure
- High Significance Area without Development Pressure
- Lower Significance Area with Development Pressure
- Lower Significance Area without Development Pressure

WETLANDS

- Datasets used 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.



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

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

Wetland patches were defined based on patches formed by the aggregation of all wetlands and all non-wetland vegetation touching existing wetlands.

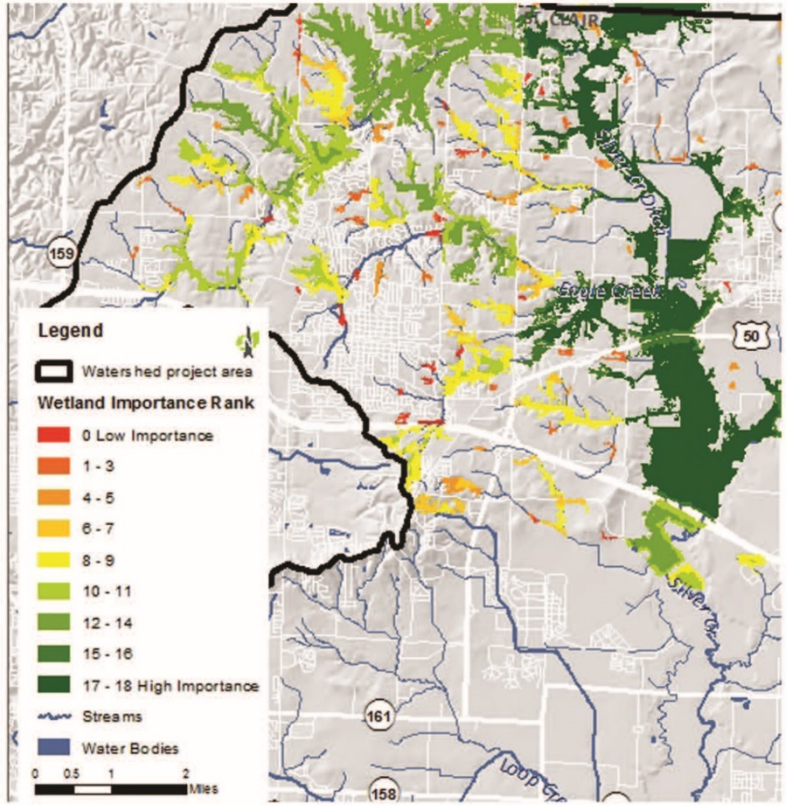
Mitigation ranks were based on wetland patch size, diversity, and distance to public lands or urban lands.

Restoration ranks were based on water regime (essentially a feasibility index for restoring wetlands) and distance to existing wetlands or public lands.

CASE STUDY: WETLANDS-HEARTLANDS CONSERVANCY

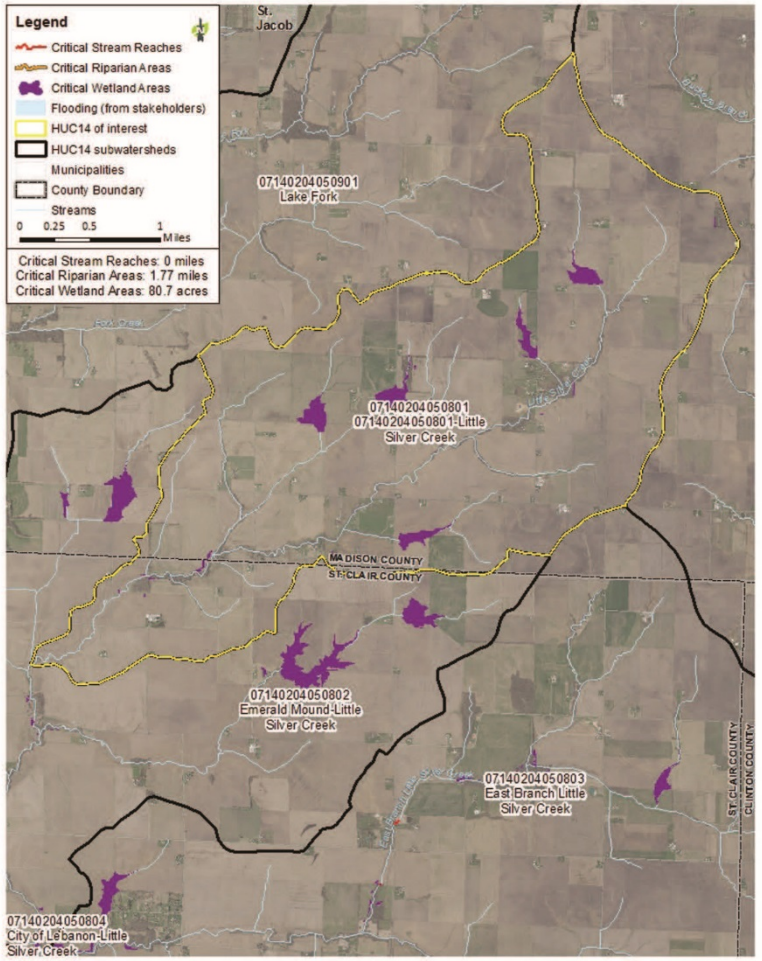
The Silver Creek in Illinois drains to the Kaskaskia River, the confluence in the southern part of St. Clair County. HeartLands Conservancy produced watershed plans for two sections of the creek, Upper Silver Creek in Madison County and Lower Silver Creek in St. Clair County, to analyze the watershed 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.

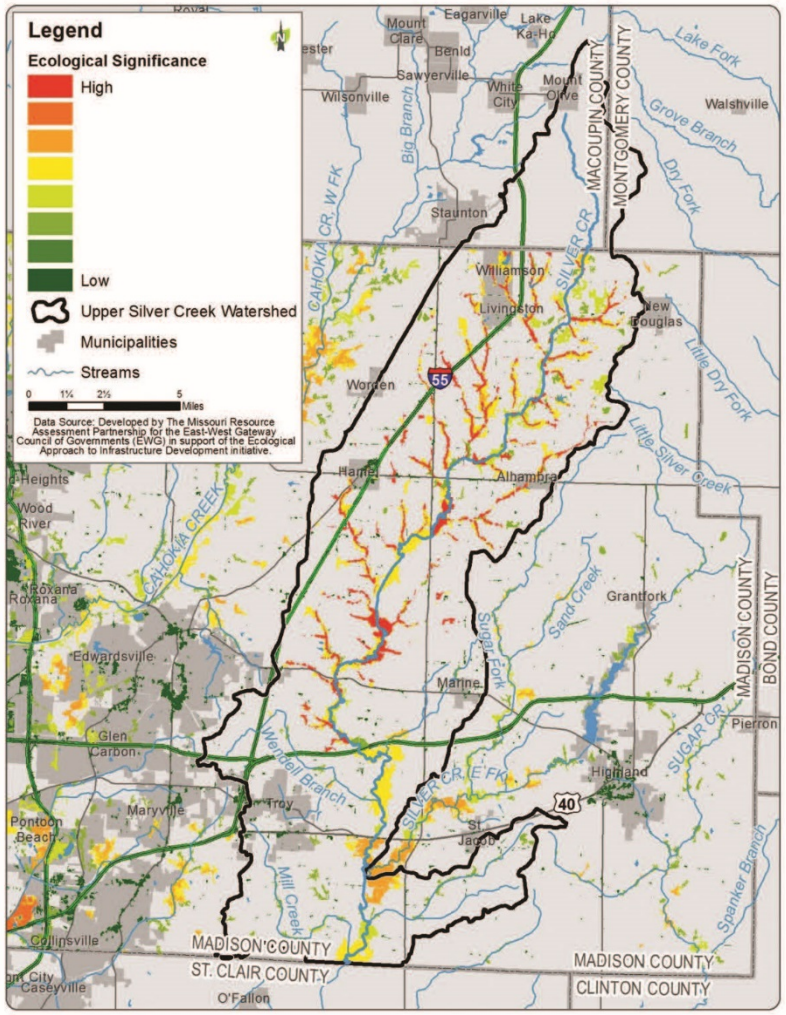
LOWER SILVER CREEK



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



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