Eco-Logical Webinar Series

Eco-Logical in Performance-Based Planning

Presenters

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Eco-Logical and Performance

- Eco-Logical helps consolidate environmental data from partners
- Intended to help anticipate potential environmental effects of projects in advance
  - Connection to transportation planning is critical
  - **Data collected through Eco-Logical can be used to develop measures, baseline condition, and targets.**

Overview of Performance Management

- Broad consensus that performance management is important for accountability and transparency in the transportation industry

- Most agencies track and report various aspects of system and agency performance

- Need to integrate performance management principles into planning and programming

- May be a requirement for a consistent national approach

Performance-based Planning and Programming

- Key role for planning and programming to influence more performance-based decision-making

- FHWA, FTA, AASHTO, APTA, AMPO, NARC and NADO working informally to:
  - Define key elements of performance-based planning/programming
  - Identify examples of good practice
 - Engage with stakeholders and identify key challenges and opportunities for capacity building

MAP-21 Background-Performance

- ***National Goals*** –Focuses the Federal aid program on 7 goals supported through the statewide and metropolitan planning process.

- ***Measures*** – USDOT to establish performance measures through rulemaking

- ***Targets*** - All States, Metropolitan Planning Organizations (MPOs), and public transportation agencies required to establish targets for each of the measures established by USDOT.

- ***Plans*** – All States, MPOs, and public transportation agencies are required to develop a number of plans to document strategies and investments to address performance needs.

- ***Reports*** – All States, MPOs, and public transportation agencies are required to report on progress toward the achievement of their targets.

Key Elements of Performance-Based Planning and Programming

- Elements of Performance-Based Planning
  - Goals and Objectives
  - Performance Measures
  - Identify Trends and Targets
  - Identify Strategies & Analyze Alternatives
  - Develop Investment Priorities
  - Investment Plan
  - Resource Allocation
  - Program of Projects
  - Monitoring, Evaluation, Reporting

  http://www.fhwa.dot.gov/planning/performance_based
  _planning/pbpp_guidebook/

Performance-Based Planning and Programming Guidebook

September 2013

U.S. Department of Transportation
Federal Highway Administration
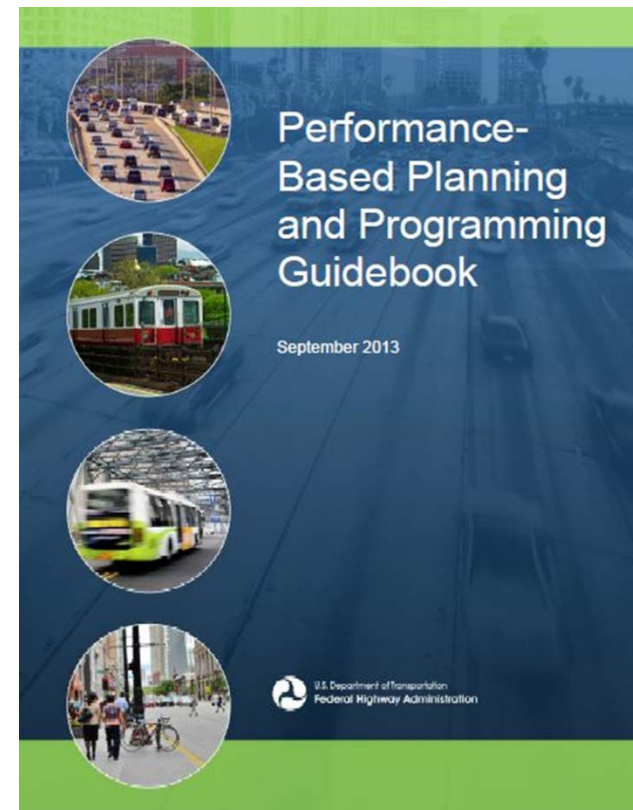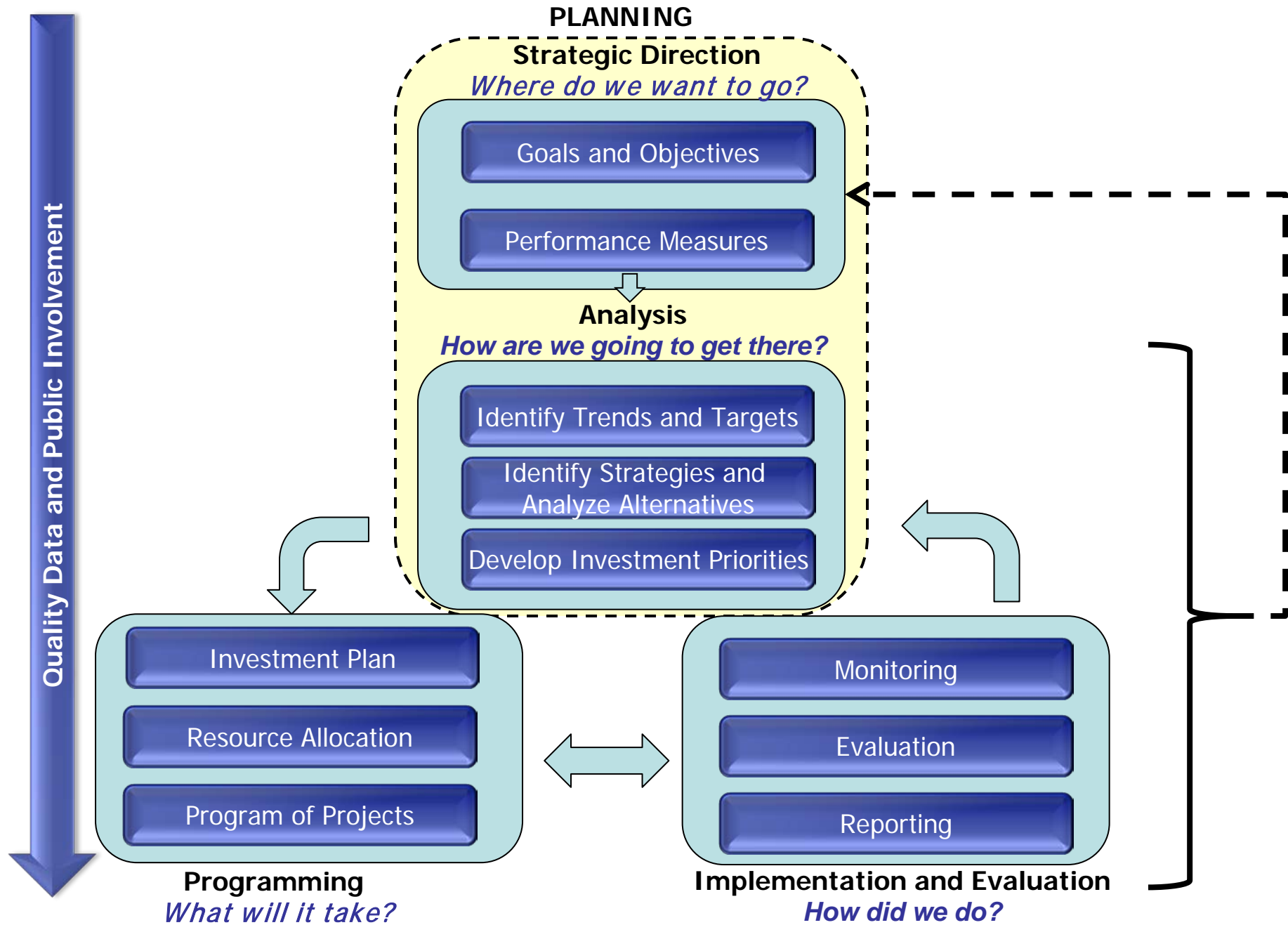
PERFORMANCE-BASED PLANNING AND PROGRAMMING

C02: Performance measures for highway capacity decision making

- Performance Measurement
  - Supports collaborative decision-making framework Structured around **5 broad topics and 18 planning factors**

- Web-based Tool
  - Performance measure database
  - Supporting case studies

- Integrated with Broader Transportation Database

- http://shrp2webtool.camsys.com/

Transportation
 Mobility
 Reliability
 Accessibility
 Safety
Environment
 Ecosystems
 Water quality
 Wetlands
 Air quality
 Climate change
 Environmental health
Economics
 Economic impact
 Economic development
Community
 Land use
 Archeological and cultural
  resources
 Social
 Environmental justice
Cost
 Cost
 Cost-effectiveness

Performance Measures for Highway

What: Framework and web-based tool for selecting performance measures to evaluate major transportation projects. It details how performance measures can be used in long-range planning, programming, and environmental review/permitting (with a heavy focus on environmental/sustainability measures).

Impact on Practice: Beyond their analytical value, these performance measures form the basis for transparent and objective decisions that help stakeholders understand transportation problems.

FHWA's Eco-Logical Process:
## Uses in Performance-Based planning

August 25, 2014

Charlottesville Albemarle
Metropolitan
Planning Organization (CAMPO) and
The Thomas
Jefferson Planning District
Commission

MPO Background

• Covers the City of Charlottesville and the urbanized areas of Albemarle County

• Economy centered around the University of Virginia

• Population 122,638 (2010)

• 24,297 Students

• The population is forecasted to grow by 36.8% by the year 2040

• TJPDC encompasses Charlottesville, Albemarle, Nelson, Fluvanna, Louisa, and Greene
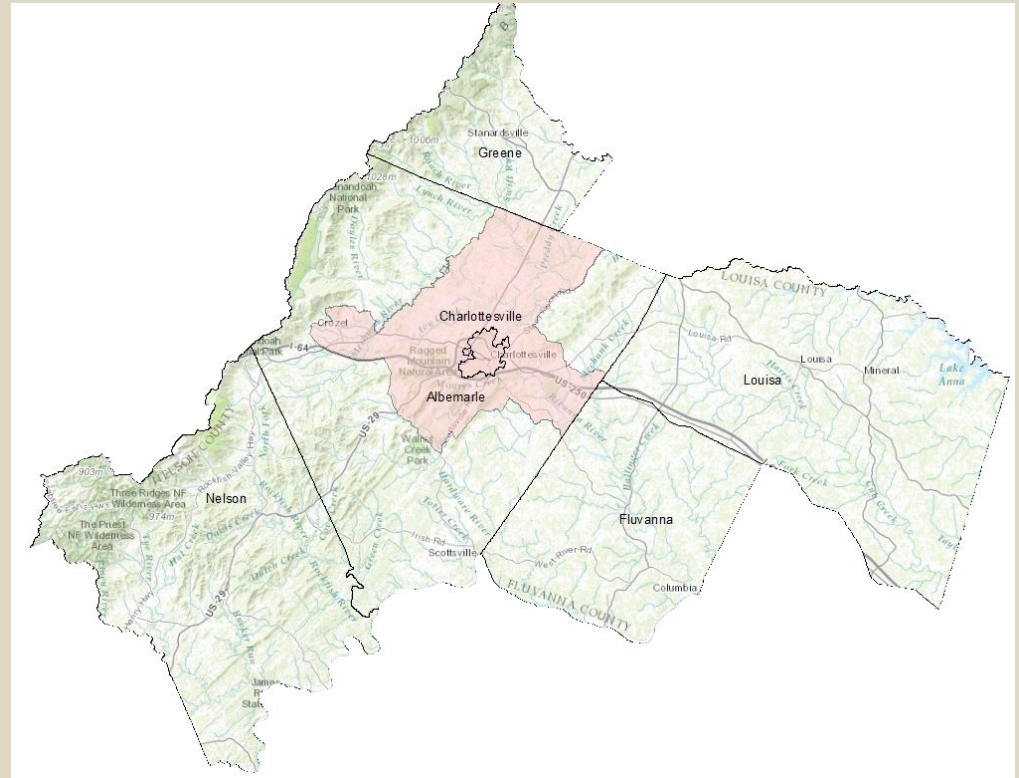
LRTP Process

The 2040 LRTP is a fiscally-constrained document that outlines the region's long-range transportation vision.

To receive federal funding, a transportation project must be included in the LRTP's project list. On July 23rd, the MPO Policy Board approved amendments to the document based on the Route 29 Solutions project package.

Performance Measures

- Map 21
  - Establishes a performance based program
- MPO's Approach
  - Develop regional specific performance measures
  - 16 measures organized into 4 categories
  - Apply performance measures to a scenario based approach

LRTP 2040

Charlottesville/Albemarle MPO
Long Range Transportation Plan

- Mobility Measures
- Economic Measures
- Environmental Measures
- Community Measures

# Performance Measures

MEASURE	DESCRIPTION
Mobility	
Congestion	The total percentage of roads that will have a level of service E or F in 2040.
Delay	The total daily hours of delay that congestion will cause in the year 2040.
Mode Share	The percentage of trips across the four main travel modes, automotive, transit, bike and walk for 2040.
Vehicle Mobility	The total system-wide vehicle miles traveled for 2040.
Vehicle Crashes	The total system-wide crashes per year for 2040.
Economy	
Access to Jobs	The average travel time to work.
Transit Accessibility	The percentage of population and the percentage of employed individuals within the MPO with access to transit.
Environment	
Habitat	The aggregate impact of projects on natural resources and habitats within 500 foot buffer of project.
Air Quality	The percent change in air quality gases and particulates in tons per year.
Water Quality	The percent change in the amount of stormwater pollutants in tons per year.
Flood Plain	The total acreage of flood plain within a 500 foot buffer of the projects.
Historical/Archeological sites	The total number of historic or archeological sites within a 500 foot buffer of these projects.
Community	
Land Use	The total number of land parcels within a 500 foot buffer of the potential projects by usage: residential, comm./ind., parks, educ./religious/charitable, and agricultural/undeveloped.
Environmental Justice and Title VI: Transit Access	The total percentage of Environmental Justice or Title VI groups with access to transit: minorities, 65 and older, limited-English speaking, and household income of less than $25,000.
Environmental Justice and Title VI: Impacts	The total percentage of Environmental Justice or Title VI groups potentially impacted due to projects: minorities, 65 and older, limited-English speaking, and household income of less than $25,000.

Eco-Logical

REF tool:

The Tool is made up of ten environmental spatial datasets which were included at the suggestion of an advisory committee.

- The tool was built using GIS and is designed to function in GIS

- It consists of a rasterized heat map

- Uses existing GIS functions and tools to conduct analyses.

- Made up of 10 different spatial environmental datasets overlaid spatially

- Datasets and attributes ranked then aggregated to form the heat map
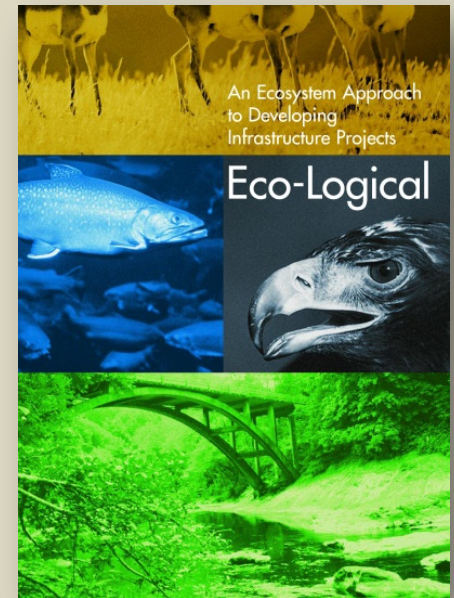
TJPDC Eco-Logical Timeline:

2009 Green Infrastructure Plan

2011 Eco-logical: Integrating Green Infrastructure and Regional Transportation Planning

2013-14 Charlottesville Albemarle MPO Long Range Transportation Plan 2040**,**

**2013-2014** Free Bridge Congestion Relief Project, 2013-2014

Eco-Logical Datasets

- Built with existing datasets
  - Tiered Species Habitat
  - Threatened and Endangered Species Waters
  - Species observations
  - Natural Landscape Assessment Cores and Corridors
  - Priority Conservation Sites
  - Important Bird Areas
  - National Wetlands Inventory
  - VCLNA Watershed Integrity Model
  - Cold Water Stream Survey
  - National Hydrography Dataset
- Numeric Ranking system: 2 – 52
- High scores representing highest value ecosystem
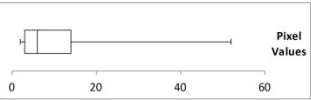- Prioritizes preservation for ecosystem areas (especially wetlands)
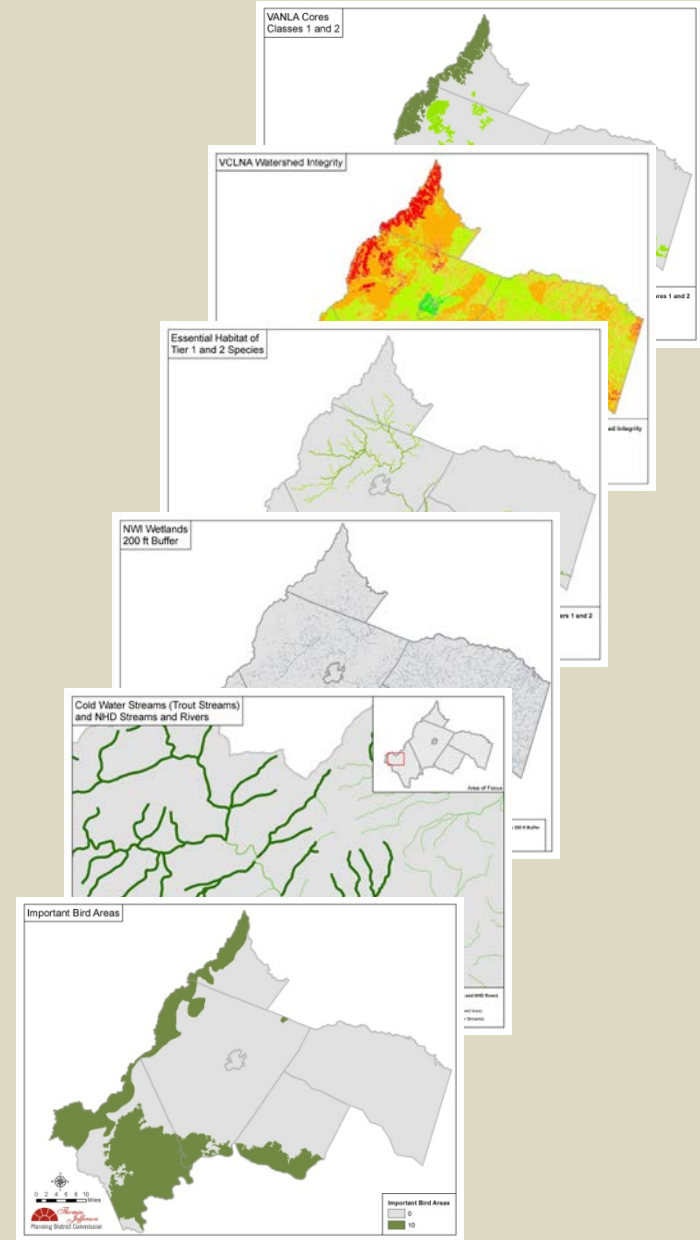
REF Tool

CA MPO Regional Ecological Framework (REF) Map
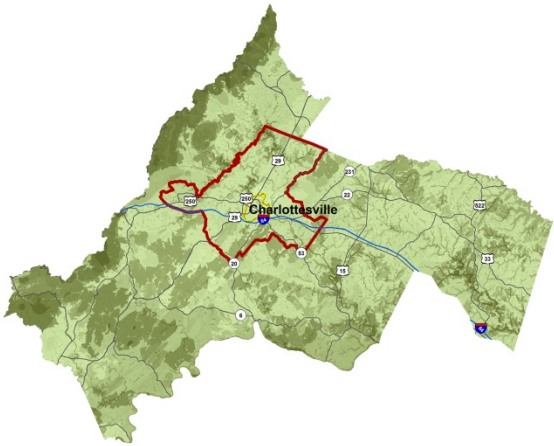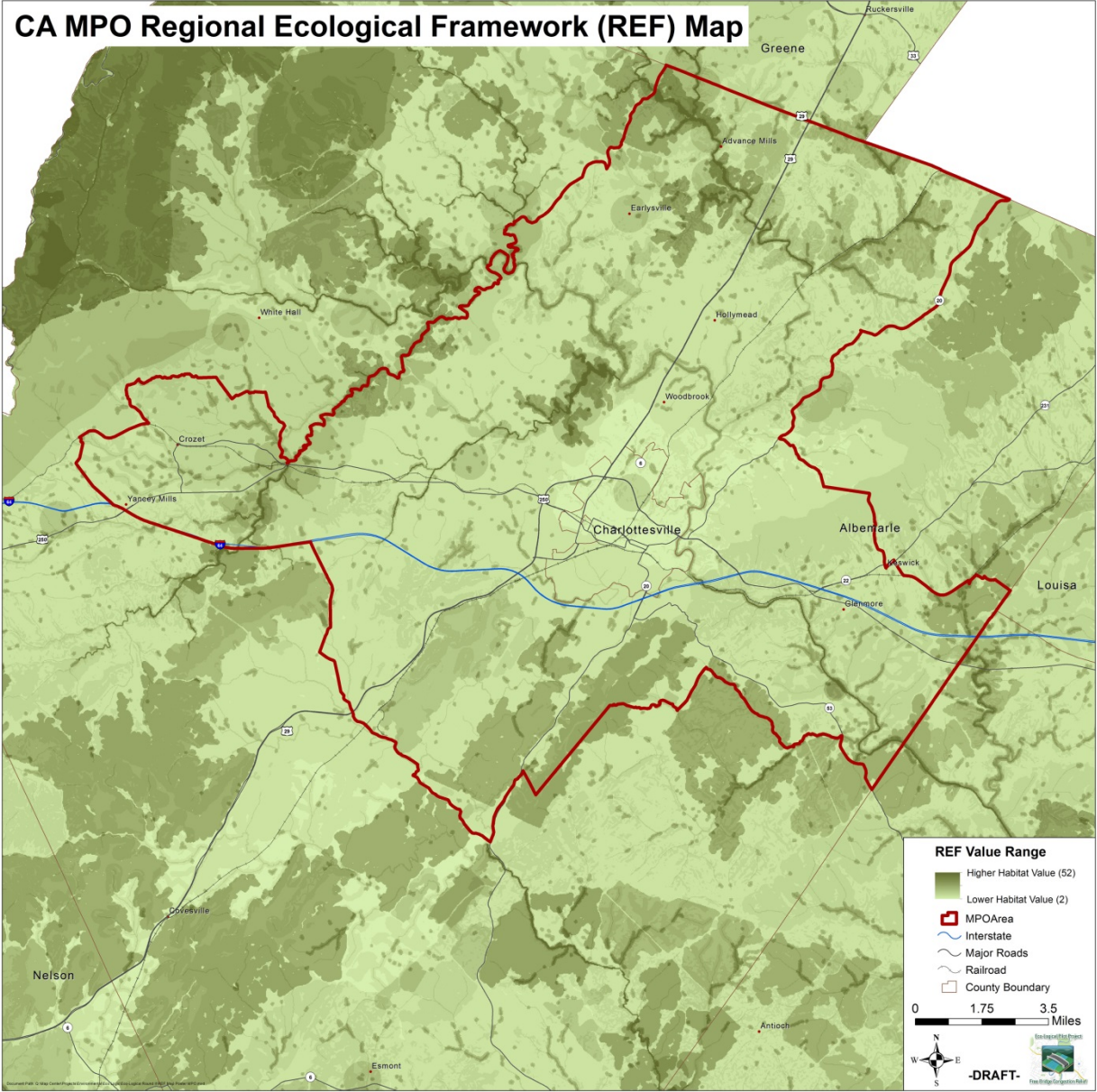
REF Pixel Value Distribution

Percentile	Pixel Value
Lower Limit	2
25th Percentile	3
50th Percentile	6
75th Percentile	14
Upper Limit	52

REF Pixel Value Distribution Plot

Atribute Scores Used to Form the REF

The table on the left lists the 10 datasets that make up the Regional Ecological Framework (REF). The table also highlights the number of attributes and how they were ranked by the Technical Advisory Committee. The rankings are what drives the color density of the REF.

REF Value Range

Higher Habitat Value (52)
Lower Habitat Value (2)
MPOArea
Interstate
Major Roads
Railroad
County Boundary

-DRAFT-

Dataset	Attribute	Rank
DGIF Tiered Species Habitat (terrestrial and aquatic)	2	10
	1	8
DGIF Threatened & Endangered Species Waters	Tier I	10
	Tier II	8
DGIF Species Observations - Diversity, # of Species Present	1	4
	2	6
	3	8
	4	10
DCR Virginia Natural Landscape Assessment (VaNLA)		
Habitat Cores	1	10
	2	8
Habitat Corridors		2
Cores 3 - 5 that intersect corridors	3	6
	4	4
	5	2
DCR Priority Conservation Sites	B1	N/A
	B2	9
	B3	8
	B4	7
	B5	6
	General	4
Audubon Important Bird Areas		4
USFWS National Wetlands Inventory	wetlands	8
	200' buffer	6
DCR VCLNA Watershed Integrity Model	5	N/A
	4	8
	3	6
	2	4
	1	2
NHD 1:100,000 streams		
1st order	50' buffer	3
2nd order	75' buffer	3
3rd order and above	100' buffer	3
DGIF Cold Water Stream Survey - Classes I - IV - 100' buffer	Class I	7
	Class II	6
	Class III	5
	Class IV	4

REF as a Performance Measure

- Quantitative measure
  - Score per mile/per acre
  - Total impact score
- Provides a way to benchmark projects and scenarios
  - Comparable
- Allows for multiple environmental considerations

LRTP 2040 Performance Measures: Env. Impacts

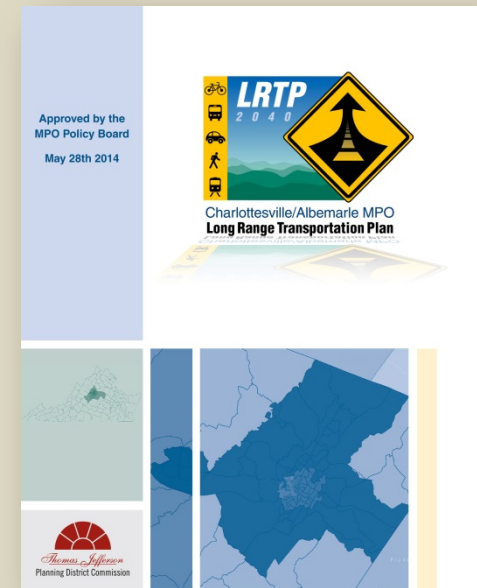| Rt 250	Eco Logic REF Raster Value		250 Pantops	Road Network
Roads	Higher Ecological Value (52)	Total Eco Logic Score	5,669	1,554,044
500ft Buffer		Eco Logic Score Per Mile	2,765.37	1,756.52
	Lower Ecological Value (2)	Roadway Length (miles)	2.05	884.73
		Average Pixel Score In Buffer	4.4	5.56

-Draft-

Eco-Logical as a Quantitative Measure

- Calculated a base score per mile of existing and committed projects

- Compared the change in the base score between scenarios
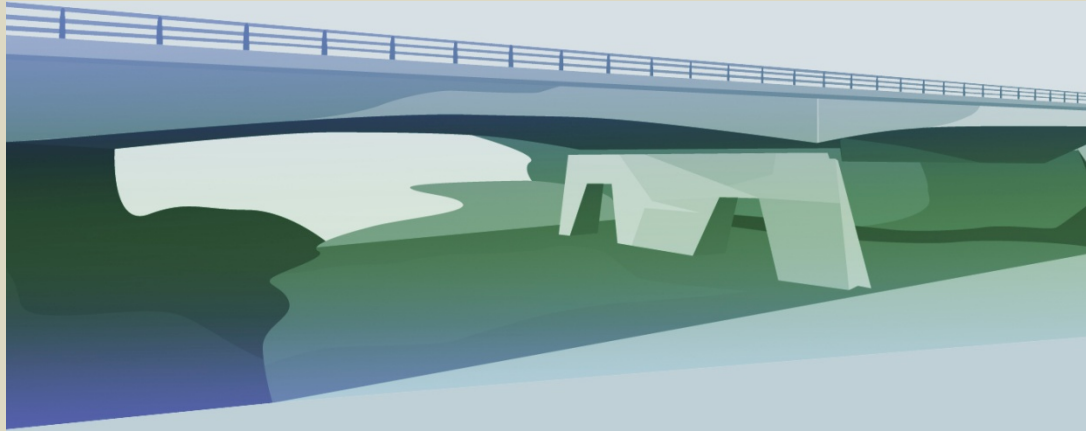
- Expressed as a percent

Performance Measure	Base		Scenario 1A	
Environmental Measures	Value	Unit of Measure	Value	% Change
Habitat	1,775.5	Eco-Logical Score/Mile	1,786.9	-0.6%
Air Quality	13,321.0	Tons/Year	13,211.0	0.8%
Water Quality (% change in stormwater pollutants) (tons per year)	1,079.1	Tons/Year	1,168.3	-8.3%
Flood Plain (acres of 100 year flood plain affected)	99.1	Acres	120.2	-21.3%
Historical (designated historic sites within 500 ft. of projects	1,141	# of Sites	1,171	-2.6%
Archeological (designated archeological sites within 500 ft. of projects)	264	# of Sites	299	-13.3%

Outcomes and Lessons Learned

- Required more outreach and education than some other performance measures

- Limited resolution (30x30 meter)

- Easy to use and replicate results

- Worked well for bigger projects and not so well on small road improvements

- Interest and understanding among local partners has increased

Approved by the
MPO Policy Board

May 28th 2014

Charlottesville/Albemarle MPO
Long Range Transportation Plan

Thomas Jefferson
Planning District Commission

Questions?

Links:

2040 LRTP: http://www.tjpdc.org/LRTP/index.asp
TJPDC Eco-Logical Report and Process:
http://www.tjpdc.org/pdf/Environment/Ecologic%20Final%20Report.pdf

Contact Information:

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Sr. Environmental Planner
Thomas Jefferson Planning District Commission
whudson@tjpdc.org

Thomas Jefferson
Planning District Commission

The OKI Region

Process

- Compare draft plan & environmental resources
- Engage stakeholders

Purpose

- Improve transportation & development decision-making
- Reduce negative & costly environmental impacts

Intended Results of OKI's Environmental Consultations

- Better decisions for improving transportation

- Better decisions about how development occurs

- Transportation improvements and development processes that more fully account for their environmental effects and financial consequences

Five Resource Categories

Regionally Significant Environmental Resources

- Regionally Significant Streams
- State Conserved Areas
- Wetlands
- Endangered, Threatened, or Rare Species
- Prime Farmland and Agricultural Districts

Endangered, Threatened, and Rare Species

- 165 local species are listed at federal or state levels as Endangered, Threatened, or Rare (20 of these are also federally listed)

- Nearly 2/3 of the 104 animal species depend on aquatic habitat for survival

- Nearly half of these aquatic species are "critically imperiled" or "imperiled" globally
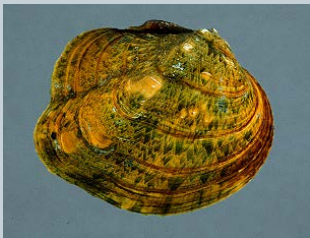
Developed agreements with each Natural Heritage Database authority:

- ❖ Ohio Dept. of Natural Resources
- ❖ Kentucky State Nature Preserves Commission
- ❖ Indiana Dept. of Natural Resources

SHRP2SOLUTIONS
TOOLS FOR THE ROAD AHEAD

- **Distance of records from OKI borders**

Data: 5 miles

Map: ½ miles

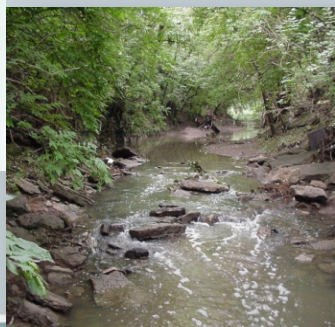- **Starting Date of records**

Data: 1800s,1912,1970

Map: 1965 (50 yrs)

Natural Heritage Data – *Mapping approach*

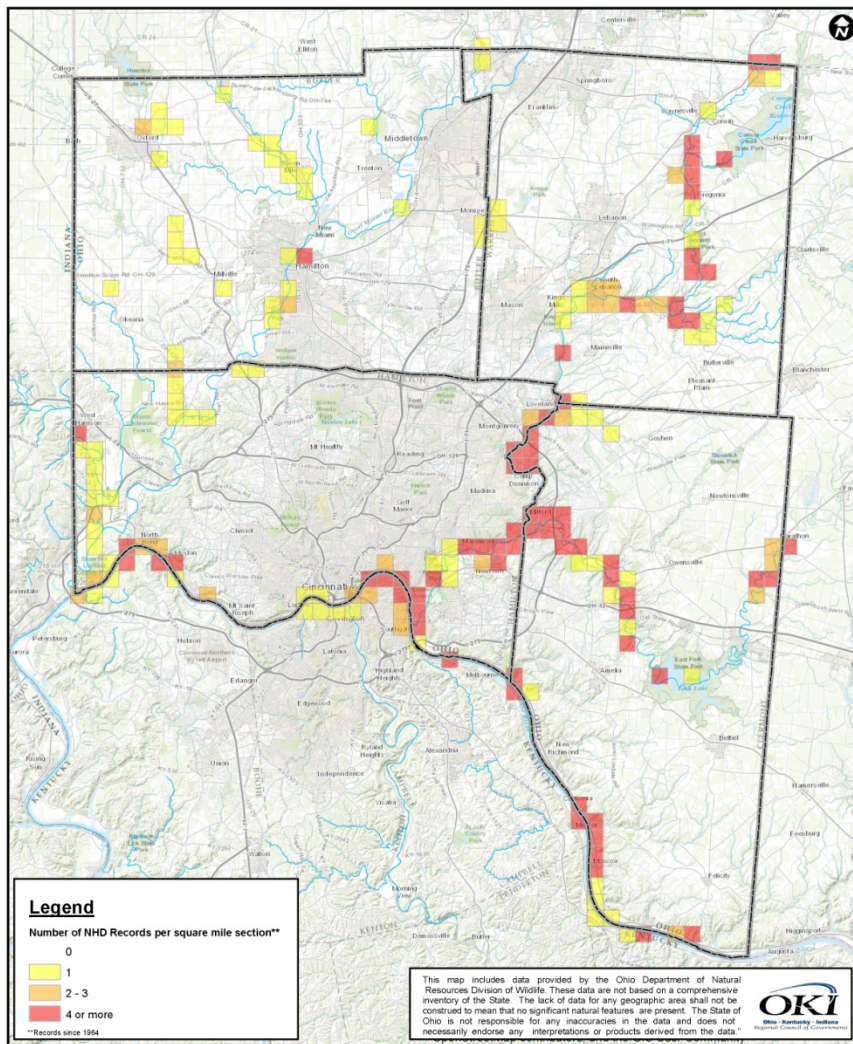## Aquatic vs. Terrestrial

❖ Enables some detail on species type without identifying species

❖ Relevant for bridge or culvert projects
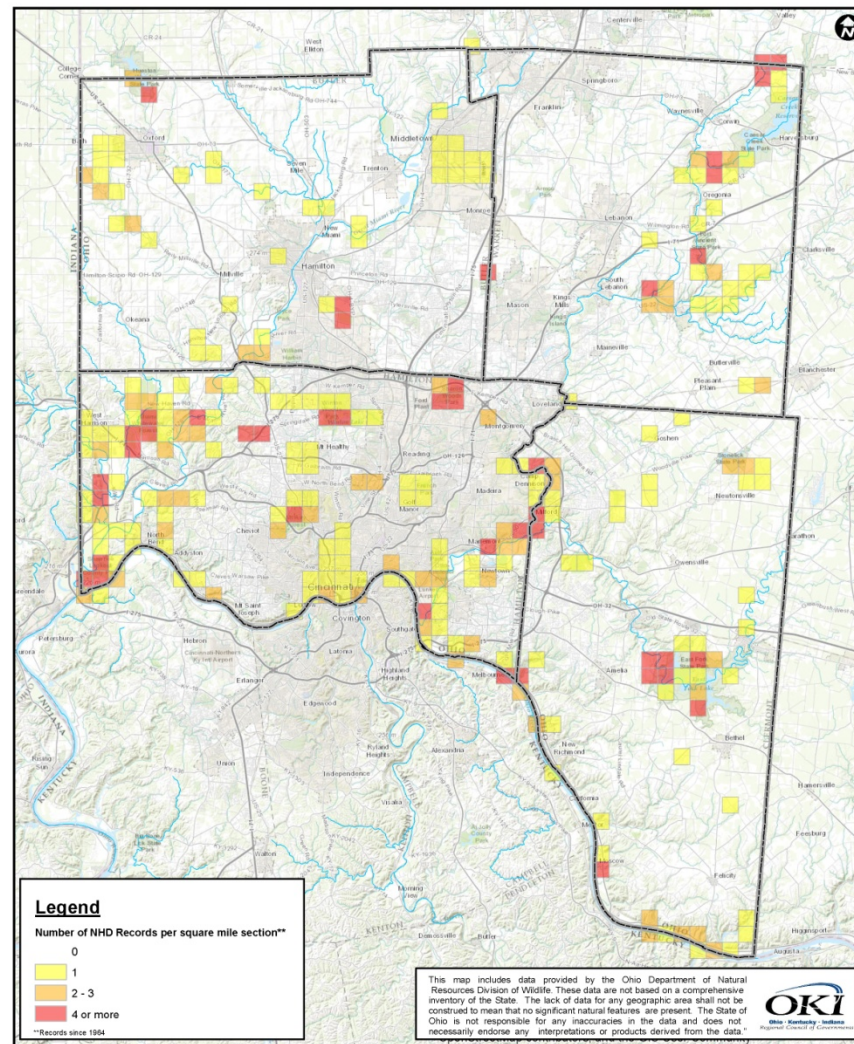
❖ Enhances map value for conservation planning (habitats)

Area with Aquatic Sites in the Natural Heritage Database*
in Butler, Clermont, Hamilton & Warren Counties, OH
*Sites with occurrences of federal or state endangered, threatened or rare species, or locations of significant natural communities or animal aggregations

Legend

Number of NHD Records per square mile section**

- 0
- 1
- 2 - 3
- 4 or more

**Records since 1964

This map includes data provided by the Ohio Department of Natural Resources Division of Wildlife. These data are not based on a comprehensive inventory of the State. The lack of data for any geographic area shall not be construed to mean that no significant natural features are present. The State of Ohio is not responsible for any inaccuracies in the data and does not necessarily endorse any interpretations or products derived from the data.

Area with Terrestrial Sites in the Natural Heritage Database*
in Butler, Clermont, Hamilton & Warren Counties, OH
*Sites with occurrences of federal or state endangered, threatened or rare species, or locations of significant natural communities or animal aggregations

Legend

Number of NHD Records per square mile section**

- 0
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OKI
Ohio · Kentucky · Indiana
Regional Council of Governments

Project Scoring Process

Environmental Impact is 1 of 7 general criteria evaluated

Avoids environmentally sensitive area(s)	5 points
Any impact(s) **will be mitigated**	3 points
Impact(s) will **not be mitigated**	0 points

2014 and Beyond…

- Launch of interactive Environmental Resource website

- Integrate Historic Resources Inventory

- Advancing Strategic Regional Policy Plan - Model Ordinance and Best Practice Sharing