Eco-Logical
Community of Practice

How to Approach your Transportation Environmental Needs Eco-Logically

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(Learn more about Eco-Logical at the FHWA website)

American Association of State Highway and Transportation Officials
AASHTO

SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

U.S. Department of Transportation
Federal Highway Administration

SHRP2 & Its Focus Areas
(Second Strategic Highway Research Program)

Safety: Fostering safer driving through analysis of driver, roadway and vehicle factors in crashes, near crashes, and ordinary driving.

Renewal: Rapid maintenance and repair of the deteriorating infrastructure using already-available resources, innovations, and technologies.

Capacity: Planning and designing a highway system that offers minimum disruption and meets the environmental, and economic needs of the community.

Reliability: Reducing congestion and creating more predictable travel times through better operations.

Eco-Logical: Community of Practice

Purpose:

- To continue the exchange of information after SHRP2 activities have concluded.

Goals:

- To create a self-sustaining network of practitioners to share knowledge, best practices, ideas, and facilitate technical assistance amongst members.

Implementing Eco-Logical

- Landscape-scale approach to transportation project development.
- Transportation agencies collaborate during the planning process.
- Lead to agreed-upon mitigation strategies and timely permit decisions.

Eco-Logical Approach Steps

1. Build collaborative partnerships & vision
2. Characterize resource status
3. Create REF
4. Assess effects on conservation
5. Identify & Prioritize actions
6. Develop crediting strategy
7. Develop agreements
8. Implement agreements
9. Update REF over time

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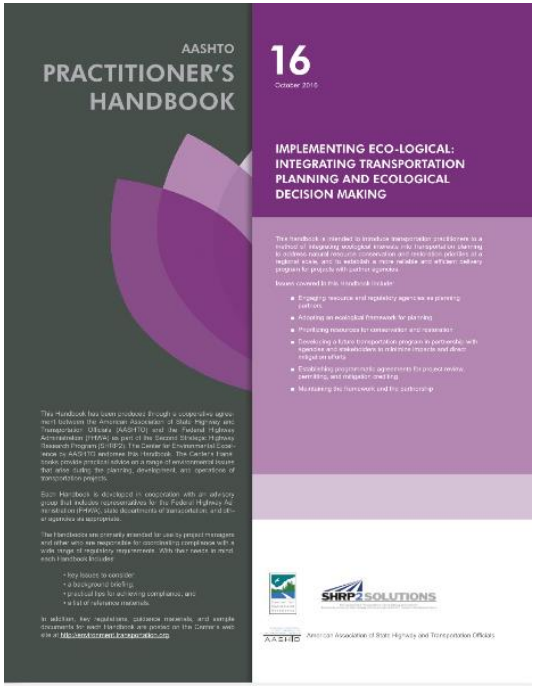
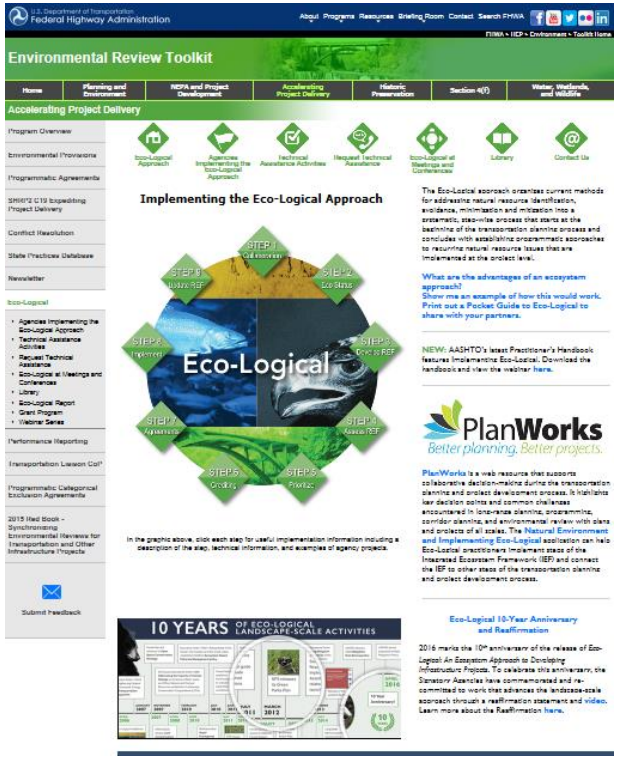
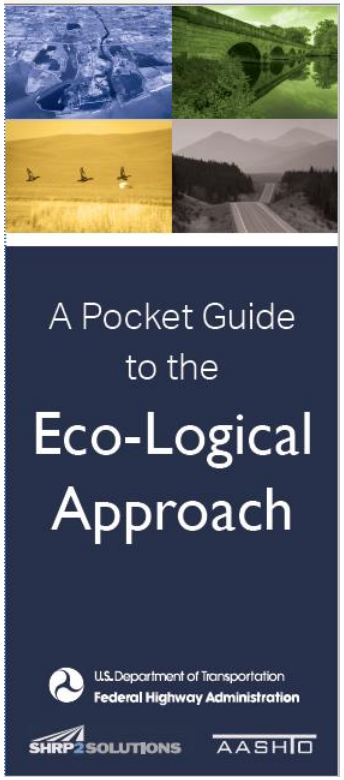
Eco-Logical Website and Tools







https://www.environment.fhwa.dot.gov/ecological/implementingecologicalapproach/default.asp

Today's Agenda

- **Sean Connolly**: Applying Eco-Logical to establish solutions for programmatic mitigation bank needs.

- **Kate Zielke**: Collect and organize geographic data to identify solutions for future conservation/mitigation sites.

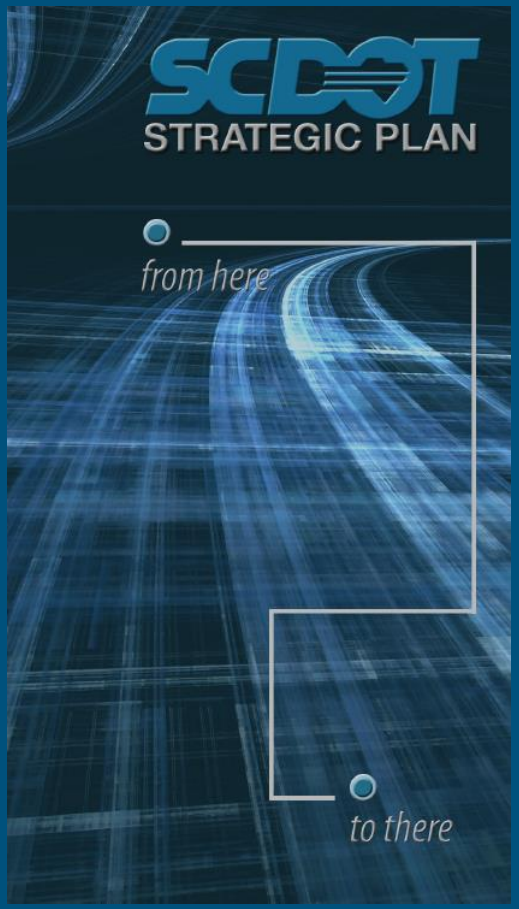
- **Suzanne Melim**: Benefits of implementing Eco-Logical to planning wildlife crossings.

SCDOT Mitigation Strategy

Eco-Logical 2017

SCDOT’s Vision

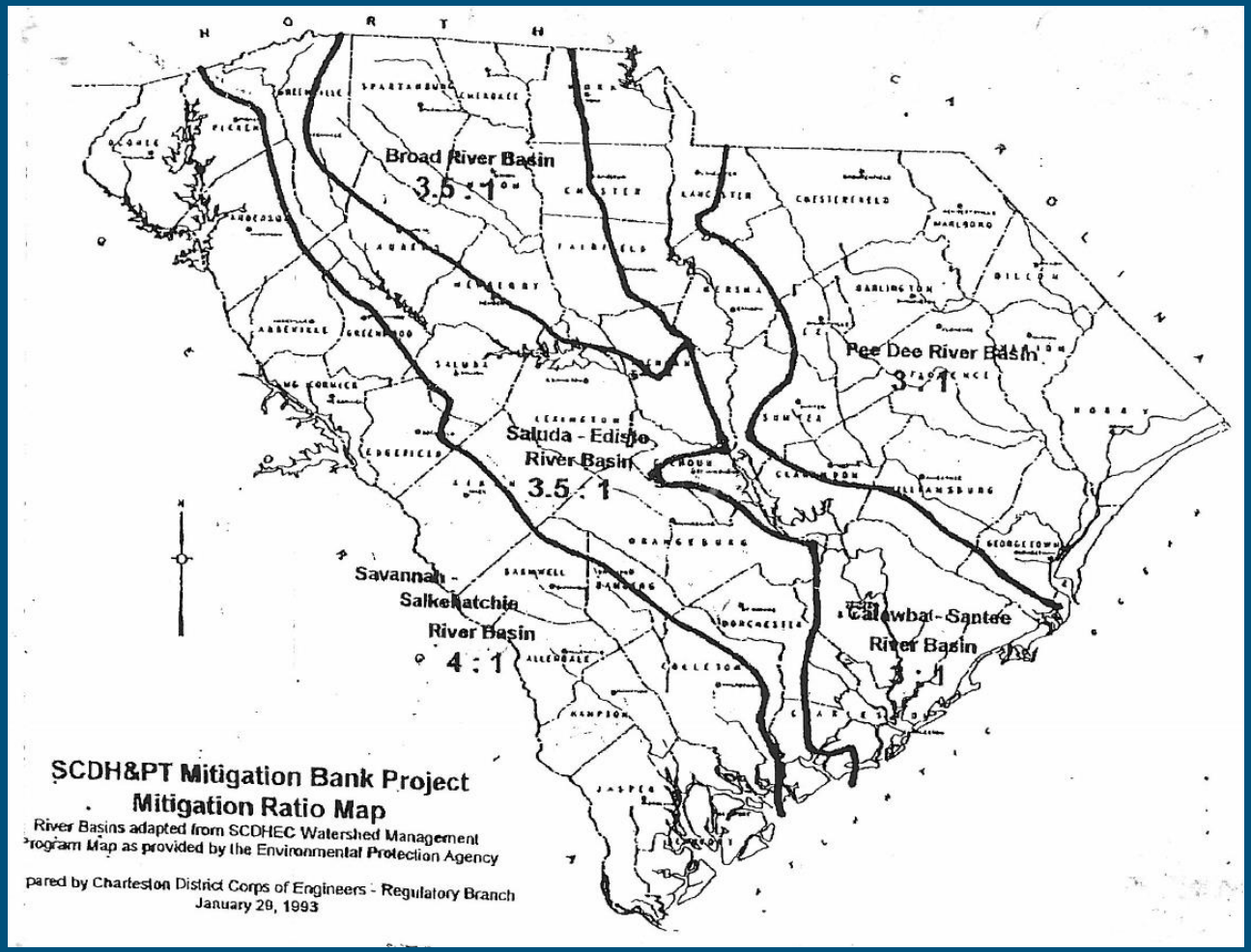
The vision of SCDOT is to deliver, operate and maintain a world-class, 21st century, multimodal transportation system that enables the Palmetto State to continue to grow its economy, enhance communities, and improve the environment.



What is SCDOT's Mitigation Strategy?

- To solve the anticipated mitigation issue for projects prior to entering the NEPA phase to have more economical and readily available mitigation options to deliver projects while also benefitting the resources.
- Improve quality of project outcomes and improve scheduling for safer, improved infrastructure.
- Begin development of a framework to improve watershed and ecosystem health as well as increase connectivity and conservation.
- To develop a framework and foundation for an interagency collaborative and ecosystem approach to developing infrastructure projects.

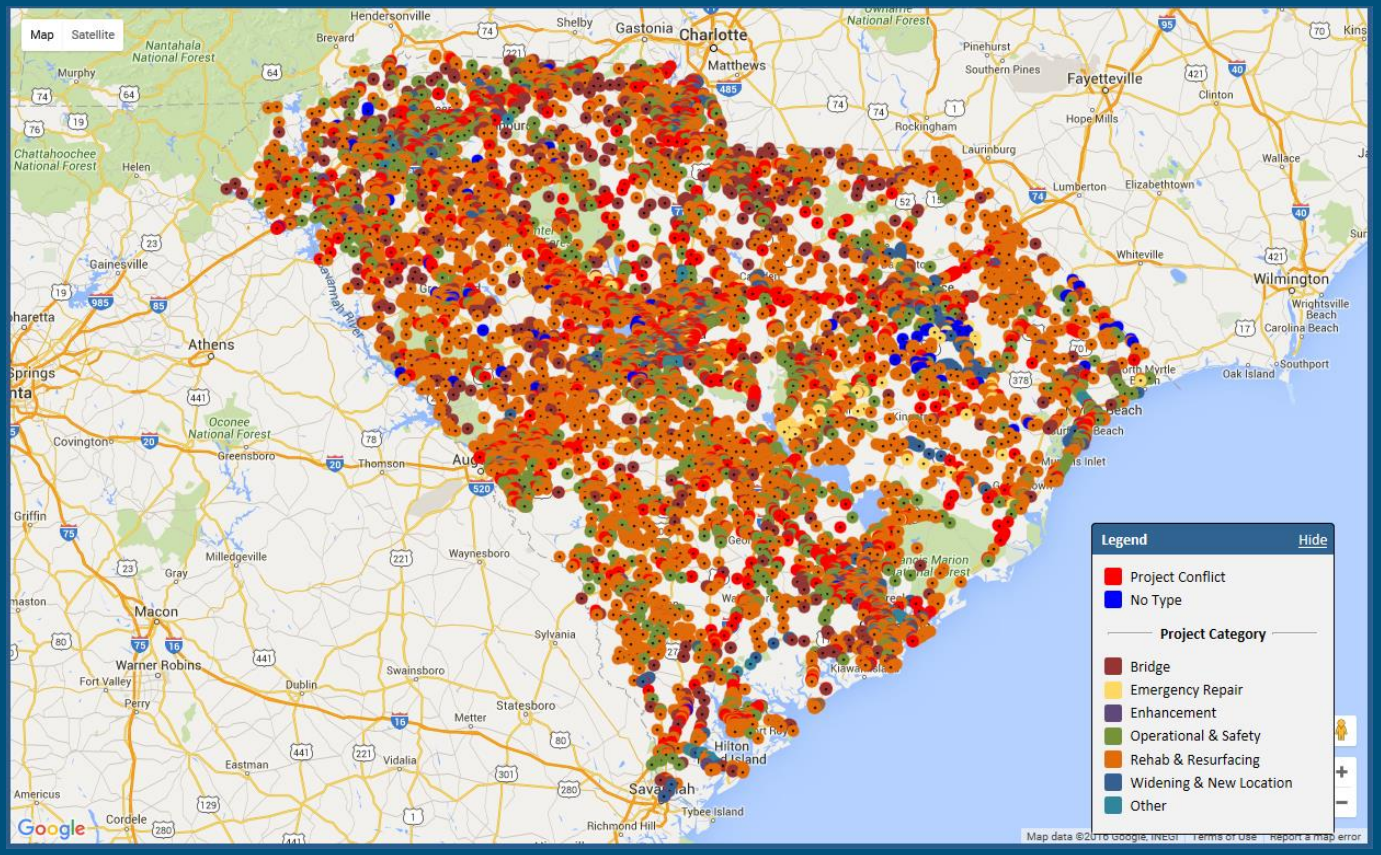
SCDOT's Historical Mitigation Methods



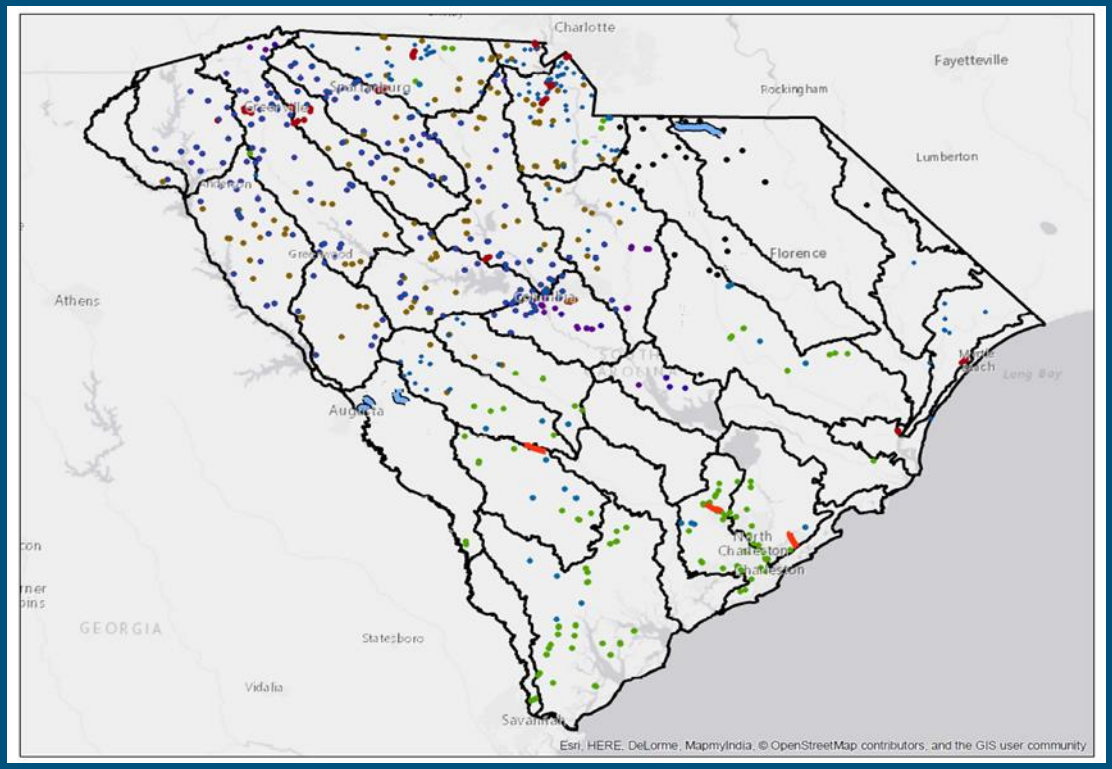
Problem Statement

- Few Mitigation Banks
- No Coastal Stream Mitigation Banks
- Concern due to limited credits available even within approved banks
- Permittee-Responsible Mitigation is not economical for smaller projects
- Project delays and complexities
- Volume of Projects
- Increasing Costs

Volume of Projects



Projects with Possible Impacts

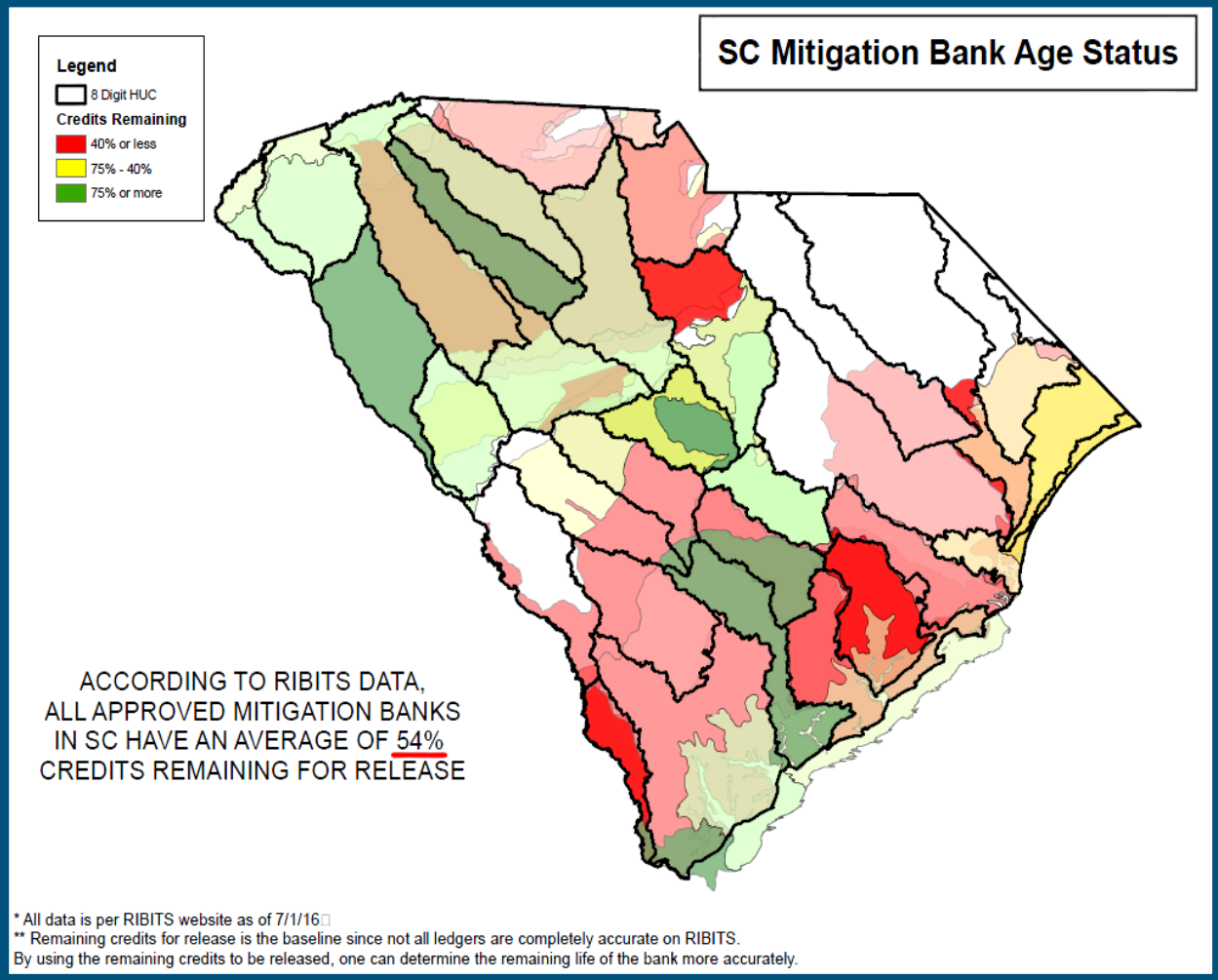


SC Mitigation Bank Service Areas

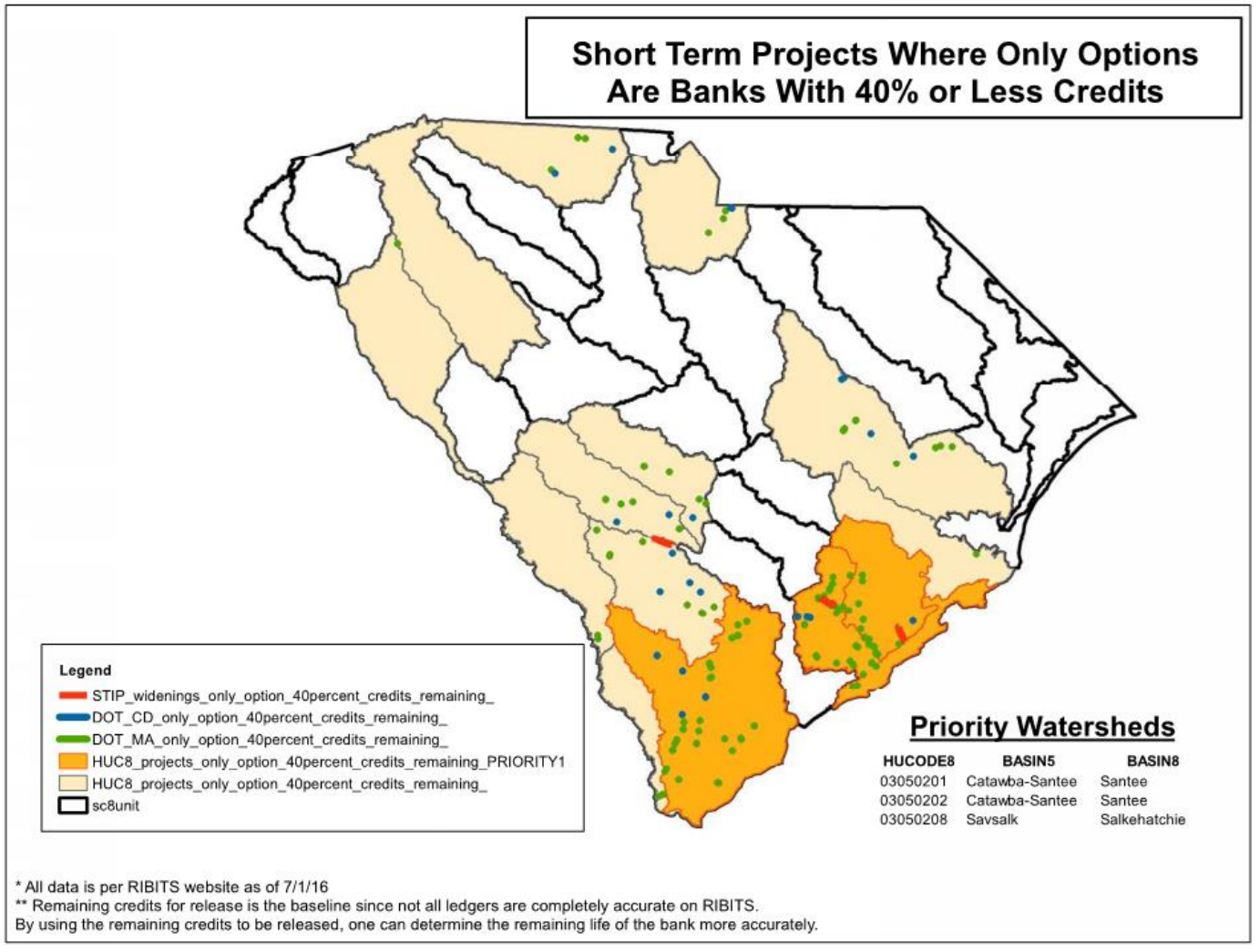
Two areas that immediately jump off the map

Zero bank coverage for these areas of the state

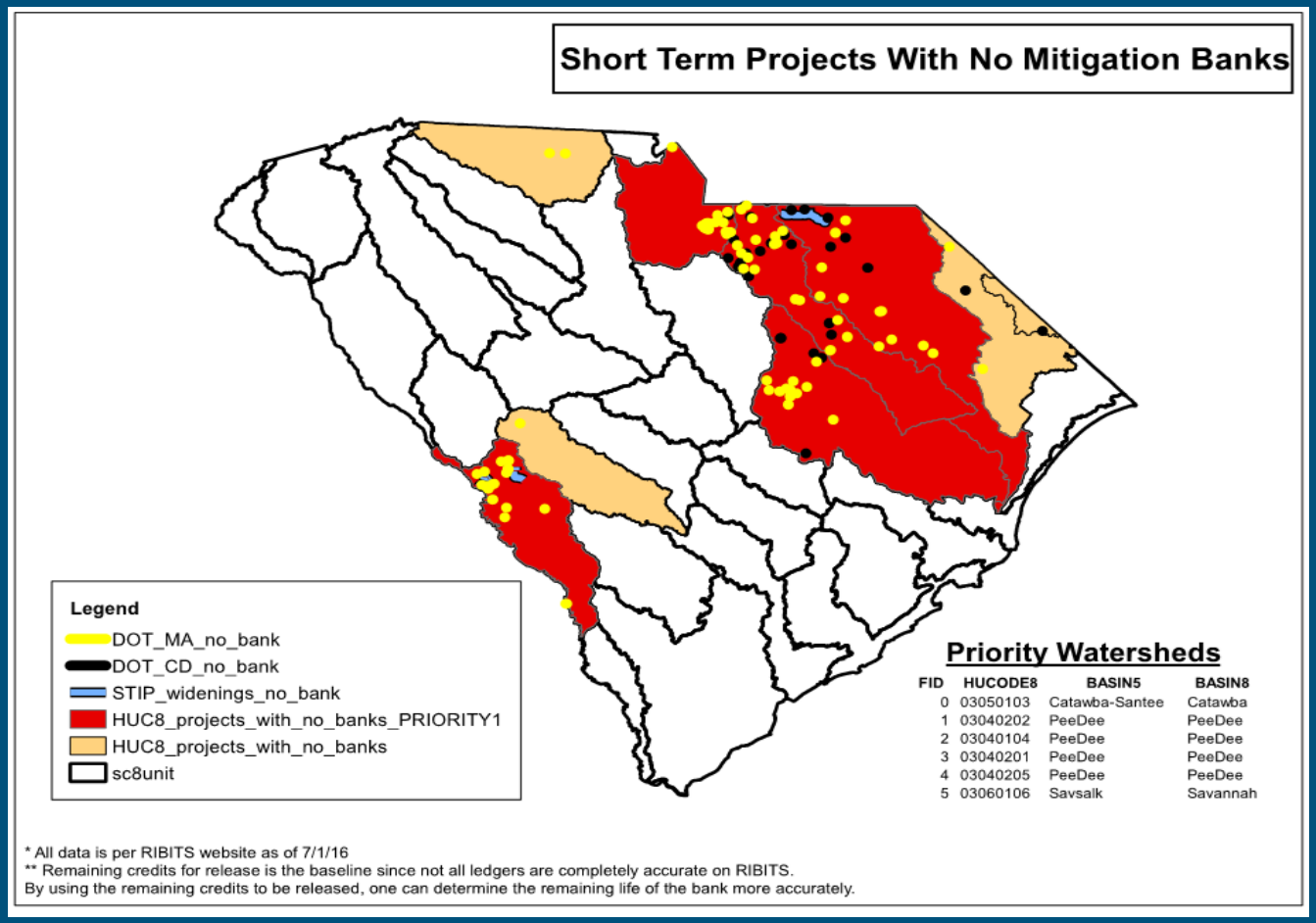
Also Coastal Area Wetlands Only



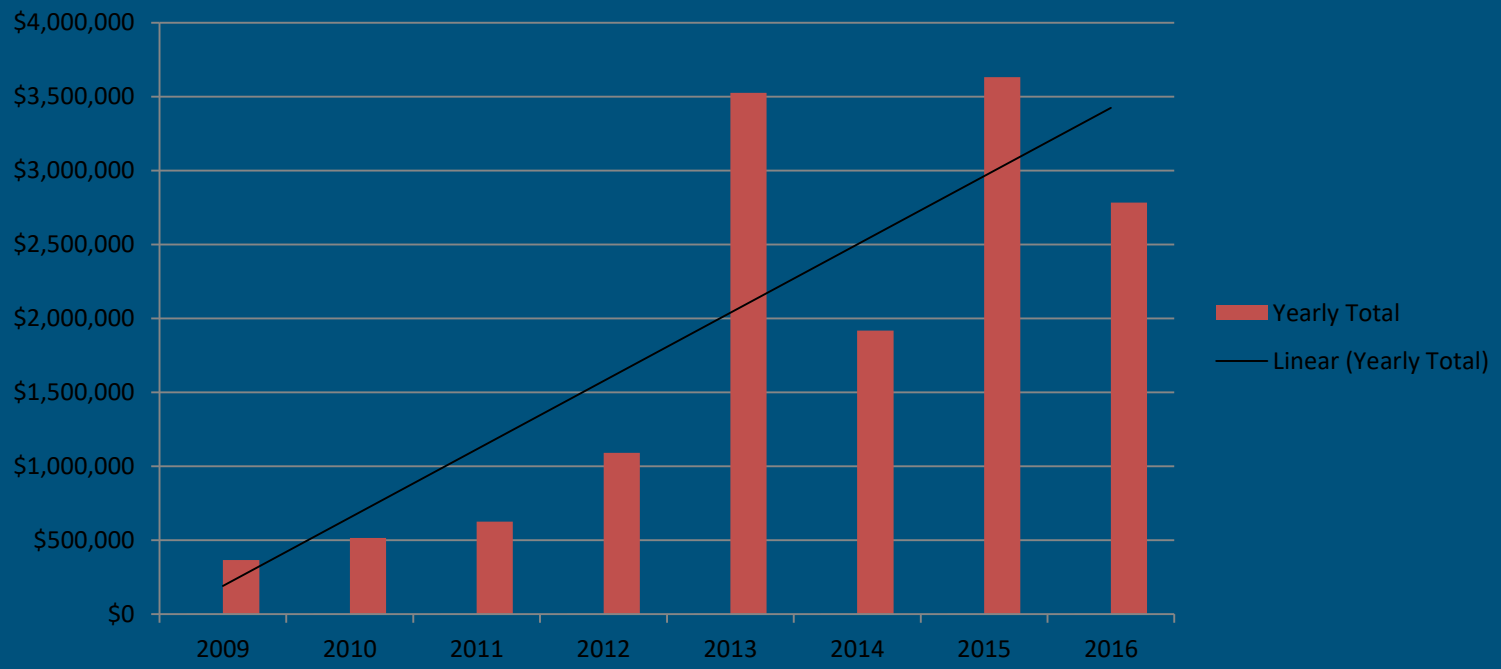
138 projects identified



Projects Lacking Bank Coverage



Increasing Compensatory Mitigation Costs

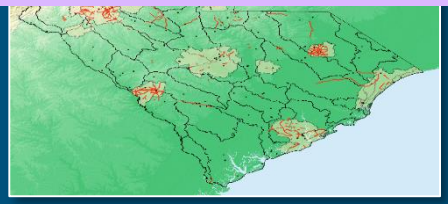


Implementing Eco-Logical Steps

1. Build collaborative partnerships & vision
2. Characterize resource status
3. Create REF (USC Forecast Tool)
4. Assess effects on conservation
5. Identify & Prioritize actions
6. Develop crediting strategy (AMP)
7. Develop agreements
8. Implement agreements
9. Update REF over time

REF STEP 3 –Forecast Impacts

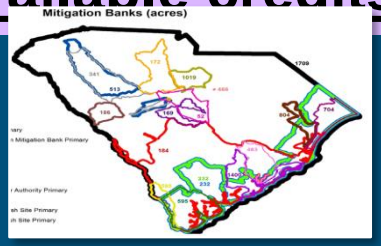
Where are the future road projects?



NWI
NHD
&
More

Where are the wetlands and streams?

Where are the available credits?



Ok, specifically where will the surface/shoulders be?

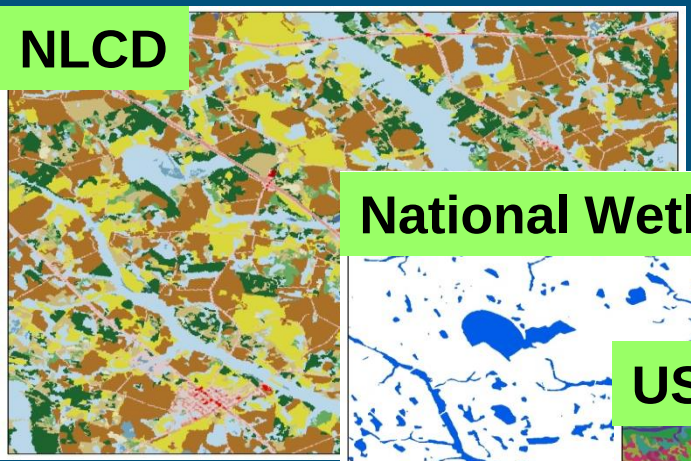
Where are the wetlands?

MODEL

Impacts:
Wetland acres
Stream feet

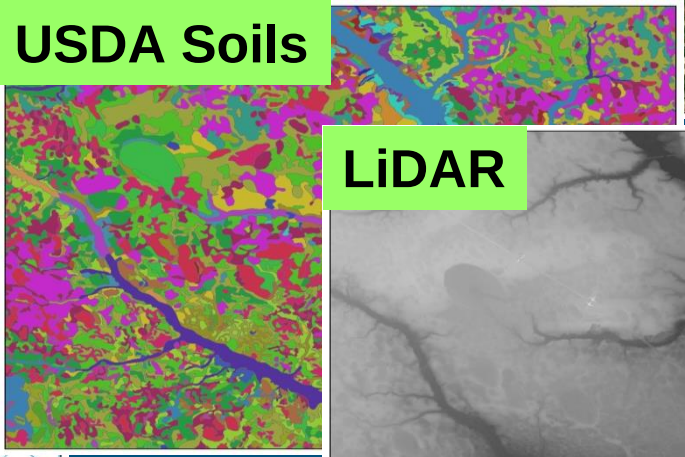
Database

NLCD



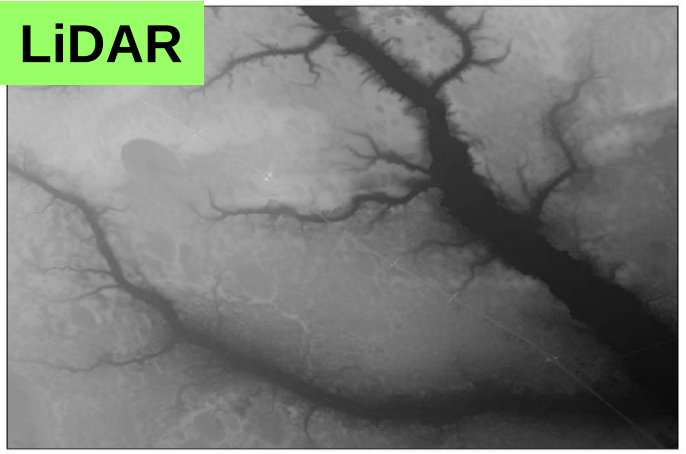
National Wetlands Inventory

USDA Soils



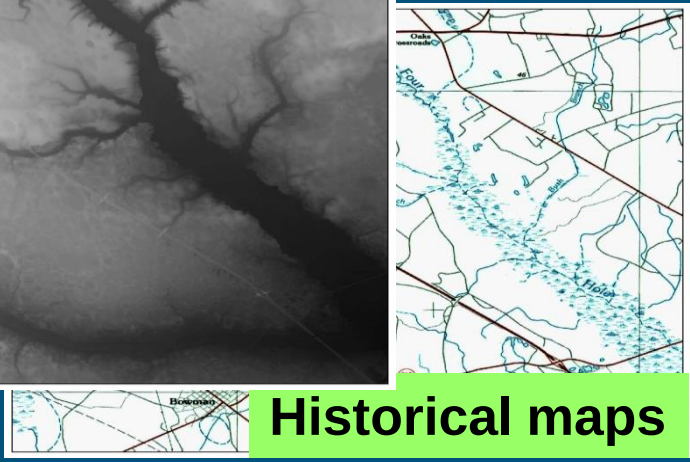
Imagery

LiDAR



Zoning

Historical maps



Data Sources

Sample of data sources that will be utilized

South Carolina	Source
Grey Infrastructure	
Roads	SCDOT
Bridges	SCDOT
Culverts	SCDOT
Railroads	SCDOT
Dams	SCDHEC, American Rivers
Land Development	
Zoning	County Govs, COGs, MPOs
Land Cover	USGS
GAP	USGS
Parcels	County Govs
Existing Land use	aerial photography
Wildland Urban Interface	SCFC
Habitat Fragmentation	

Green Infrastructure	
Local Parks	County Govs
Publicly Owned Lands	
USGS PADUS	SCDNR
	SC Forestry Commission
	US Forestry
	USFW
	SCDOT
	State Parks
	National Parks
	Other State agencies
	Department of Correction
	Department of Energy
	Other Federal Agencies
	Ports Authority
	Army Corps of Engineers

Existing Conservation Easements	
National Conservation Easement Database	NRCS Easements
	SCDNR
	Land Trusts
	SC Conservation Bank
Nature Conservancy, DU, NWTF, Audubon, Norfolk RR	Other NGOs
Local Watershed Districts	DNR will look
Existing Mitigation Banks	USACOE - RIBITS
Service Areas	USACOE - RIBITS
Physical Location	USACOE - RIBITS
Threatened and Endangered Species	SCDNR, USFW
SWAP species	SCDNR
Trout streams	SCDNR, SCDHEC
EcoRegions	SCDNR, USGS
Critical Area	OCRM
Shellfish Harvesting	SCDHEC, SCDNR
Shellfish Bed locations	SCDHEC, SCDNR
Wetlands likelihood	USC

Data Sources

Blue Infrastructure	
SCDHEC Watershed Atlas	SCDHEC
Streams	SCDHEC, SCDNR, USGS
Wetlands likelihood	USC
Rivers	USGS, SCDHEC, SCDNR
Scenic Rivers	SCDNR
Lakes	USGS, SCDHEC, SCDNR
Ponds	USGS, SCDHEC, SCDNR
Aquifers	

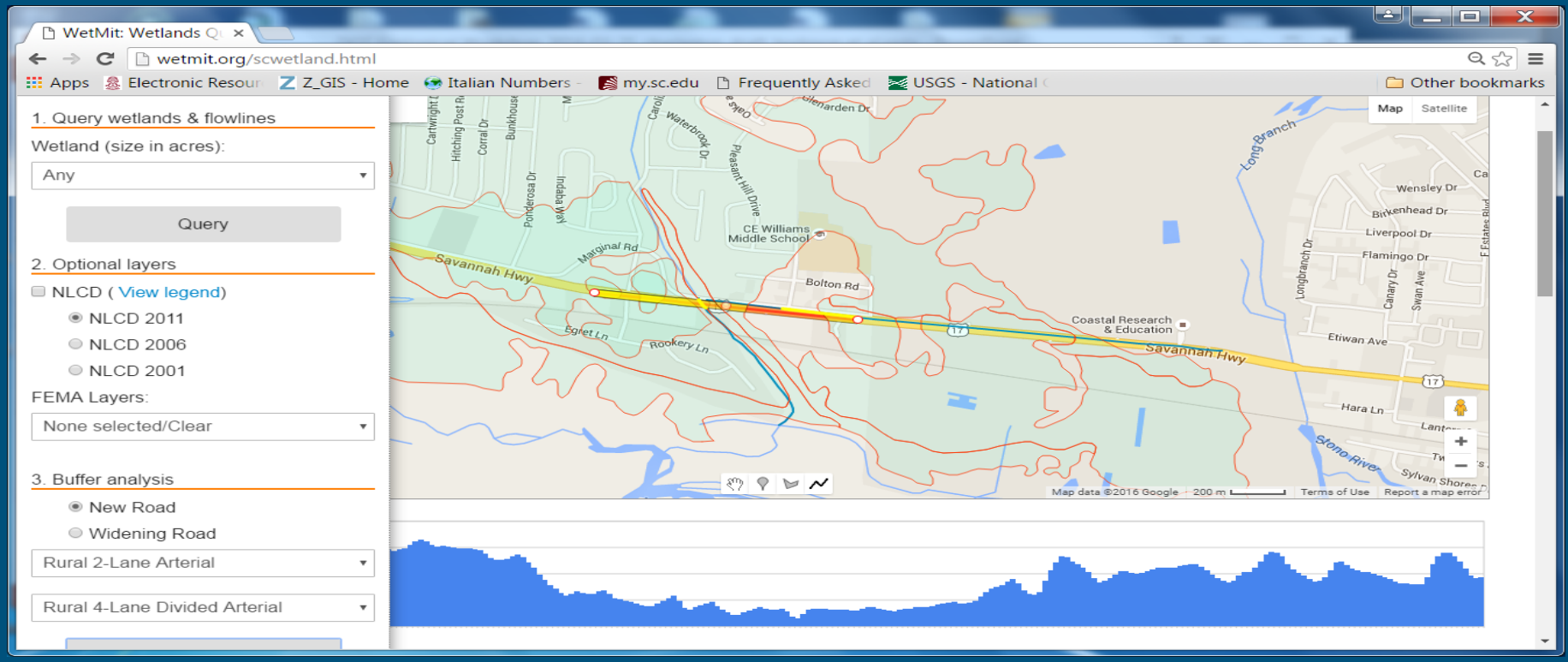
Ground Water	SCDHEC
Water Quality	SCDHEC
	303(d)
	TMDL
	Stations
FEMA floodzones	FEMA
Watersheds	SCDHEC, SCDNR, USGS
All HUCs available	SCDHEC, USGS
River Basins	SCDHEC, USGS
DNR Stream Assessment tool??	SCDNR

Other	
Historical Aerials	USC Thomas cooper, counties
Census	
LiDAR	SCDNR
SCDNR Focus Areas	SCDNR
Farmland	NRCS
Forest Action Plan	SCFC

Example: USC-SCDOT

Public Access Site

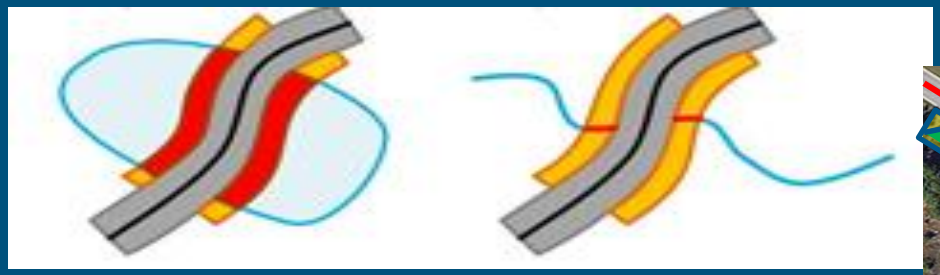
www.wetmit.org

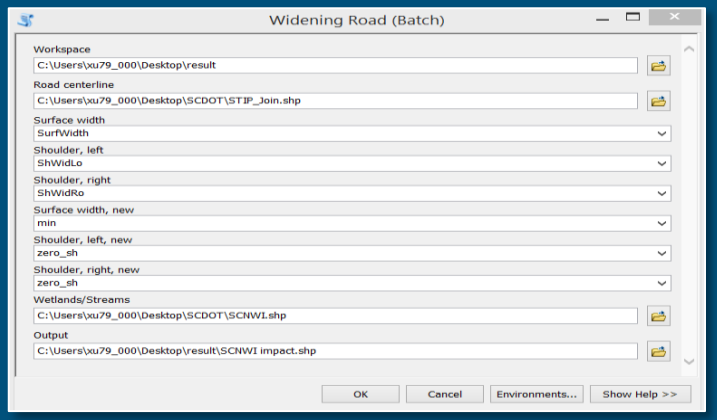


Desktop Road Modification Tool

Wetlands Impacts

Stream Impacts

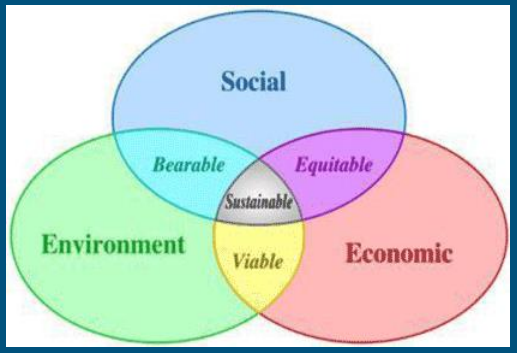




It’s NOT all about SCDOT

Together, partners can work to implement an ecosystem approach to infrastructure projects. In doing so, substantive contributions to species, watershed, and ecosystem health and recovery can be made that are sometimes missed when regulations are administered on a project-by-project basis.

(ECO-Logical April 2006)



2nd Phase- Advanced Mitigation Partnership

Who: SCDNR, SCDHEC, USACE, USFWS, SCDOT, NMFS, SCFC, SCDOT, FHWA, USEPA

When: AMP meets every other month

What: Evaluate USC Forecast Model, SCDOT critical watersheds, and Short term/ Long Term Improvements

Why:

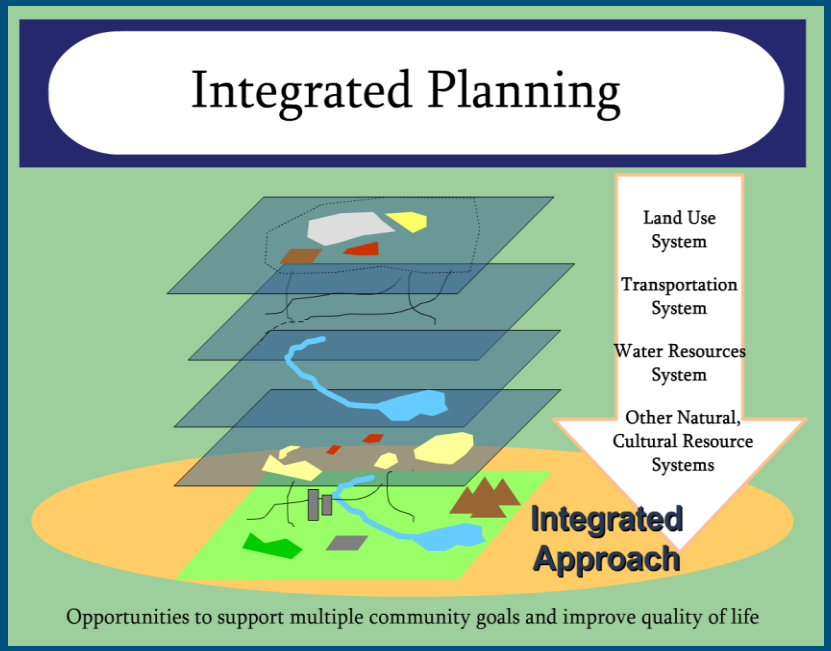
SC Advanced Mitigation Partnership

1. Discuss Absolutes for Mitigation.

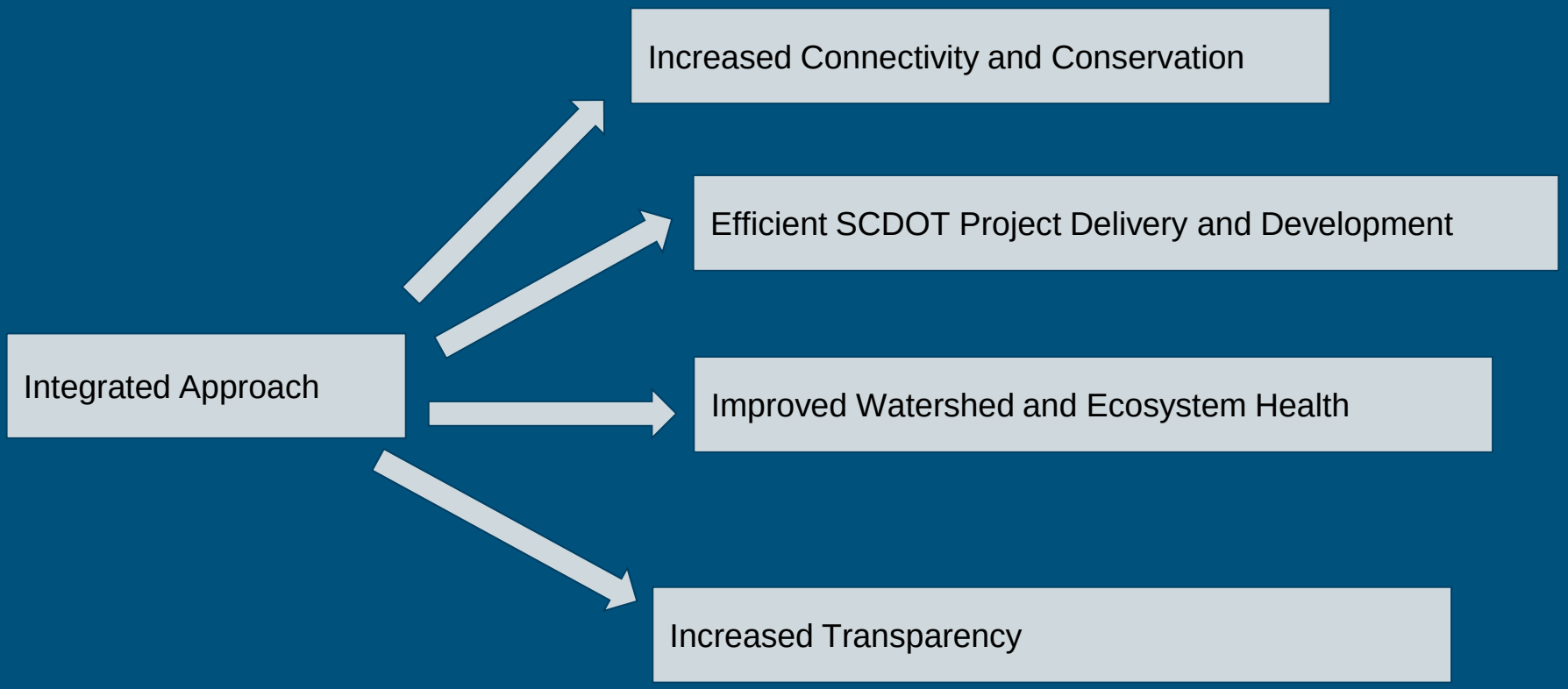
2. Evaluate and incorporate overlapping Agency Missions and develop AMP step by step (e.g. 303(d) list, Fish Passage).

3. Share data between each agency.

4. Evaluate watershed's needs and best way to protect and/or restore. (stream buffers, corridors, stormwater retrofit)



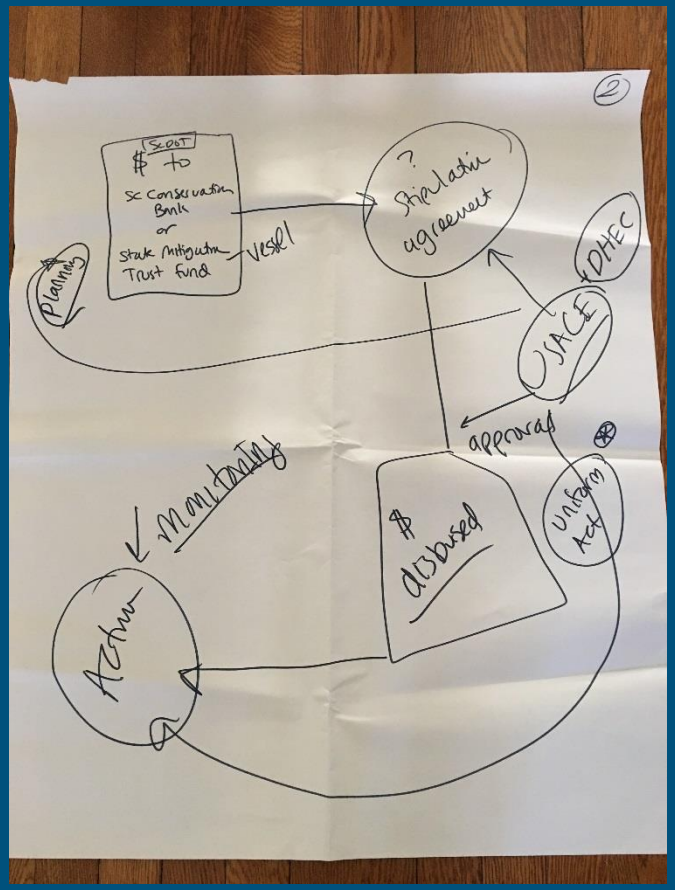
In other words...

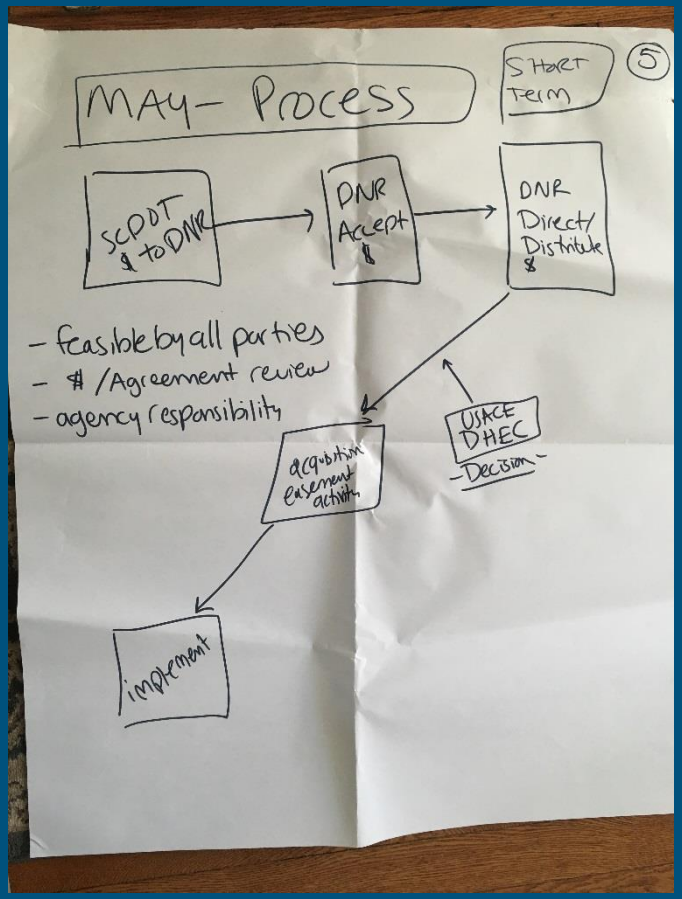


Ultimate Goals

- Create a methodology that is based on South Carolina resource needs and is scientifically sound
- Continue collaboration and information sharing between state agencies and federal agencies
- Have a functioning web based tool that will identify enhancement/restoration and preservation opportunities for a variety of resources throughout the state of SC
    - This tool can be used for more than wetlands and stream mitigation site identification
- Create solutions that benefit the state of South Carolina
    - Good for resources, Good for agencies, Good for taxpayers and general public

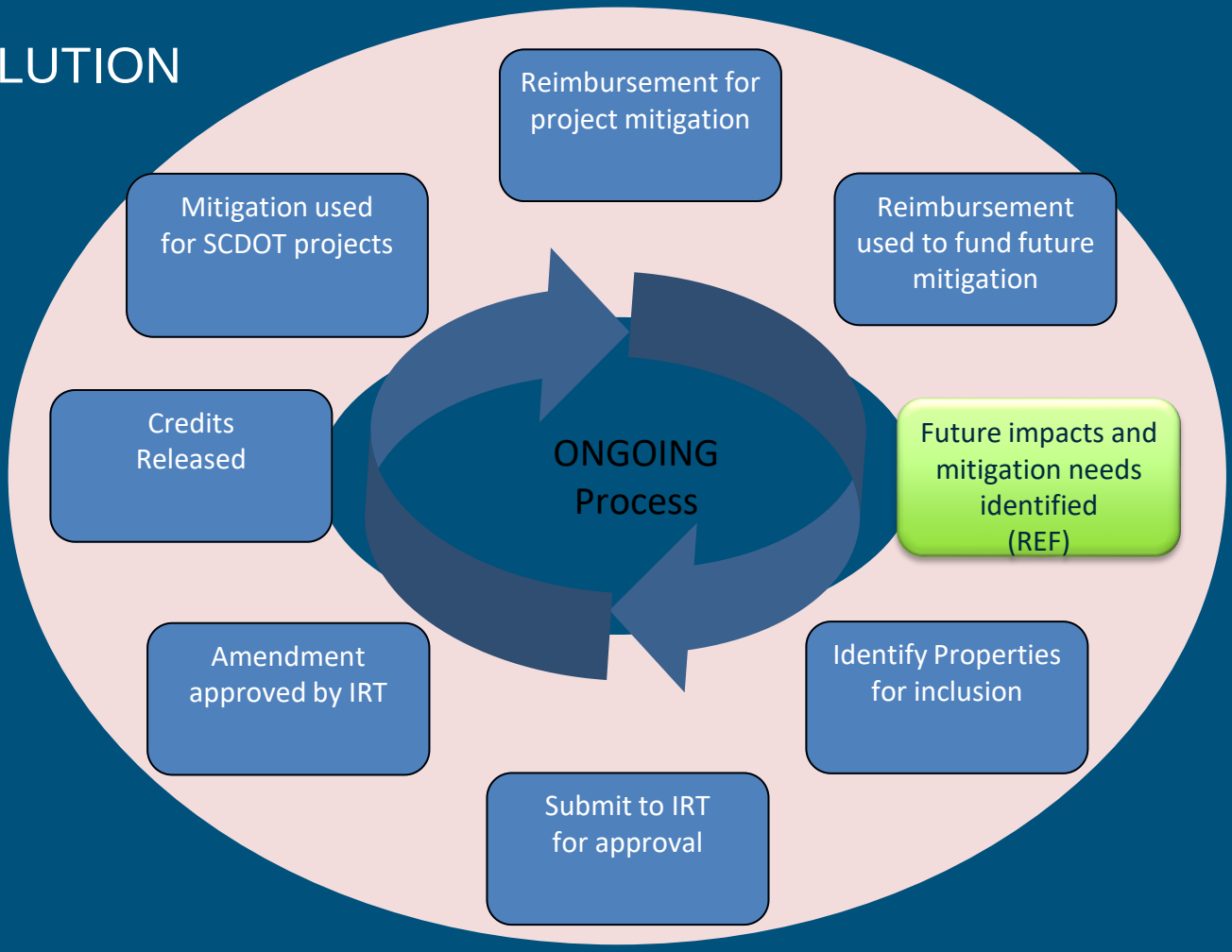
Solutions Begin with an Idea: JUST START





A POTENTIAL SOLUTION (Long Term)

- AMP Generated Process



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Thank you!

How to Approach Your Transportation Environmental Needs Eco-Logically

North Central Texas Council of Governments

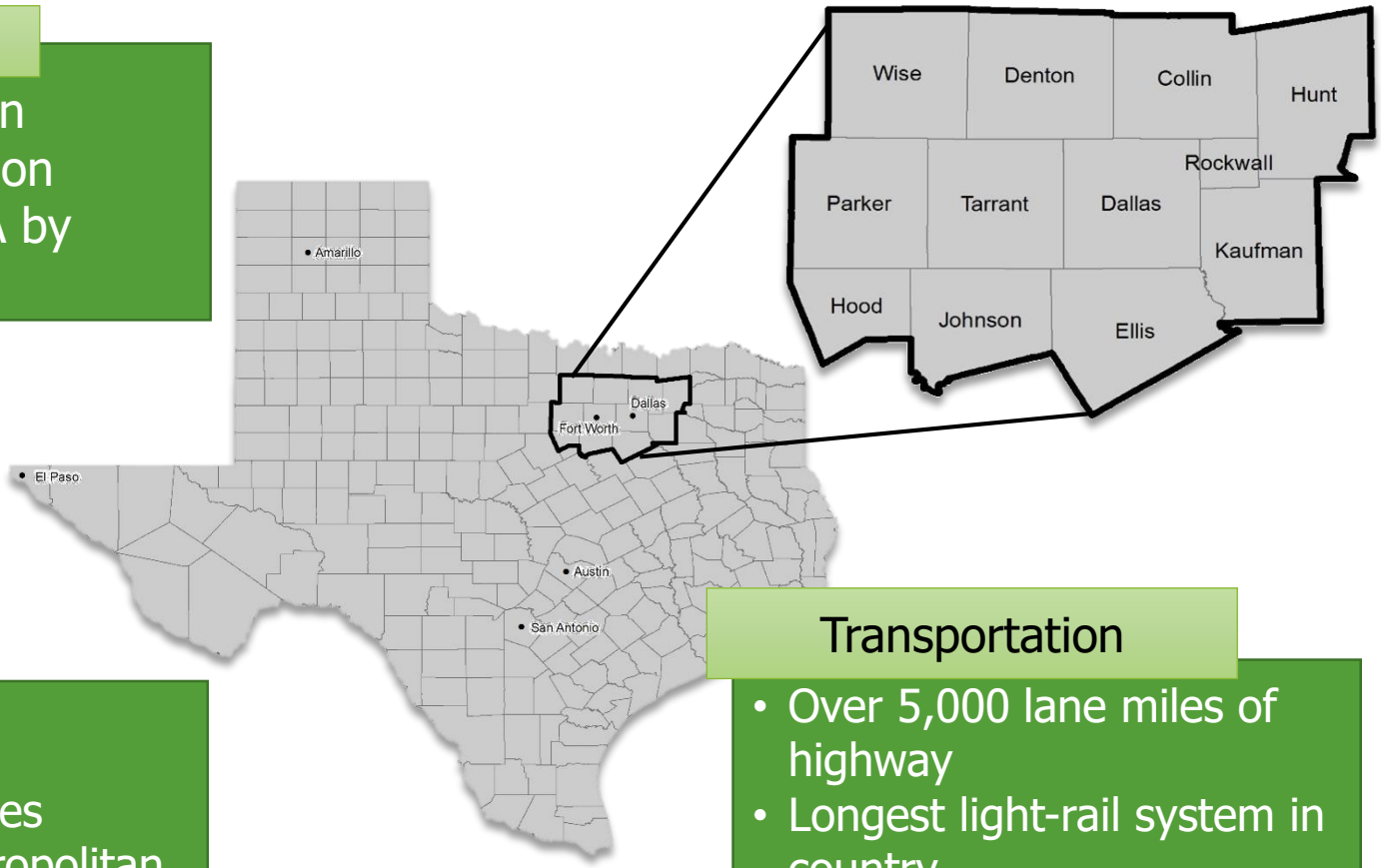
AASHTO Eco-Logical Community of Practice Webinar

January 31, 2017

Regional Perspective

Population

- 2017: 7.2 million
- 2040: 10.7 million
- 4th Largest MSA by Population



Area

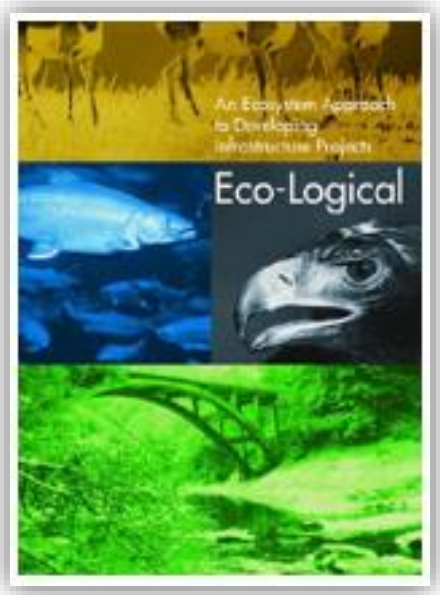
- 12 counties
- 9,441 square miles
- 2nd Largest Metropolitan Planning Area

Transportation

- Over 5,000 lane miles of highway
- Longest light-rail system in country
- $118.9 billion identified in Mobility 2040 plan

NCTCOG Eco-Logical Efforts

- 2008, 2013 FHWA Eco-Logical Grants
- Regional Ecosystem Framework (REF)
- Loop 9 Corridor Area Conservation Vision and Opportunities
- REF Update
- REF Website
- Wetland and Stream Mitigation Assessment

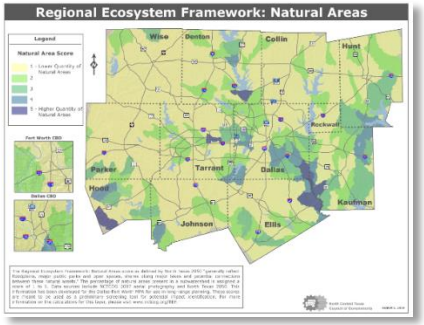


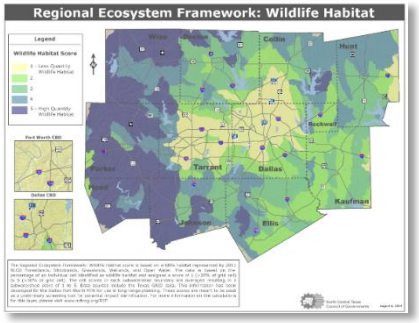
Regional Ecosystem Framework (REF)

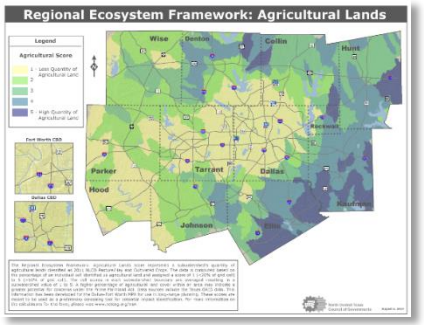
- Planning tool developed to identify natural/ecological/agricultural resources
- Developed with feedback from resource agency partners
- Data is aggregated to HUC12 level
- An early screening tool, not a mitigation tool

REF Layers

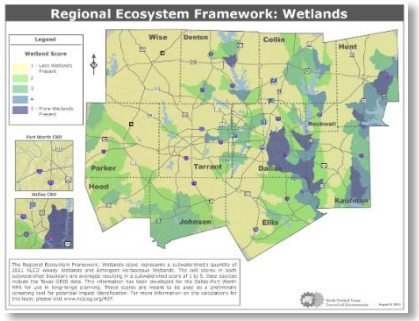
Green Infrastructure Layers

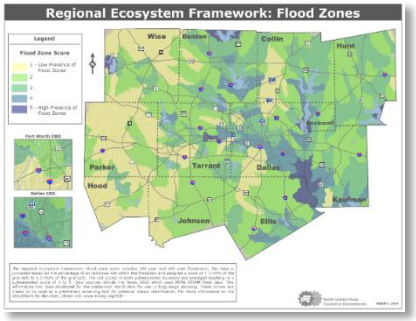


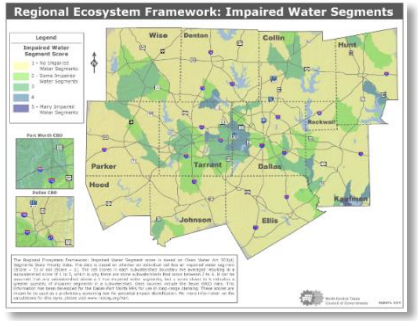


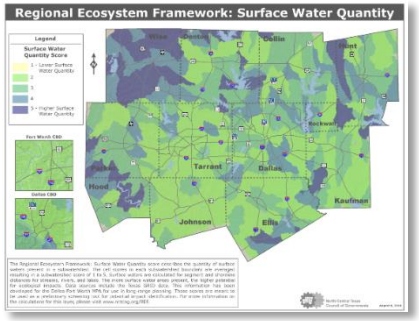


Water Considerations Layers

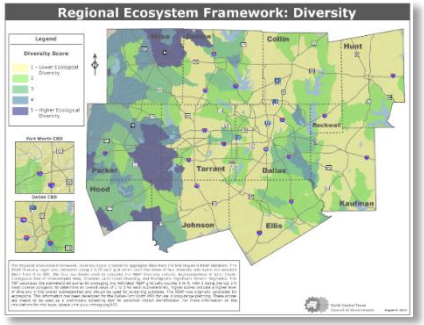


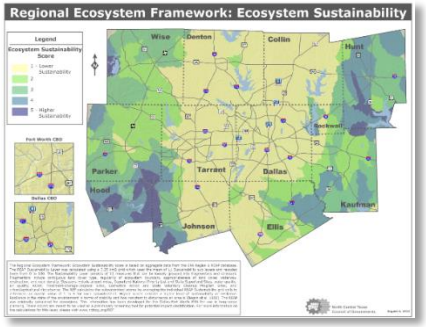


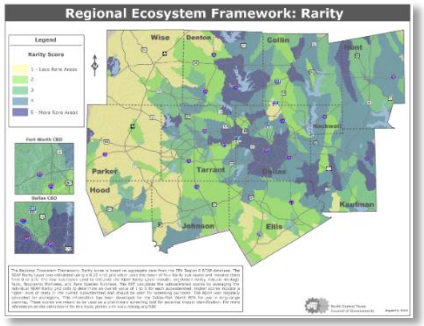




Ecosystem Value Layers







REF Data Sources

Green Infrastructure Layers

National Land Cover Database (USGS/DOI)

Vision North Texas (NCTCOG)

Water Considerations Layers

303(d) List (Texas Commission on Environmental Quality)

Flood Zones (FEMA)

National Hydrography Dataset (USGS)

National Land Cover Database (USGS/DOI)

Ecosystem Value Layers

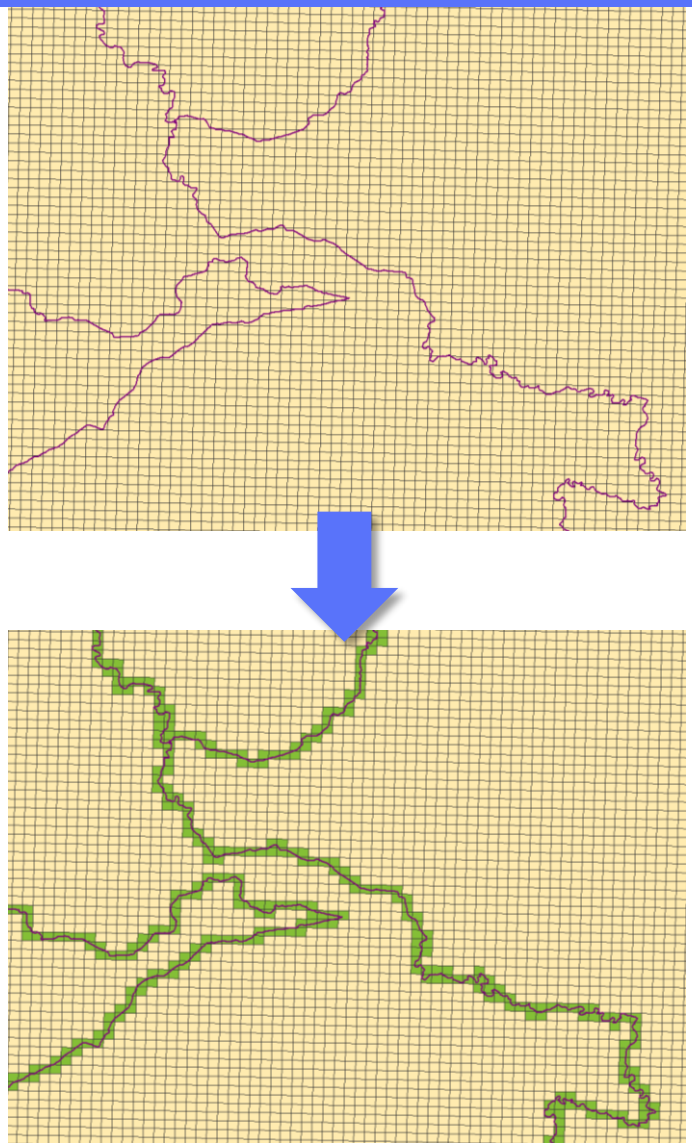
Regional Ecological Assessment Protocol (EPA Region VI)

Layer Scoring Example

Impaired Water Segments

- Region is divided into 1/4km² grid
- Select by Location tool is used to target grid cells that contain an impaired water segment
- Grid cells are assigned a score based on presence of an impaired water segment:

Grid Cell Attributes	Score
No Impaired Water Segment Present	1
Impaired Water Segment Present	5

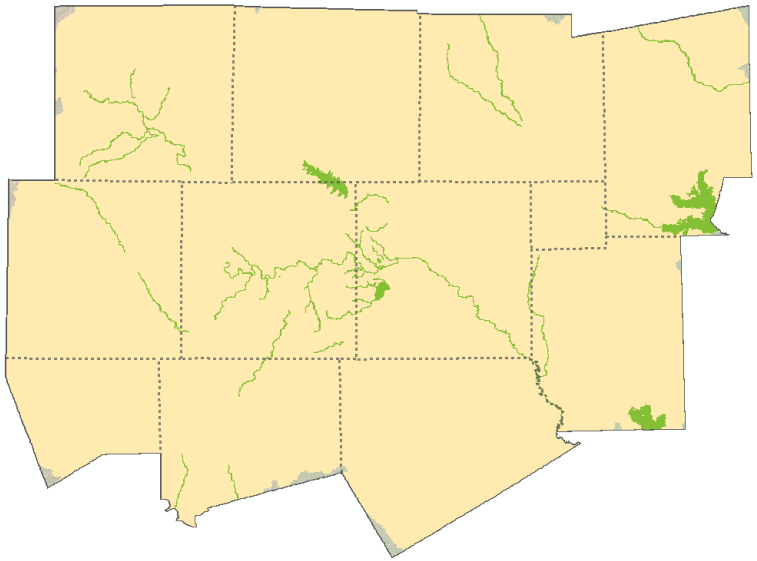


Layer Scoring Example

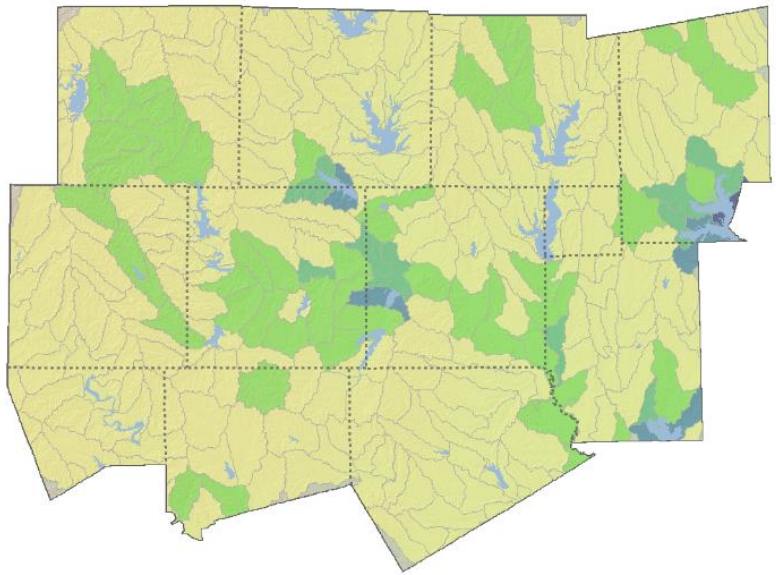
Impaired Water Segments

Grid cell scores are aggregated to subwatershed level by using natural breaks to assign scores from 1 to 5

Grid-Level Scores



Subwatershed Scores

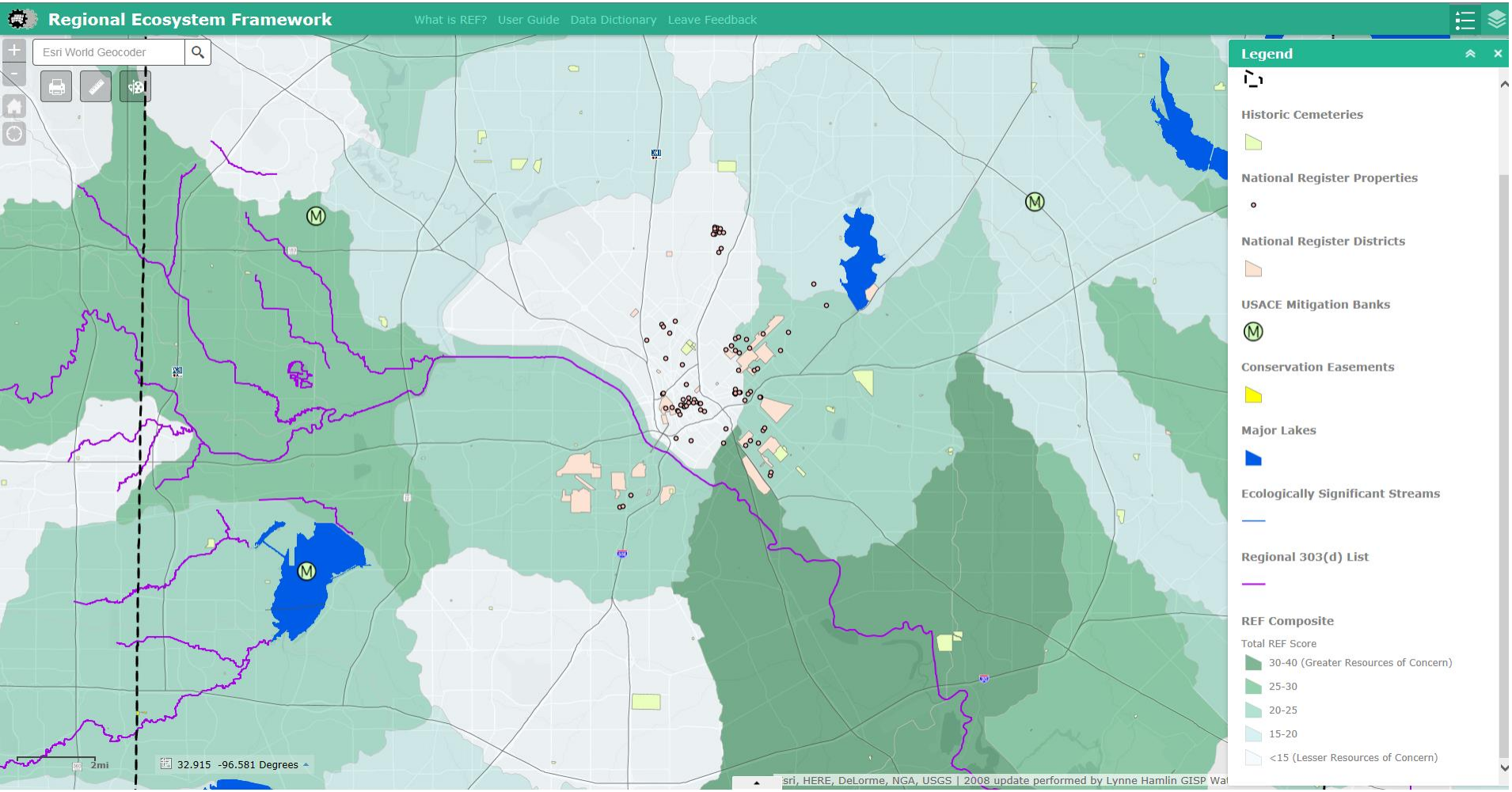


Current Applications of REF

- In Mobility 2040:
  - Used in environmental scoring of roadway and transit projects
  - Identified HUC12 subwatersheds through which each project travels
- Included in publicly available REF Website
- Used as an overlay layer to enhance analysis of estimated mitigation credit demand in Wetland and Stream Mitigation Assessment
- Helped develop NCTCOG culture of sensitivity to ecosystem approach
  - Led to funding for Environmental Stewardship Program

Sharing REF Data

REF Interactive Mapping Website



Future Applications of REF

Mobility 2045 goals:

- Identify which environmental resources in each subwatershed may face the greatest impacts generated by roadway and transit projects; will help identify future mitigation needs
- Update environmental scoring method and include score in project-selection process for Mobility 2045

Issues to Address

- Data updates
  - Diversity, Ecosystem Sustainability, and Rarity layers produced by EPA using grant funds – data dates to ~2001
  - Natural Areas layers come from NCTCOG vision plan
- Limited species data
- Cannot compare aggregated change over time
  - About half of layers were not updated in 2014
  - Counties for which data was available changed over time for one layer
  - Original scoring of this layer did not differentiate between no data and lowest score
- Aggregating data should be discussed
  - People like to see one final score, but a lot of information is lost

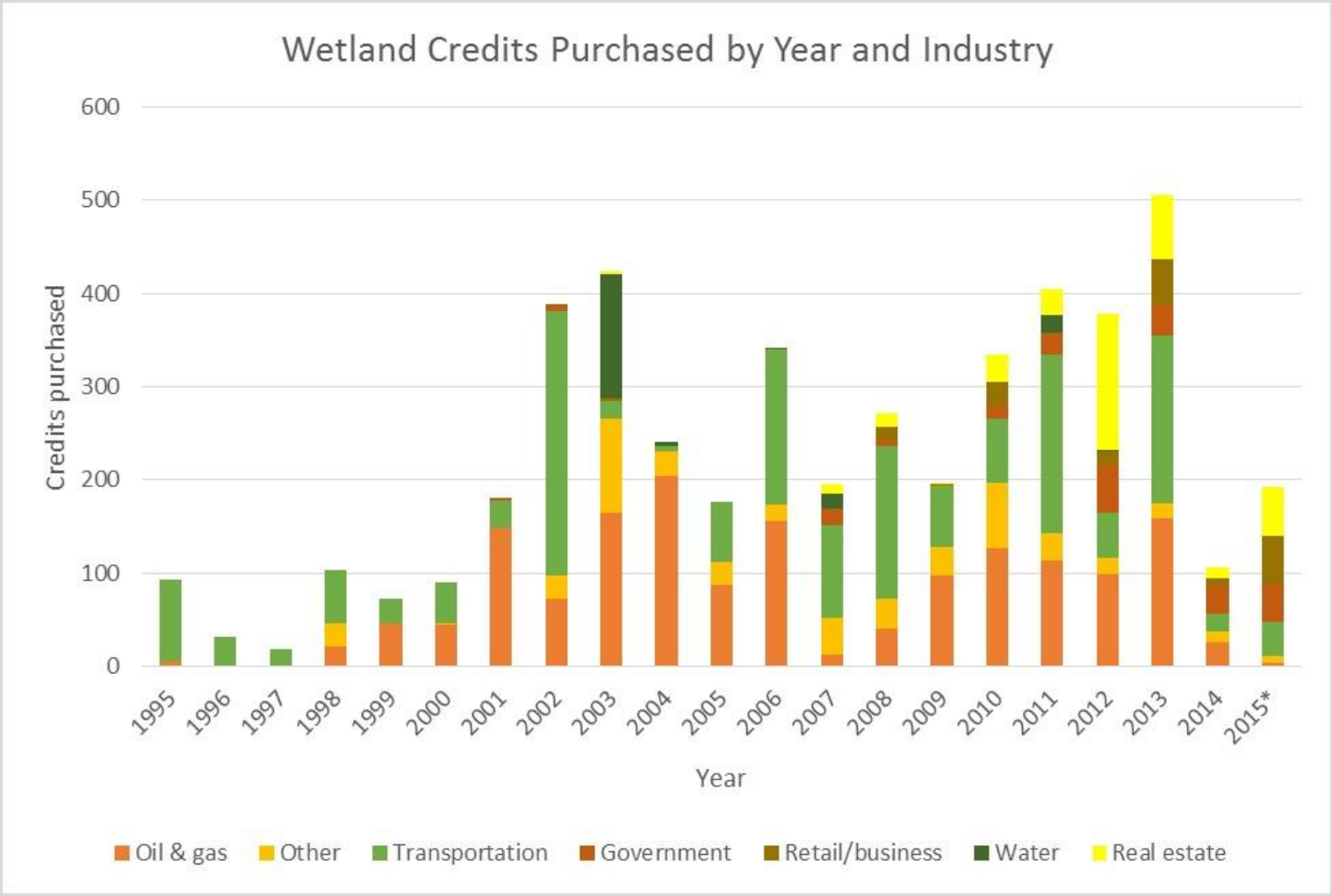
Wetland and Stream Mitigation Assessment

Four Components of Project

- Quantifying supply and demand of Clean Water Act Section 404 wetland and stream mitigation credits
- Mapping available credits
- Estimating demand generated by roadway projects in Mobility 2040
- Identifying potential locations for mitigation banks that would meet demand and generate the greatest ecological benefit
    - Sought the expertise of resource and regulatory partners

Wetland and Stream Mitigation Assessment

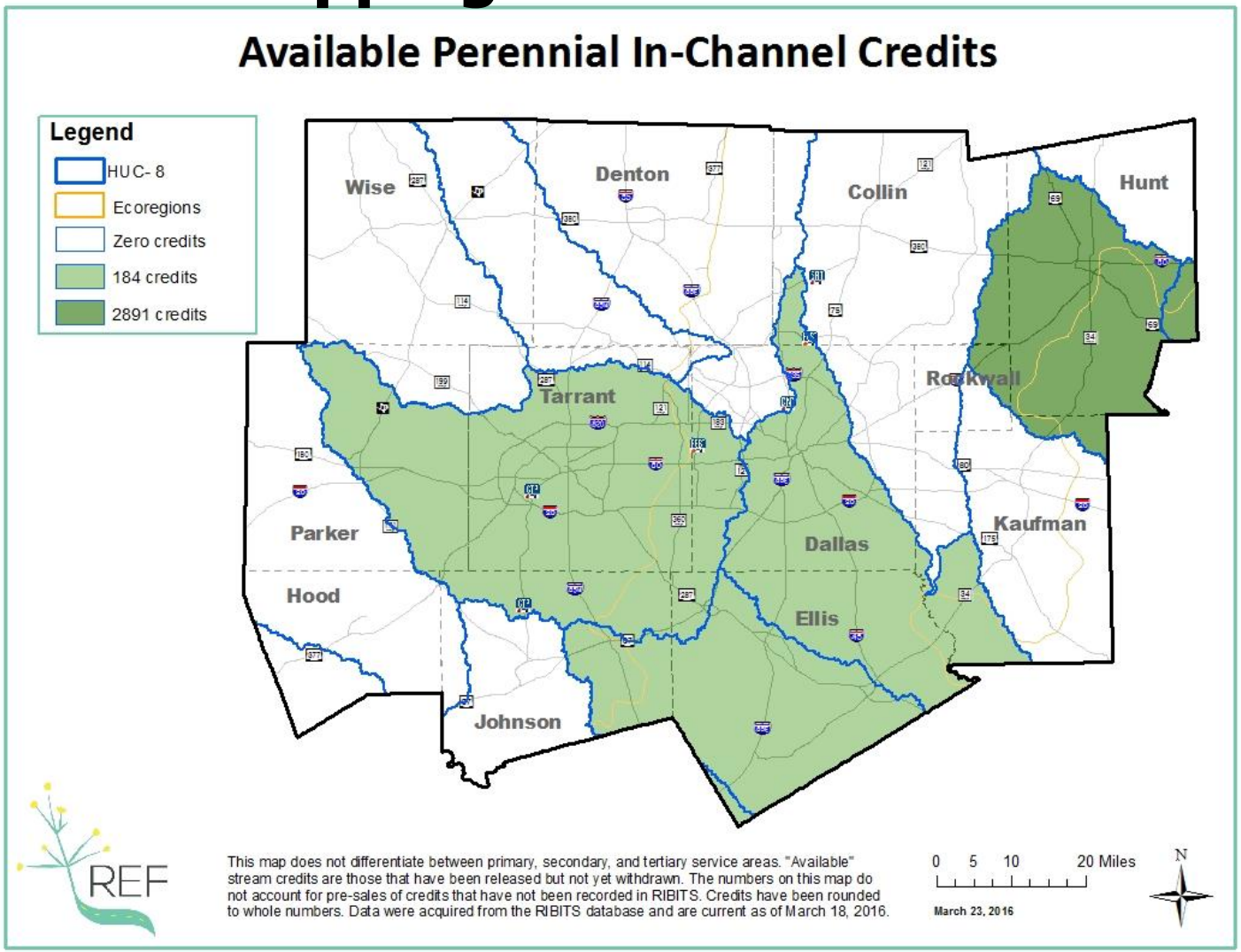
Supply and Demand



* Through November 2015

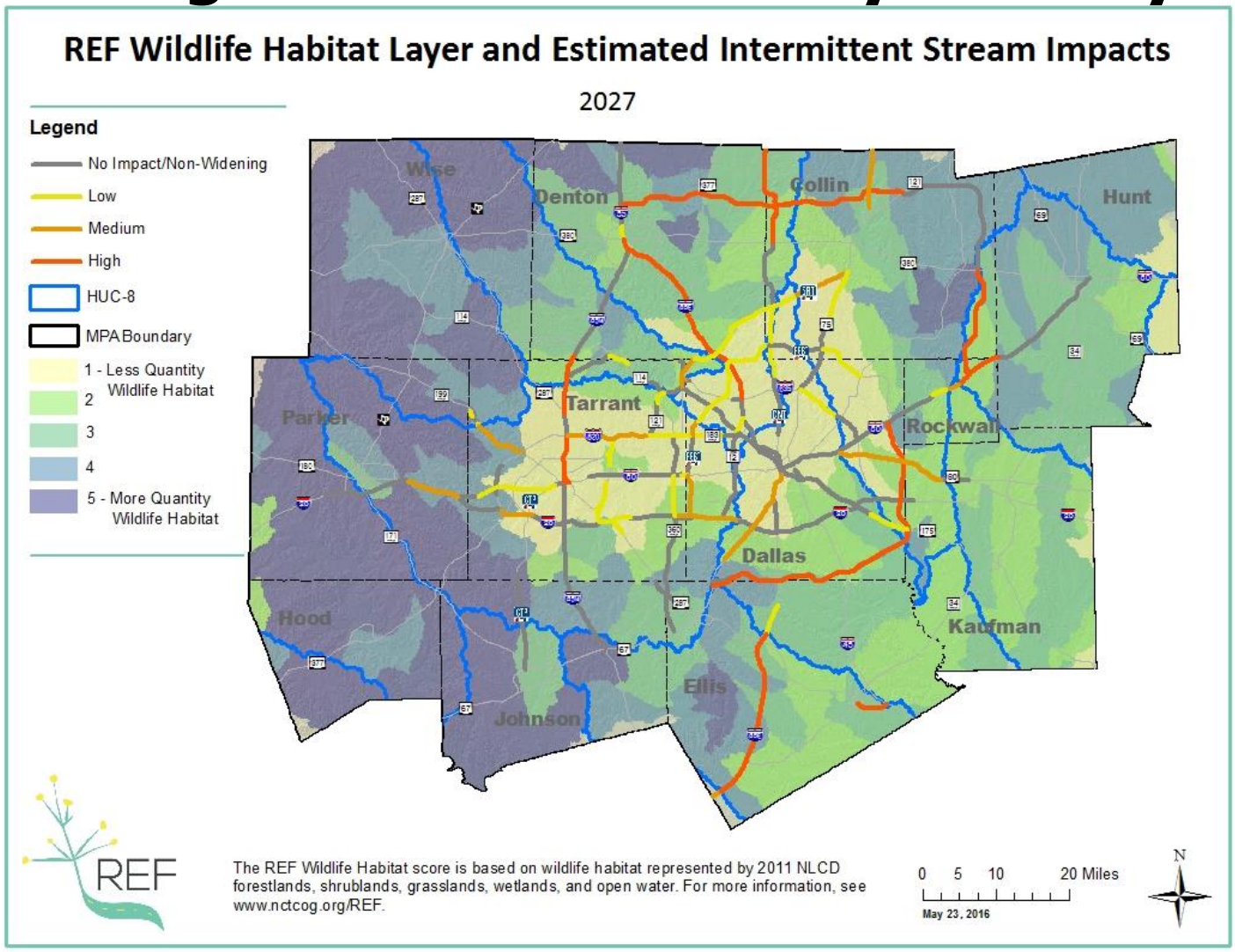
Wetland and Stream Mitigation Assessment

Mapping Available Credits



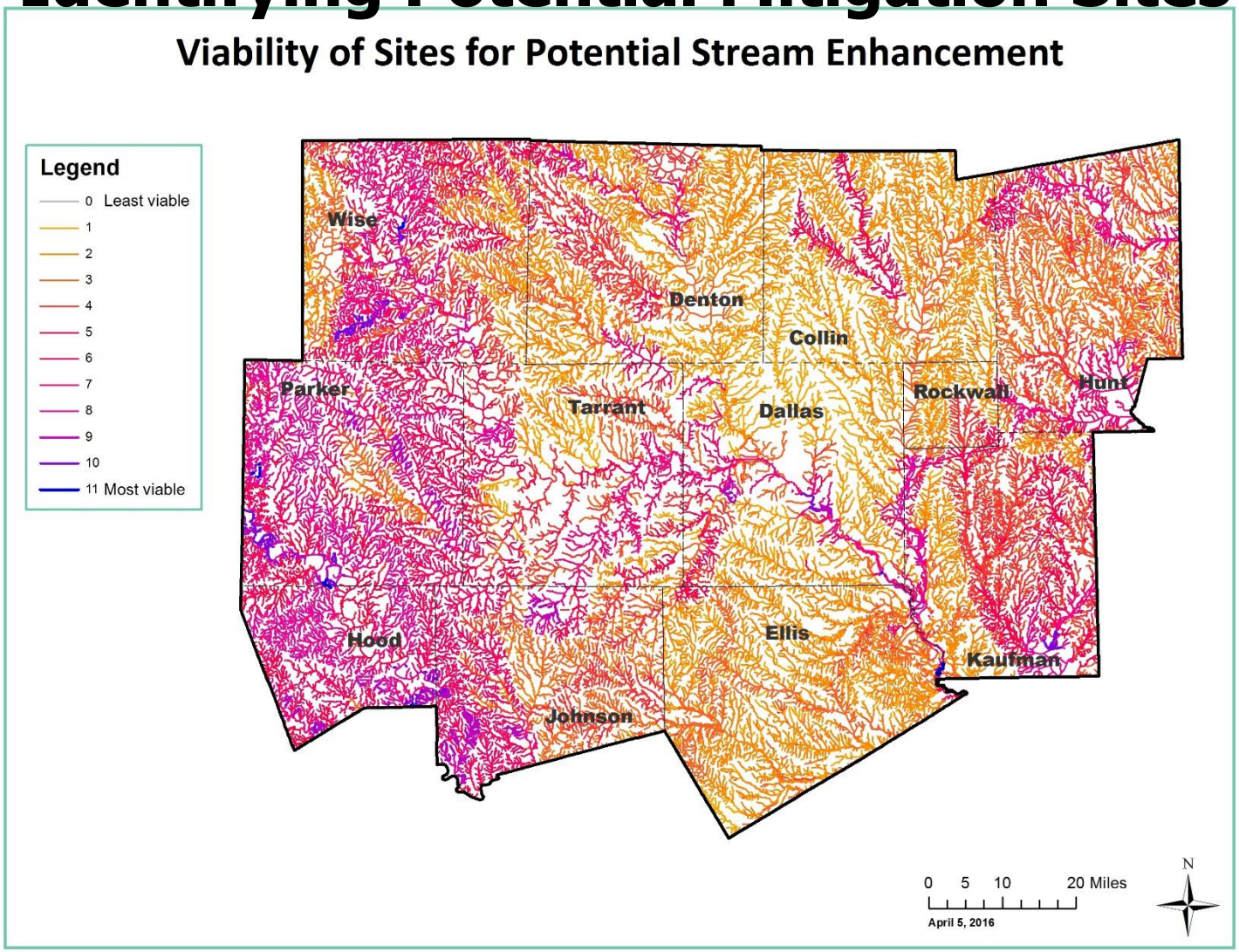
Wetland and Stream Mitigation Assessment

Estimating Demand Created by Mobility 2040



Wetland and Stream Mitigation Assessment

Identifying Potential Mitigation Sites



Results of Mitigation Assessment

- Identified supply-side issue with stream mitigation credits
- Led to mitigation emphasis for the private-sector education component of our Environmental Stewardship Program. We are in preliminary discussions with partners to:
  - Encourage builders and developers to avoid, minimize
  - Educate mitigation bankers about our need for stream credits
- Identified State Natural Resource Code that prevents NCTCOG from creating mitigation bank
- Hope to estimate credit demand with each metropolitan transportation plan

Shortcomings of Mitigation Assessment

- Estimated demand is just that – estimated
  - Roadway widths are estimates; actual alignments not yet determined
  - Issues such as single and complete linear transportation projects and separate and distinct crossings of aquatic resources could not be addressed
  - No spatial data on ephemeral streams exists for our region, so no estimates could be made
  - Quality of aquatic resources could not be considered
- Supply is a moving target
- 20-year transportation planning horizon is much longer than mitigation bankers' planning horizon

Contact Information

Project Info

www.nctcog.org/ref

Includes links to reports, methodology, REF website

Contact

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Highway 89 Stewardship Team

Success in Partnership

An Eco-Logical Approach to Planning & Efficient Project Delivery

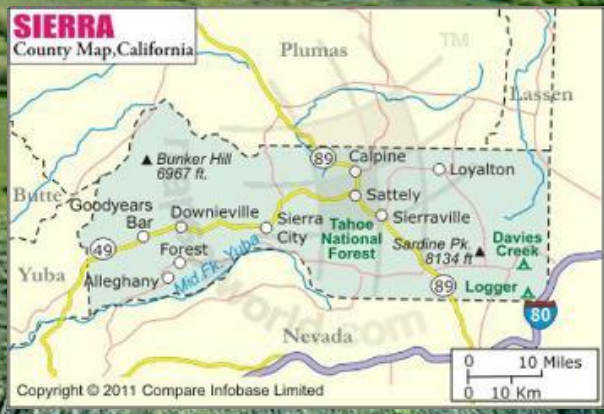
Caltrans District 3

Who is the Highway 89 Stewardship Team?

The Highway-89 Stewardship Team is a diverse group dedicated to reducing animal-vehicle collisions & preserving wildlife movement corridors through education, research & direct mitigation.

- Sierra County Fish and Wildlife Commission,
- Sierra County,
- USDA Forest Service: Tahoe National Forest & Pacific Southwest Research Station,
- California Department of Fish and Game,
- California Department of Transportation (Caltrans)
- University of California Cooperative Extension,
- UC Berkeley-Sagehen Creek Field Station,
- California Deer Association,
- University of California, Davis.

Sierra County, California



What does this presentation offer?

- The Eco-logical approach does not have to be large or expensive
- How to get started
- What makes a small effort successful
- A little planning can lead to large accomplishments
- How to have a lasting effect

The Highway 89 Stewardship Team began with a meeting…..

How to make the first meeting a success:

- Bring together potential partners
- Recognize the problem and identify the goals
- Identify what each agency can achieve through the partnership
- Start discussing goals for the corridor

Next: Bring together what you already know

Roll out a map or go out in the field

Identify initial opportunities to fill in the data gaps

Caltrans
- Continue collecting roadkill data
- Investigate and map Traffic accident data
- Evaluate planning documents
- Research funding opportunities

USFS
- Provide Habitat mapping
- Review Forest Plan for goals and priorities
- Meeting facilitation

CDFW
- Wildlife Numbers
- Critical Habitats
- Deer Collaring

Sierra County Fish and Wildlife Commission
- Money for Cameras
- Public Support

UC Davis
- Education Connection
- Leadership and research

UC Berkeley
- Research opportunities and connections
- Education facility
- Funding opportunities

Sierra County
- Transportation priority
- Education grants
- Local Support

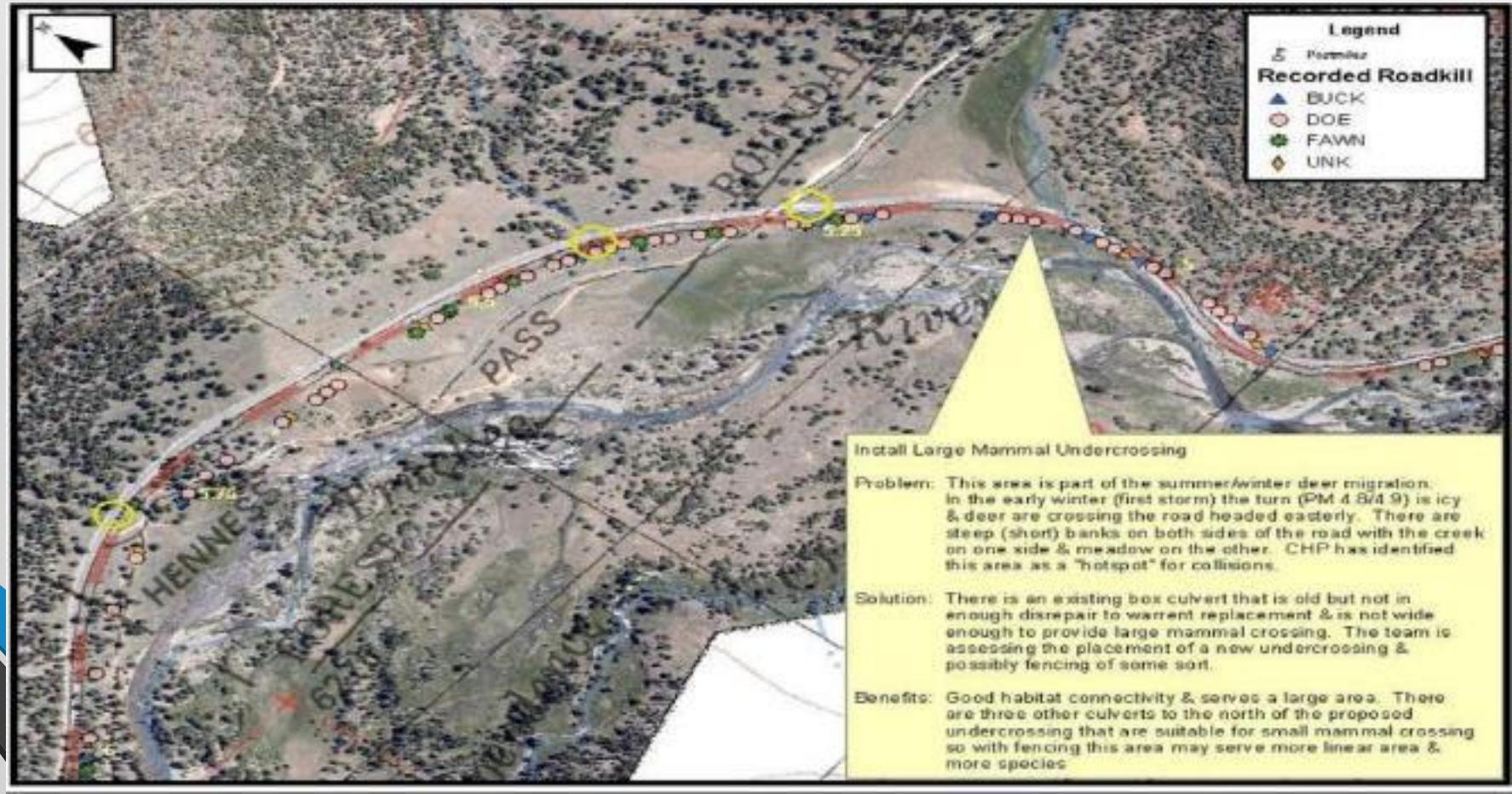
California Deer Association
- Grant money for cameras
- Public interest
- Grant money for wildlife collaring

How to tackle a corridor:

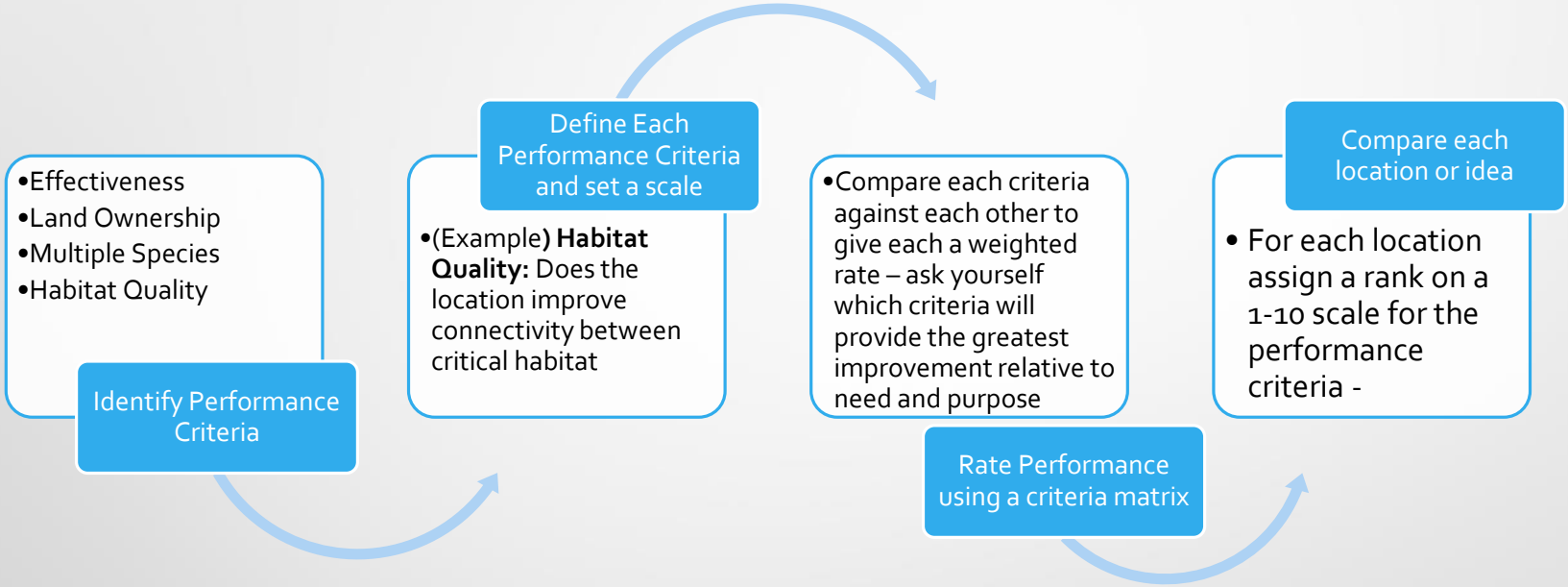
In a just a few meetings:

- We broke the corridor down into segments
- We prioritized the segments by roadkill/accident date, area to be affected by increased pressure (traffic, development), areas where other habitat plans contributed to the landscape
- Within our priority segment we evaluated all the locations for habitat connectivity and collision reduction
- We considered new structures and retrofit opportunties

Map data, identify potential mitigation locations, discuss priority criteria



Conduct an initial evaluation of the information you have

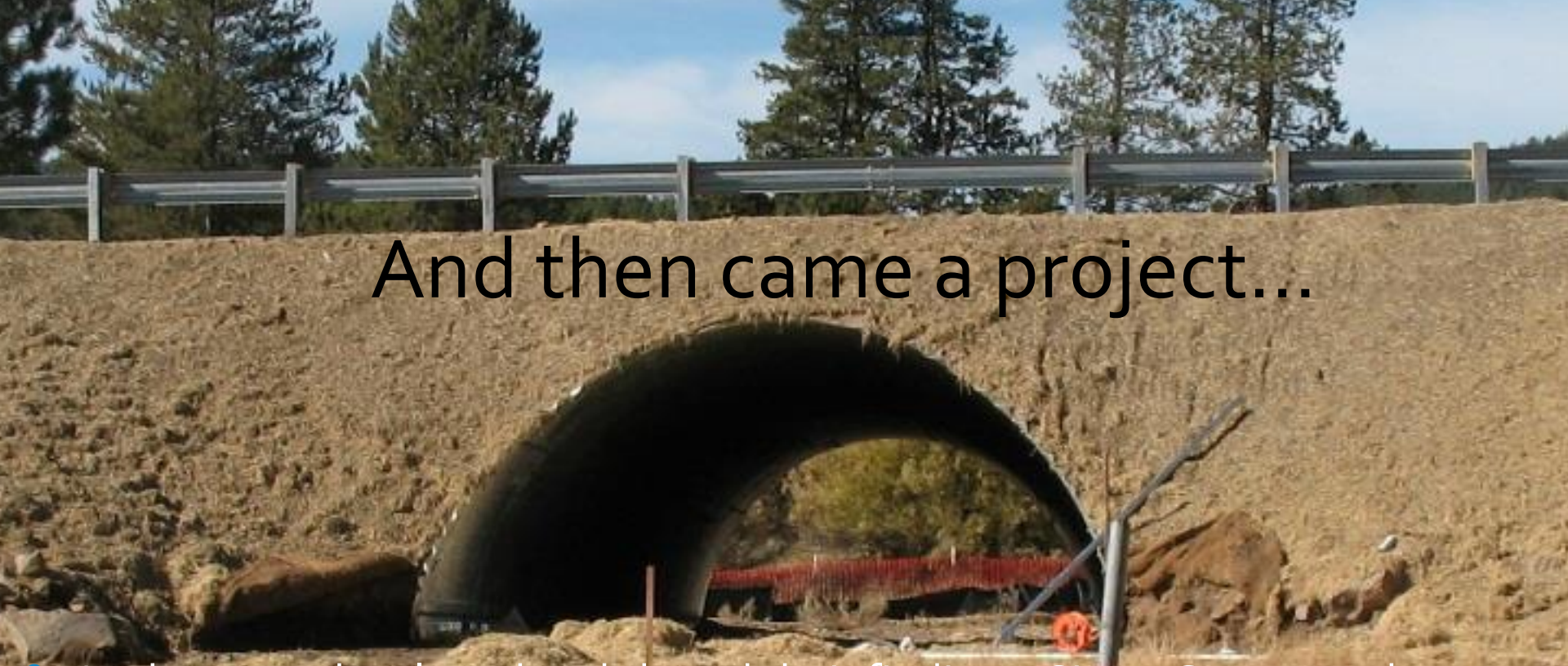


For our initial evaluation we re-purposed various tools from the value analysis process to prioritize our locations and then evaluated potential solutions at each location.

												Total	%
Feasibility	**A**	A	A	A	A	A	A	A	A	A	A	**10**	**18**
Aesthetics	**B**	C	D	E	F	G	H	I	J	K		**0**	**0**
Maintainability	**C**	C	E	F	G	H	I	J	K			**2**	**4**
Environmental Impacts	**D**	E	F	G	H	I	J	K				**1**	**2**
Cost Effectiveness	**E**	E	G	H	I	J	K					**4**	**7**
Land Ownership	**F**	G	H	I	J	K						**3**	**5**
Urgency	**G**	H	I	J	G							**6**	**11**
Habitat Quality	**H**	H	H	H								**9**	**16**
Multiple Species	**I**	I	I									**8**	**15**
Safety	**J**	J										**7**	**13**
Human Disturbance	**K**											**5**	**9**

							Criteria											
							Aesthetics	Cost Effectiveness	Environmental impact	Feasibility	Habitat Quality	Human Use	Land Ownership	Manageability	Marine Species	Safety	Urgency	
Concept No.	Description	Begin Milepost	End Milepost	Advantage(s)	Disadvantage(s)	Weight	0	4	1	10	9	5	3	2	8	2	6	Total Score
2.1	Undercrossing, Arched, pre-cast, natural bottom	0.83		Meets most criteria, capability of being modular with other projects, improve permeability	High Cost			5	5	5	5	5	5	5	5	5	3	
							0	20	5	50	45	25	15	10	40	10	18	238
3.1	Culvert	1.44		Improvement to drainage, riparian habitat, improves permeability	Private ownership on eastside of the road – not as modular			5	3	5	5	3	3	5	5	5	3	
							0	20	3	50	45	15	9	10	40	10	18	220
3.2	Bridge	1.44		Bridges have higher shoulder improves safety.				5	5	5	5	3	3	5	5	5	3	
							0	20	5	50	45	15	9	10	40	10	18	222
4.1		1.77																
							0	0	0	0	0	0	0	0	0	0	0	0
5.1	For berries open or slotted drains or trench	2.34		mitigation for amphibians	Not mortality "hotspot													
							0	0	0	0	0	0	0	0	0	0	0	0
5.2	Culvert that enables wetland to achieve equilibrium	2.34		Wetland restoration Mitigation for amphibians														
							0	0	0	0	0	0	0	0	0	0	0	0
5.3	Thinning/pruning			Improve visibility	Some mortality will occur													
							0	0	0	0	0	0	0	0	0	0	0	0
5.4	Green reflectors to avoid eyeshine			Reduces confusion betw white reflectors and eyeshine														
							0	0	0	0	0	0	0	0	0	0	0	0
5.5	Little Truckee Br Options: Modify boulder size and/or place to create shelf. Fence with human allies	2.65																
							0	0	0	0	0	0	0	0	0	0	0	0
6	Fence entirety. Fence from where rd and crk converge and active driver warning system. Fence w/ raised rdbed and lrgr culvert at Upper Little Truckee CG	3.73	5															
							0	0	0	0	0	0	0	0	0	0	0	0
7.1	Woodchuck PL Options: Retro fit culvert w/ fencing	5			Dual benefit of public safety and deer mortality			5	3	5		5	5	5	5	5	3	
							0	20	3	50	0	25	15	10	40	10	18	191
							0	0	0	0	0	0	0	0	0	0	0	0
							0	0	0	0	0	0	0	0	0	0	0	0

And then came a project…



- As the team developed and shared their findings, Sierra County and Caltrans decided to invest in a project
- With the limited available data the team was called upon to make a recommendation on the location
- Just by meeting a few times, prioritizing segments, identifying potential locations and supporting the project it is estimated that the Stewardship Team saved the environmental approval phase 6-9 months

How to maintain momentum

- Share your success
- Re-evaluate the team objectives, location criteria, new data
- Re-evaluate partner priorities
- Continue evaluating the corridor and searching for funding

Share your Success

The team applied for an Eco-logical grant to share and evaluate the framework of the Stewardship success and work on the longoterm strategy for Sierra 89.
We mentored a team in Northeastern California and the Southern Sierra Nevada in and around Yosemite National Park.

Innovative Approaches to Wildlife and Highway Interactions – UC Berkeley Sagehen Creek Field Station

Modoc 139 (Northern Team)

The problem


The Planning

What are the Unique Challenges of the Modoc 139 (North Tunnel) Project

Highway 139 bisects critical winter range for California Mule Deer, Elk and Pronghorn Antelope that migrate from southern Oregon and Northeastern California. There is a mixture of public and private land with extensive agricultural areas. There is a national wildlife refuge and Lava Beds National monument to the west and a parallel railroad.

- The solution will require substantial partnership with private landowners
- The critical habitat needs should be evaluated
- The public land management agencies need to evaluate if there is vegetation management they can complete to reduce the need for wildlife to move across the highway in severe storm events
- The team needs to study and understand the habitat connectivity needs

State Route 41 in the Sierra National Forest accessing Yosemite National Park (Southern)

The Unique Challenges of the State Route 41 Team

- The mammals being impacted are small so there is no collision data (Pacific Fisher); there is also a Great Grey Owl road mortality concern
- The highway goes through a typical public and private checkerboard of ownership
- The public property is primarily the Sierra National Forest until you get into the Park
- There is a lack of data sharing
- There is substantial key partner turnover
- The National Park is limited to what they can do

What we are learning…

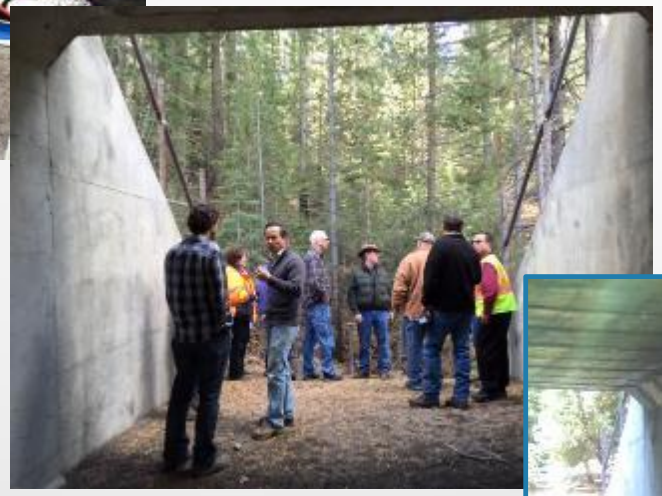
Great Grey Owl road mortality ideas:

- Vegetation trimming
- Public education

Pacific Fisher:

- Share data with Caltrans
- Prioritize Crossing locations
- Determine mitigation measures (fencing, more culverts, more/less cover)

How do we continue Eco-logical?



- Long term research strategy using the new paired undercrossings
- Begin evaluation and priority of the next segment
- Expand the success to more corridors throughout the state
- Create regional data and information sharing

We estimate that for the second project of 2 undercrossings, the eco-logical approach saved the project 9-12 months in planning

- Continue to work with the new teams
- Share and plan for the mitigation opportunities
- Expand the success to more corridors throughout the state
- Create regional data and information sharing

How to Apply Eco-logical?

- Recognize that a lot can be done with limited resources
- Take a leadership role and pull together a meeting – start the dialogue
- Find out what your partners are looking for, issues they have and common ground
- Evaluate your system, the available plans and upcoming opportunities
- Meetings can occur as little as quarterly and be very effective
- Share what the team is learning (with everyone)

Questions?

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Questions?

Please remember to type in your questions to the question prompt.

Thank you for participating!