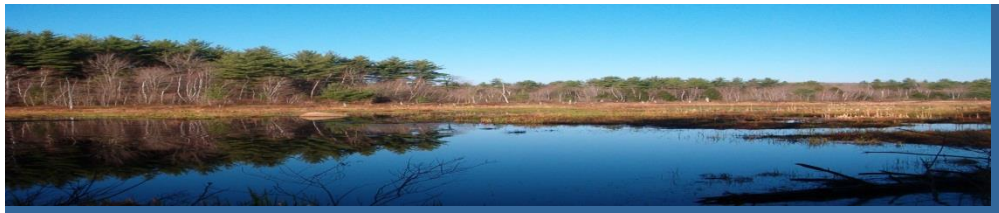
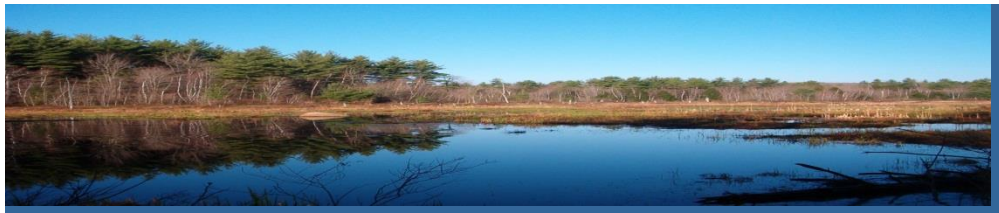


NHDES
Aquatic Resource Mitigation Program

Strategies for Watershed Restoration & Protection

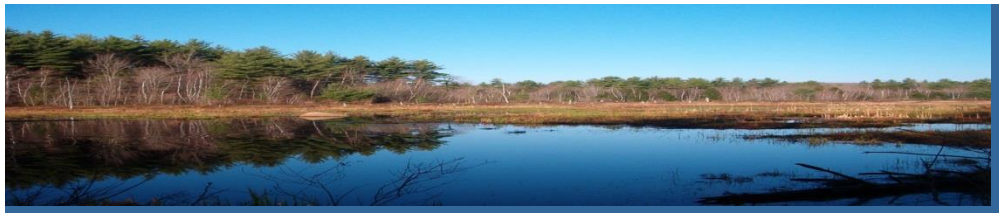
2016 Environmental Law Institute Conference

Lori Sommer
NHDES
Wetland Mitigation Coordinator



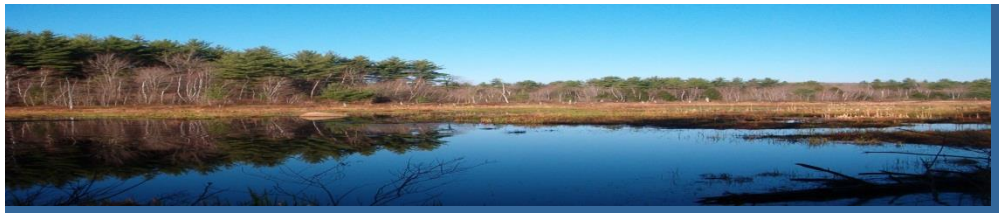
Wetland Mitigation Rules
Chapter Env-Wt 800 – Effective 2004

- Require avoidance, minimization then compensation for unavoidable impacts.
- Establish thresholds and provides ratios for wetland creation, restoration, and/or land preservation.
- Establish criteria for mitigation plans and for preservation proposals.
- Require functional assessments.
- Standards to be met for upland buffer preservation.



RSA 482-A:28
Aquatic Resource Mitigation Fund

- Statutory revision in June, 2006 authorized DES to accept mitigation funds
- Establishes the fee structure for a mitigation payment
- Identifies what projects are eligible
- Develops a Site Selection Committee
- Recognizes the Wetlands Council to approve disbursements



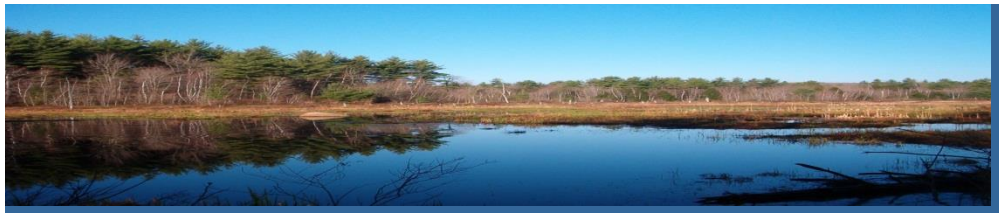
What Guides the NH In-Lieu Fee Program?

- NH Mitigation Rules: Chapter 800. Adopted in 2004, Revised in 2007 and 2/1/2016

- Federal Mitigation Rules: Department of Defense and Environmental Protection Agency. April 10, 2008. *Compensatory Mitigation for Losses of Aquatic Resources*. Final rule. Federal Register. Vol. 73, No. 70: pp. 19594-19705.

- In Lieu Fee Instrument: http://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/NHinstrument051812.pdf

  - District Engineer Oversight/Approval
  - Interagency Review Team and Site Selection Committee



NHDES
Aquatic Resource Mitigation Program

New Hampshire Aquatic Resource Mitigation Fund
Final In-Lieu Fee Program Instrument
March, 2012

ARM Fund Final In-Lieu Fee Program Instrument, 2012

Any delay or failure of the NHDES to comply with the terms of this agreement shall not constitute a default hereunder if and to the extent that such delay or failure is primarily caused by any act, event or conditions beyond the NHDES' reasonable control and that significantly adversely affects its ability to perform its obligations hereunder including: (i) acts of God, lightning, earthquake, fire, or landslide; (ii) condemnation or other taking by any governmental body; (iii) change in applicable law, regulation, rule, ordinance or permit condition, or the interpretation or enforcement thereof; (iv) any order, judgment, action or determination of any federal, state or local court, administrative agency or government body; or (v) the suspension or interruption of any permit, license, consent, authorization or approval. If the performance of the NHDES is affected by any such event, the NHDES shall give written notice thereof to the IRT as soon as is reasonably practicable.

The Corps or NHDES may terminate this Instrument by giving sixty (60) days written notice to the other party. Prior to termination, the NHDES shall provide an accounting of funds and shall complete payment on contracts for projects approved by the IRT, the Wetlands Council and G & C, and any expenses incurred on behalf of the account. Upon termination, after payment of all outstanding obligations, the remaining funds in the ARM Fund shall be paid to not more than five different entities if required by the Corps. In the event the program is closed, the NHDES is responsible for fulfilling any remaining obligations for credits sold, unless the obligation is specifically transferred to another entity as agreed upon by the Corps and NHDES. Funds remaining in an account after these obligations are satisfied should continue to be used for restoration, enhancement, or preservation of aquatic resources.

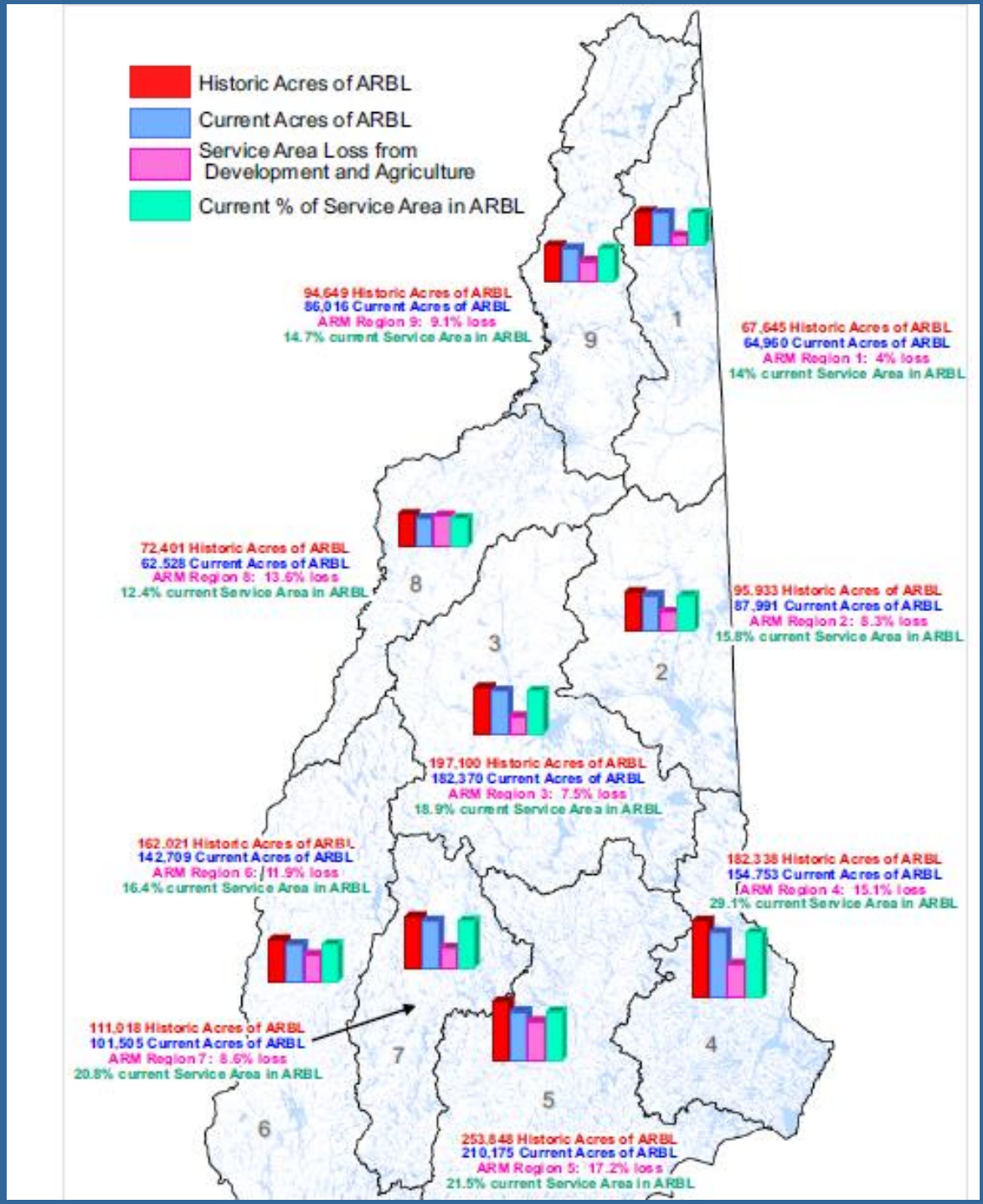
IX. SIGNATURES

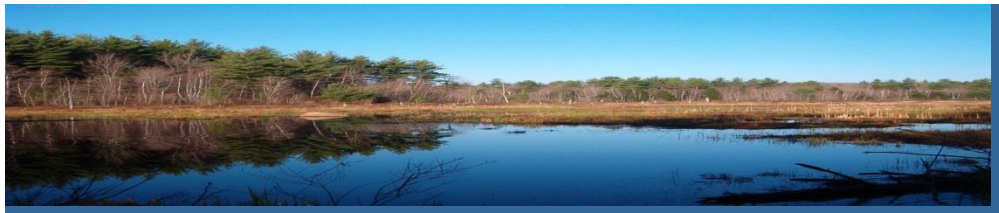
U.S. ARMY CORPS OF ENGINEERS

By: _____ Date: 8 May 12
Its: Charles P. Samaris, District Engineer

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

By: _____ Date: May 17, 2012
Its: Thomas S. Burack, Commissioner


Historic Acres of ARBL
Current Acres of ARBL
Service Area Loss from Development and Agriculture
Current % of Service Area in ARBL
94,649 Historic Acres of ARBL
86,016 Current Acres of ARBL
ARM Region 9: 9.1% loss
14.7% current Service Area in ARBL
9
1
67,645 Historic Acres of ARBL
64,960 Current Acres of ARBL
ARM Region 1: 4% loss
14% current Service Area in ARBL
72,401 Historic Acres of ARBL
62,528 Current Acres of ARBL
ARM Region 8: 13.6% loss
12.4% current Service Area in ARBL
8
3
95,933 Historic Acres of ARBL
87,991 Current Acres of ARBL
ARM Region 2: 8.3% loss
15.8% current Service Area in ARBL
2
197,100 Historic Acres of ARBL
182,370 Current Acres of ARBL
ARM Region 3: 7.5% loss
18.9% current Service Area in ARBL
162,021 Historic Acres of ARBL
142,709 Current Acres of ARBL
ARM Region 6: 11.9% loss
16.4% current Service Area in ARBL
182,338 Historic Acres of ARBL
154,753 Current Acres of ARBL
ARM Region 4: 15.1% loss
29.1% current Service Area in ARBL
111,018 Historic Acres of ARBL
101,505 Current Acres of ARBL
ARM Region 7: 8.6% loss
20.8% current Service Area in ARBL
7
4
5
6
253,848 Historic Acres of ARBL
210,175 Current Acres of ARBL
ARM Region 5: 17.2% loss
21.5% current Service Area in ARBL



NHDES
Aquatic Resource Mitigation Program

ARM FUND GOALS: Target Important Resources on the Landscape

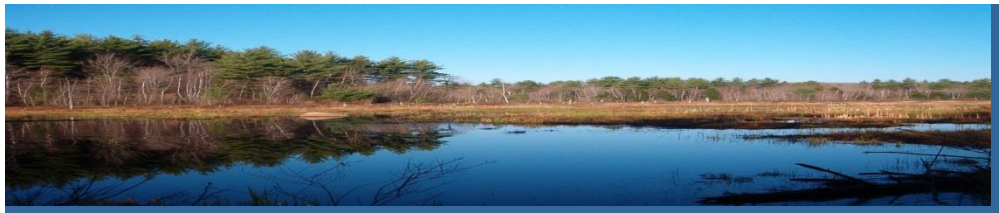
- Identify and permanently protect wetland systems of statewide significance;

- Achieve ecological success by directing ILF funds to protect natural resource types and functions that compensate for development impacts and are appropriate to the geographic service area;

- Substantially increase the extent and quality of restoration, enhancement, creation, and protection of natural resources;

- Continue to provide effective and responsible levels of protection and restoration through an efficient regulatory program; and

- Improve coordination among and between agencies with respect to wetland policies and regulatory programs to ensure efficiency in effort, consensus in outcome, and consideration of wetlands at the landscape scale.



NHDES
Aquatic Resource Mitigation Program

Data Analysis and GIS Tools

NHDES One Stop http://des.nh.gov/onestop

NH Fish & Game Wildlife Action Plan (2015)
http://www.wildlife.state.nh.us

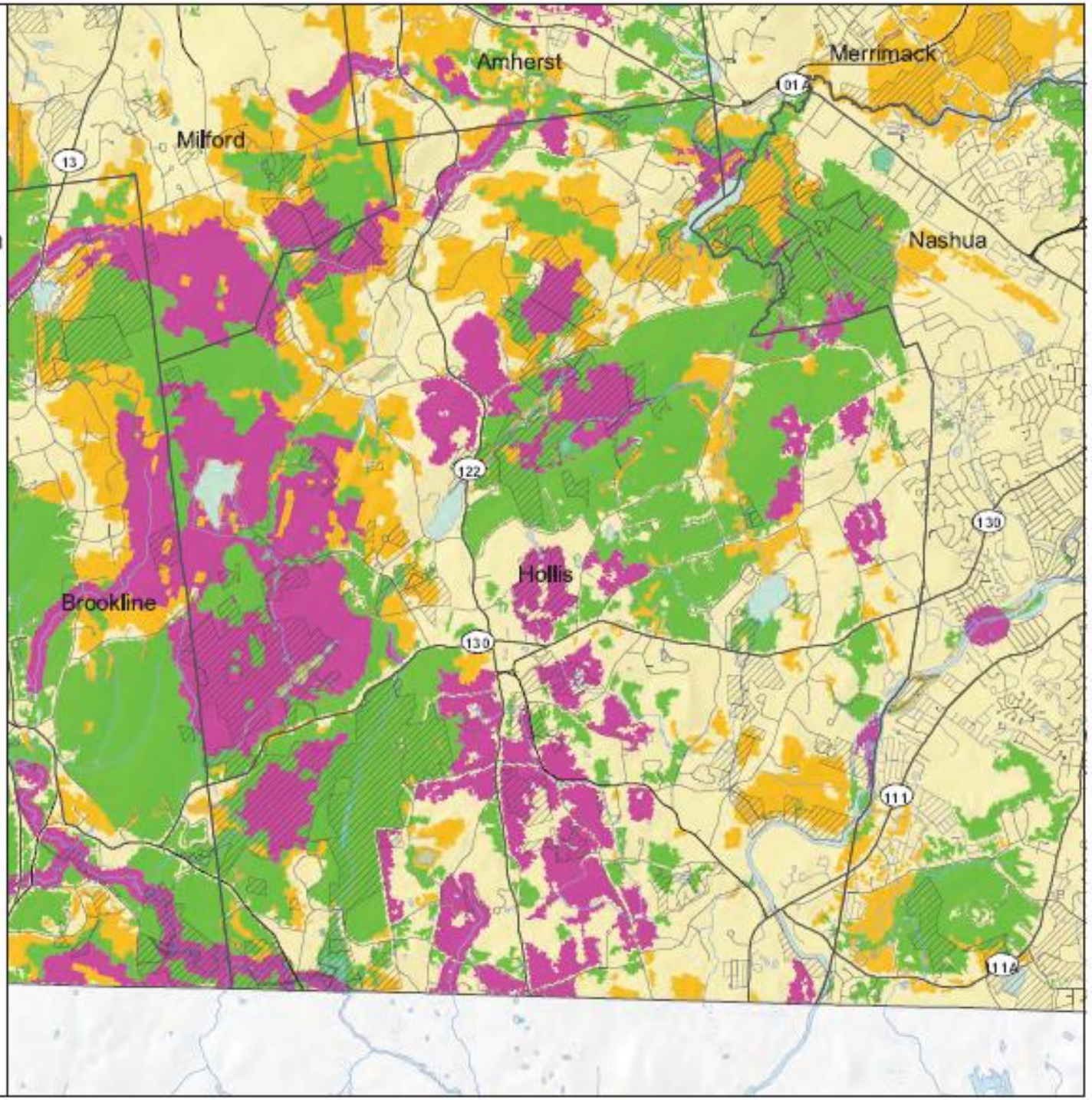
NH GRANIT VIEWER http://www.granit.unh.edu/

NH Wetlands Mapper http://nhmethod.org/

2015 HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in New Hampshire
- Highest Ranked Habitat in the Biological Region

  Biological region = TNC ecoregional subsection for terrestrial habitats or Aquatic Resource Mitigation region for wetlands and floodplain forest.
- Supporting Landscapes
- Conservation or public

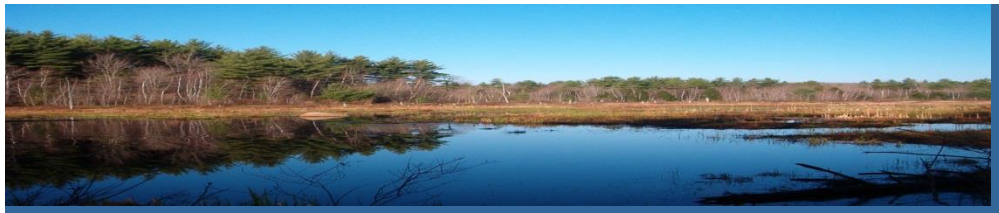


Base map data provided by NH GRANIT (2015)
Not intended for legal use.

NEW HAMPSHIRE
Wildlife Action Plan
September 2015

0 1 2 Kilometers

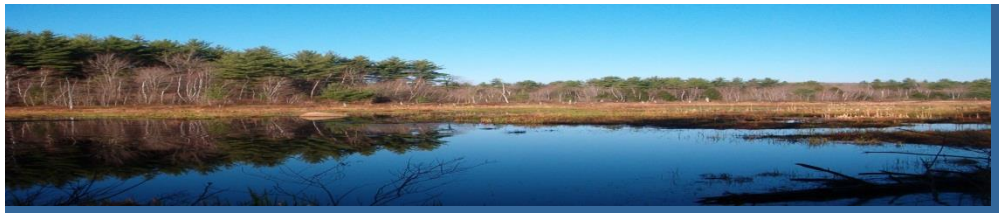
0 1 2 Miles



NHDES
Aquatic Resource Mitigation Program

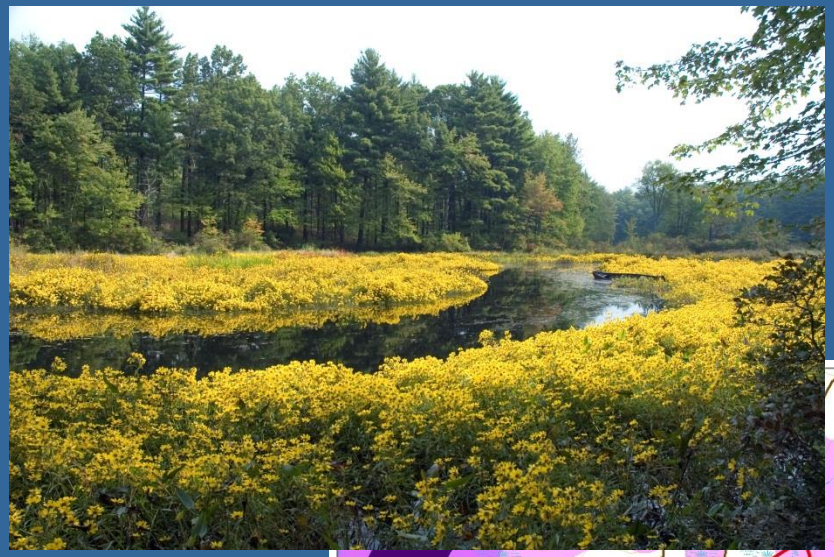
Berry Brook Watershed Restoration through Wetland & Stream Restoration, Buffer Development and LID Retrofits

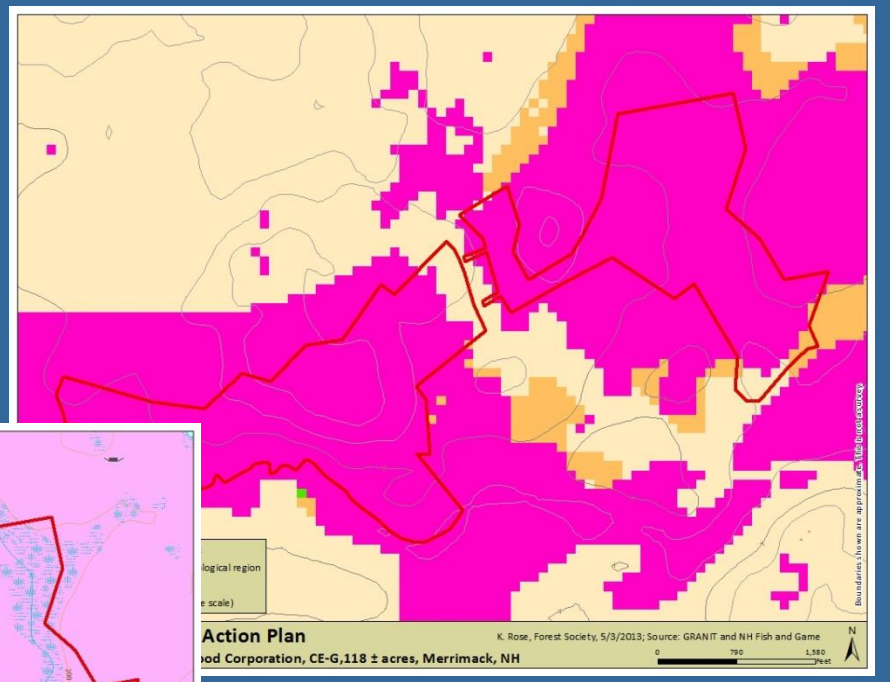
- Restored 0.9 miles of 1st order stream to the Cocheco River
- Removed fish barriers
- Provides treatment of 164 acres of the watershed
- Restored 2.5 acres wetland/floodplain habitat
- Preserved 5 acres of land at the mouth of the Cocheco River
- Engaged abutting landowners by planting riparian area and improved recreational opportunities

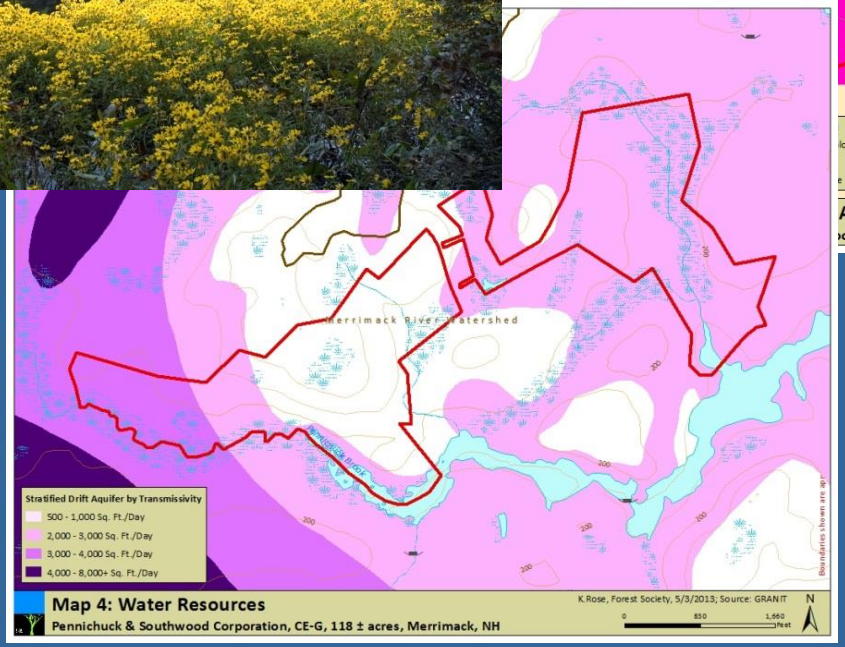


NHDES
Aquatic Resource Mitigation Program

Pennichuck Water Works Property
Merrimack







Sprucewood Forest, Durham

~ Conservation easement on 176 acres

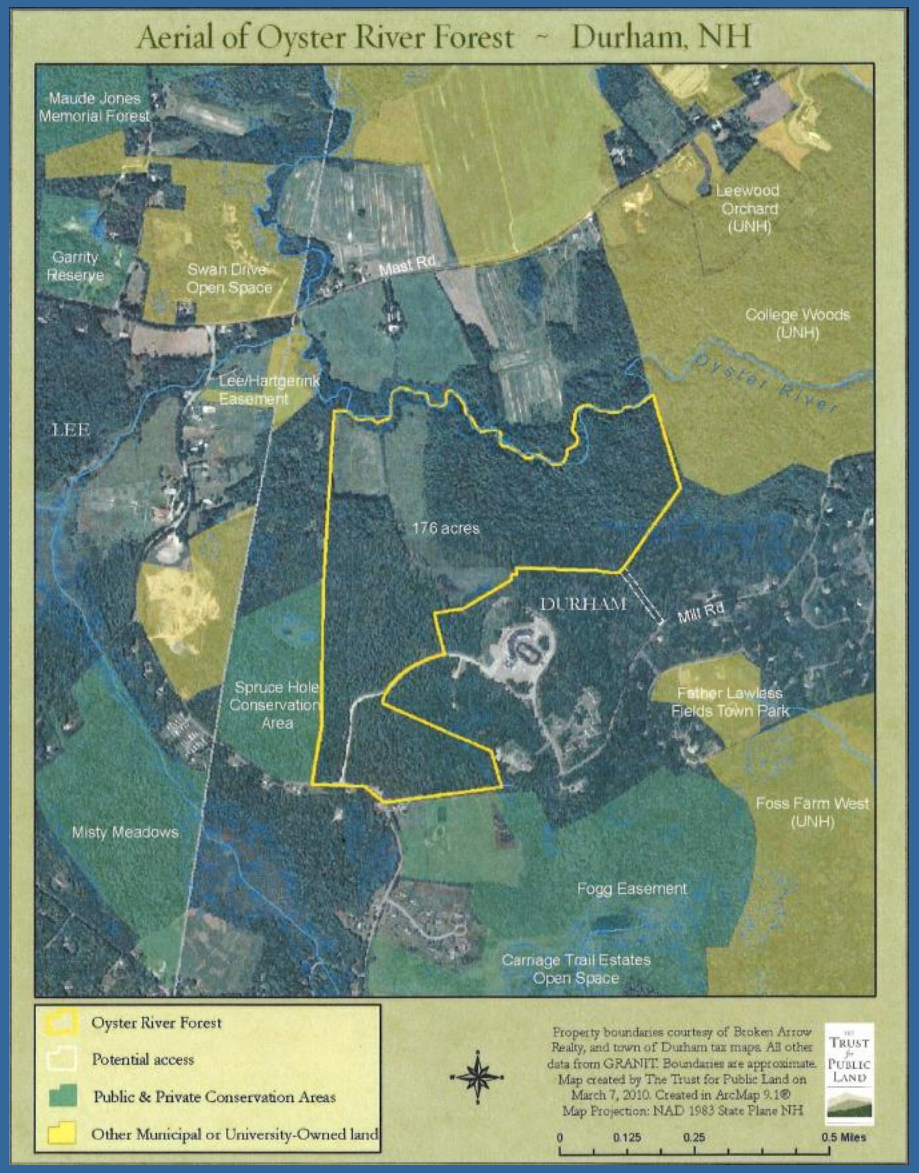
~ 142 acres of uplands and 34 acres of wetland with rare floodplain forest and riparian habitat

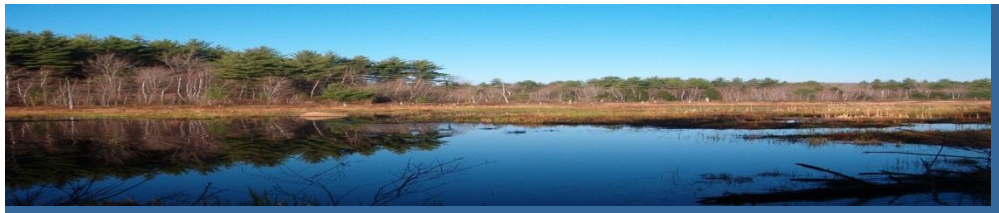
~ 1 mile of shoreline along the Oyster River designated a *Special Significant Stream Reach*

~ Located in headwaters of the primary drinking water source for the Town of Durham

~ Connecting over 2,200 acres of conservation land

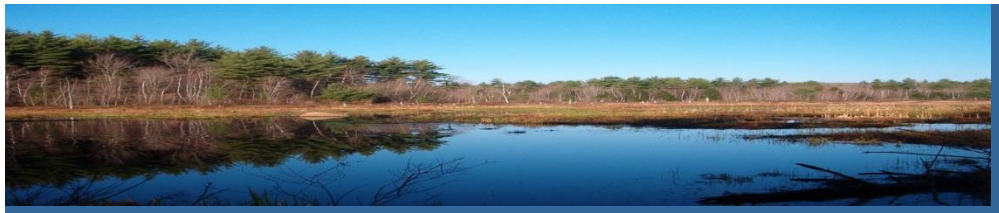
~ Highest ranked wildlife habitat in NH with active habitat restoration efforts ongoing for New England Cottontail





Sprucewood Forest Funding Sources

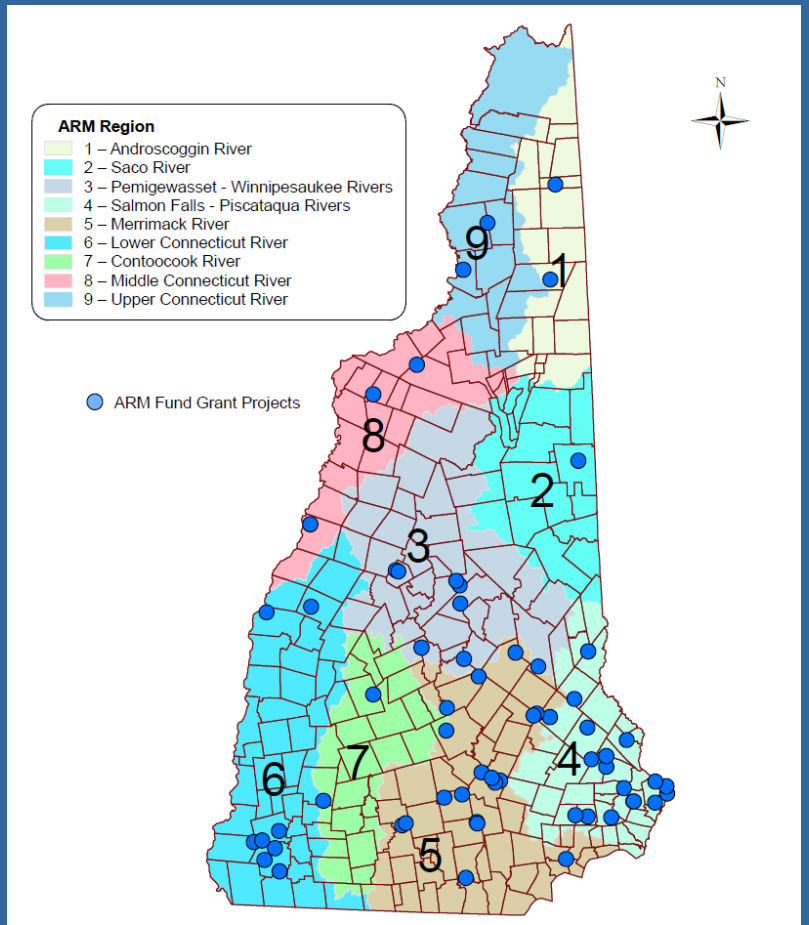
• DES ARM Funds	$500,000
• Coastal & Estuarine Land Conservation Program (CELCP)	$3,000,000
• Town of Durham	$400,000
• LCHIP	$250,000
• Lamprey River Advisory Committee	$150,000
• Private fundraising	$585,000
• Private Individuals	$866,400
TOTAL PROJECT COSTS	$5,751,400



NHDES
Aquatic Resource Mitigation Program

ARM FUND PROJECTS 2009-2015

- 63 projects
- Approx 12,300 acres of land protected
- 18 acres of wetland restoration
- 82 acres of wetland enhancement
- Over 1-mile of stream restoration with up to 49 miles of stream connectivity improvement.



New Hampshire House Bill 648

Chapter 179 Laws of 2007

Comprehensive Flood Management Study Commission

Final Report

September 2008

HB 648 Comprehensive Flood Management Study Commission: Key Finding

Need: Ensure that bridges and culverts are adequately sized.

"DOT, DES and Fish & Game with input by the Nature Conservancy, should be tasked to develop the procedure and database for a standard culvert assessment data collection."

HTTP://GENCOURT.STATE.NH.US/STATSTUDCOMM/REPORTS/1853.PDF

Department of Environmental Services	Department of Transportation	Fish & Game Department	Division of Homeland Security and Emergency Management (DOS)
Ensure installed culverts properly sized for passing flows (Wetlands permitting)	Culverts sized for proper hydraulic capacity	Properly designed culverts to adequately pass fish	Responsible for protection of public safety from flood hazards
Criteria development for use of aquatic resource mitigation funds to replace problem crossings	Responsible for stream crossing assets on state road network	State expertise on river/wetland aquatic organisms (fish) and wildlife	Display information in state EOC during flood events
State expertise on river and stream processes	Replace crossings with asset condition issues	Replace crossings with fish passage issues	Work with towns to fund crossing upsize replacements with

Ultimate goal

Targeting of identified most at-risk vulnerable crossings for check during emergency situations/public response. Targeting for replacement using grant funds.

Public safety with sound environmental and fish passage goals at stream crossings

Culvert Assessment Field Form – Geomorphic & Habitat Parameters

Structure ID	Unknown ☐			Structure Number	
Observer(s)/ Organization(s)				Date & Time	
Town		Datum		Latitude (N/S)	
Location				Longitude (E/W)	
SGA Reach ID				Stream Name	
Road Name				Road Type	paved gravel trail railroad
# of shoulder lanes				Crossing Condition	new old eroding collapsing rusted
# of travel lanes		Structure Materials	Concrete Plastic-Corrugated Plastic-Smooth Tank Stone Steel-Corrugated Steel-Smooth Aluminum-Corrugated Other: _____	Structure skewed to roadway	yes no
# of culverts at crossing				Flow Conditions	unusually low typical low higher than average flood conditions
Overflow pipe(s)	yes no				

Geomorphic and Fish Passage Data

General

Floodplain filled by roadway approaches: entirely (> ¾ of floodplain) partially (¼ – ¾ of floodplain) not significant
Structure within ½ mile downstream of a significantly steeper segment of stream: yes no unsure
Culvert slope as compared with the channel slope is: higher lower about the same
Water depth in the crossing matches that of stream: yes no (significantly deeper) no (significantly shallower)
Water velocity in crossing matches that of stream: yes no (significantly faster) no (significantly slower)

Upstream

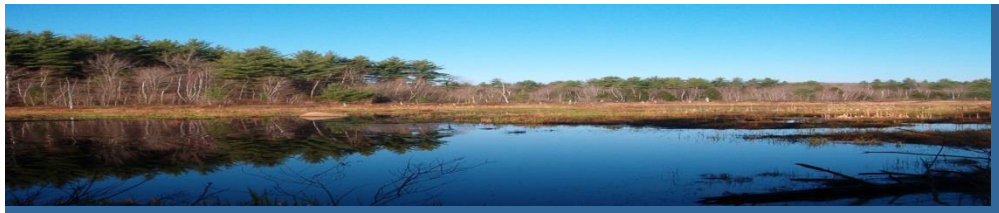
Structure opening partially obstructed by (circle all that apply): wood sediment wood & sediment deformation of culvert none other: _____
Steep riffle present immediately upstream of structure: yes no
If channel avulses, stream will: cross road follow road cross and follow road unsure
Estimated distance avulsion would follow road: _____ (ft.)
Angle of stream flow approaching structure: sharp bend (45° - 90°) mild bend (5° - 45°) naturally straight channelized straight
Evidence of streambed erosion or aggradation immediately upstream of culvert: erosion aggradation none
Culvert inlet: at grade cascade free fall
Upstream bankfull widths: 1.)_____ 2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)

Reference bankfull widths: 1.)_____ 2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)

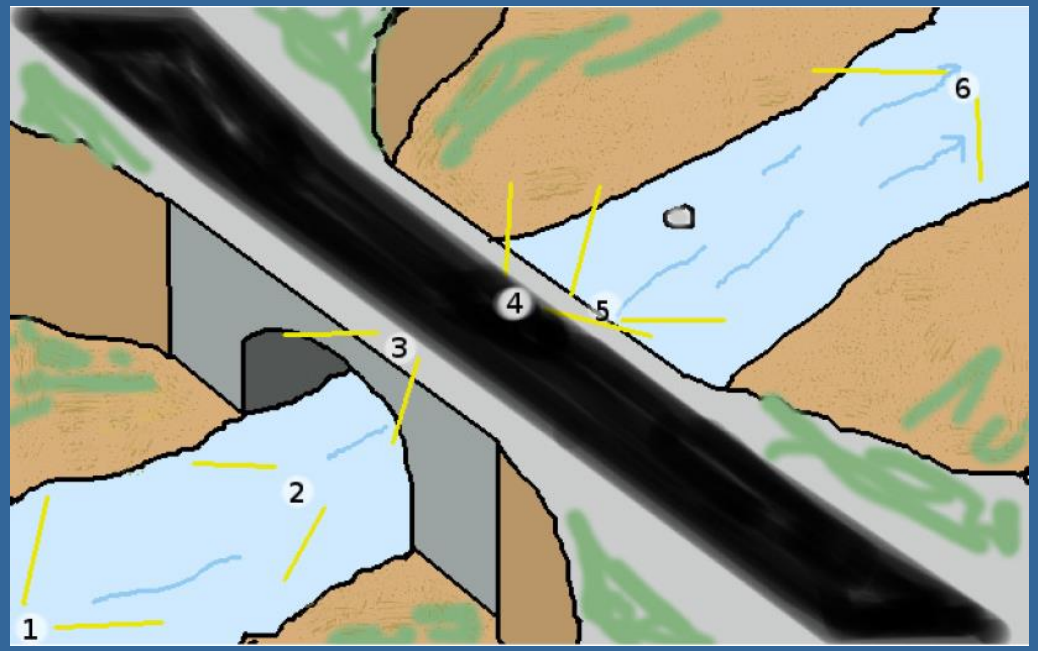
New Hampshire's Stream Crossing Assessment form

- 2 Forms – 1 for culverts; 1 for bridges and arches
- 66 Parameters total allow for three compatibility characterization types:
  - Geomorphology
  - Aquatic organism passage
  - Hydrology
- Multiple stakeholders in design and annual modification
- NHGS has been the steward of the form since 2009.

2009-2014 – Culvert assessments in NH funded largely through DES



Quality Control Review Process



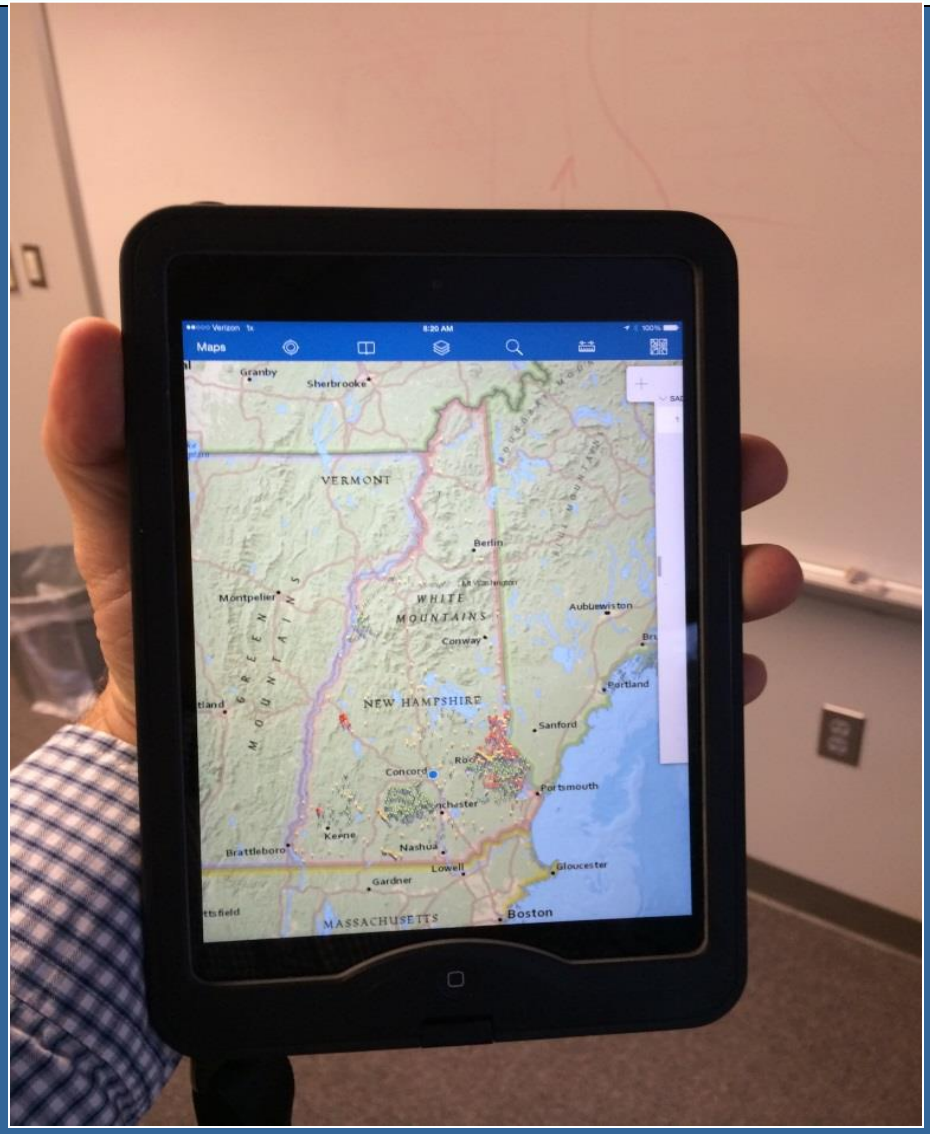
- 6 photos per crossing
- Cross-reference of photos with data
- Issues/comments to collectors

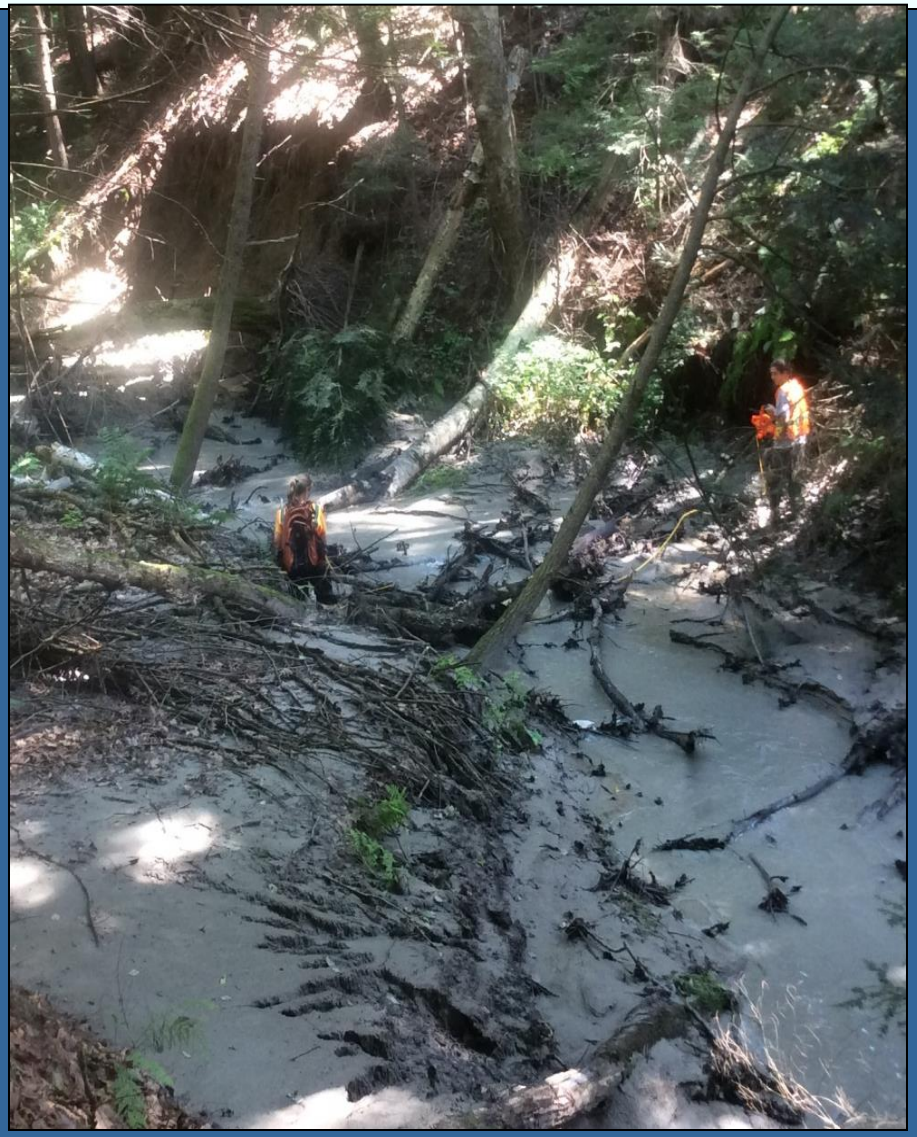
"SADES"

Statewide Asset Data Exchange System

- Cloud Based / ArcGIS Online
- Ipad, Web and Desktop applications
- WiFi / Cell Data / Ethernet
  Connection to the Cloud
- Multiple users using the same data, crowd-sourcing

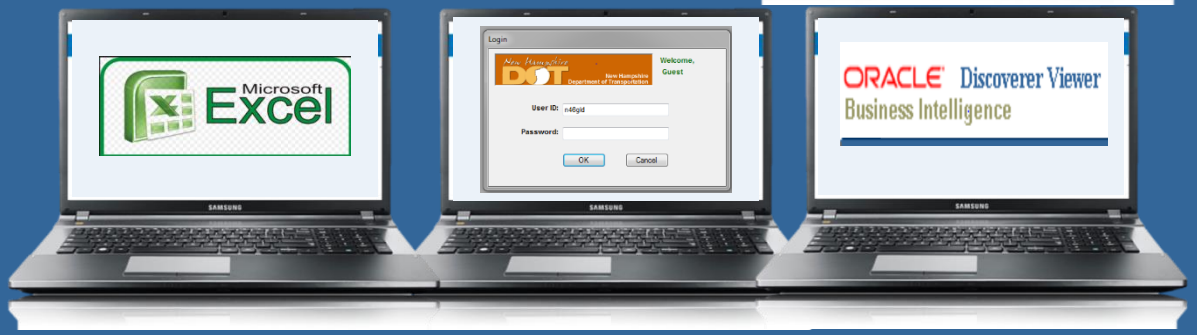
Ipad (field collection)

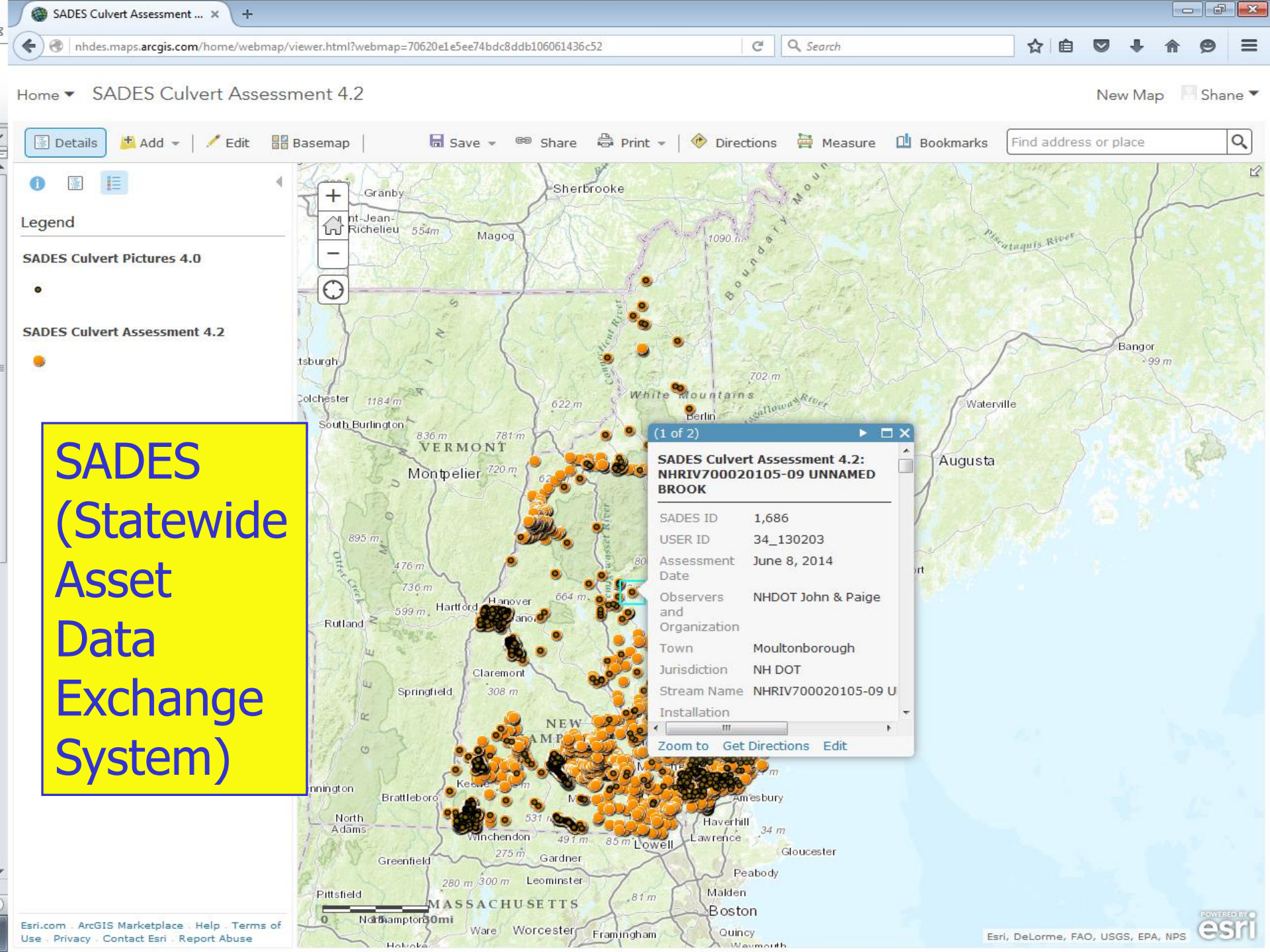




SADES

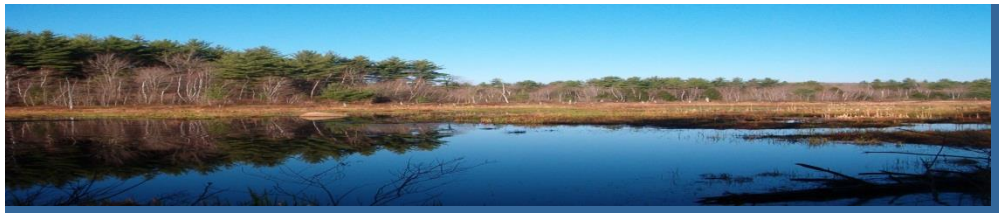
Data -> Information -> knowledge




SADES Culvert Assessment ...
nhdes.maps.arcgis.com/home/webmap/viewer.html?webmap=70620e1e5ee74bdc8ddb106061436c52
Search
Home
SADES Culvert Assessment 4.2
New Map
Shane
Details
Add
Edit
Basemap
Save
Share
Print
Directions
Measure
Bookmarks
Find address or place
Legend
SADES Culvert Pictures 4.0
SADES Culvert Assessment 4.2
(1 of 2)
SADES Culvert Assessment 4.2: NHRIV700020105-09 UNNAMED BROOK
SADES ID 1,686
USER ID 34_130203
Assessment Date June 8, 2014
Observers and Organization NHDOT John & Paige
Town Moultonborough
Jurisdiction NH DOT
Stream Name NHRIV700020105-09 U
Installation
Zoom to
Get Directions
Edit
SADES (Statewide Asset Data Exchange System)
Sherbrooke
Granby
Magog
Berlin
Bangor
Waterville
Augusta
Montpelier
VERMONT
Hartford
Hanover
Rutland
Claremont
Springfield
Brattleboro
North Adams
Greenfield
Pittsfield
Lowell
Lawrence
Haverhill
Amesbury
Gloucester
Peabody
Malden
Boston
Worcester
Framingham
Quincy
MASSACHUSETTS
White Mountains
Esri, DeLorme, FAO, USGS, EPA, NPS
Esri.com . ArcGIS Marketplace . Help . Terms of Use . Privacy . Contact Esri . Report Abuse

Sharing

Data -> Information -> knowledge



NHDES
Aquatic Resource Mitigation Program

New Hampshire State Stream Crossing Steering Team

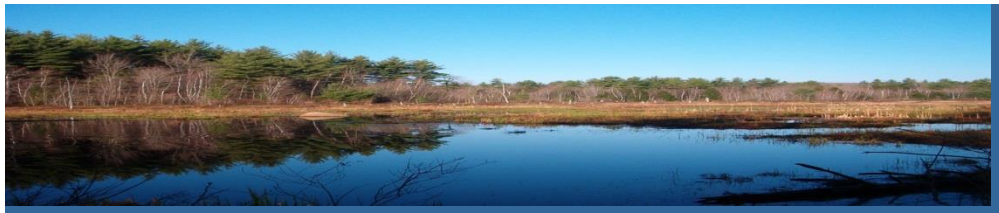
New Hampshire Department of Environmental Services (lead)
- New Hampshire Geological Survey
- Wetlands Bureau

New Hampshire Department of Transportation (co-lead)

New Hampshire Fish and Game Department (co-lead)

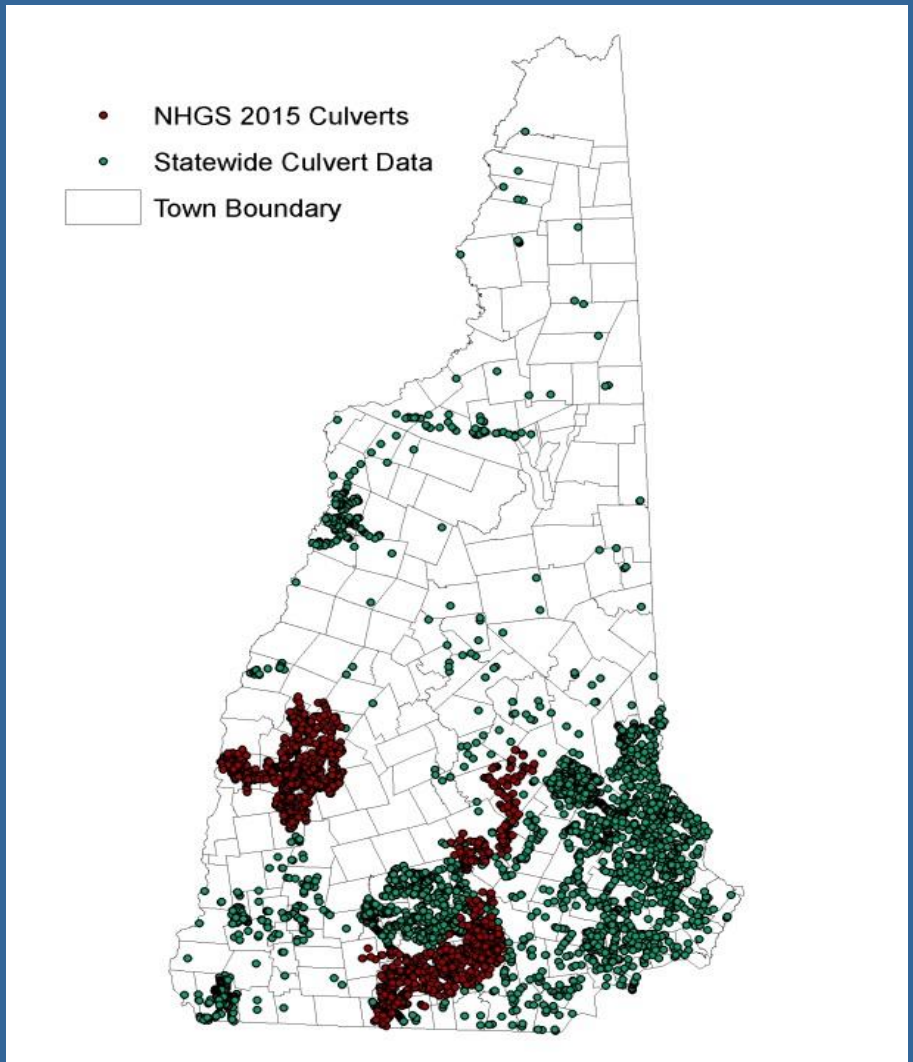
New Hampshire Division of Homeland Security and Emergency Management (partner)

- Based on a "governance model" (distributive management structure) that directs the operation of the team
- Each agency is responsible for condition data and criteria development based on specific missions and expertise
- All assessments are coordinated – minimize duplication of effort
- Consistent messaging to the public on data outputs and scoring
- Starting this summer – collection of both transportation and environmental portions of protocol (one stop shopping).



NHDES
Aquatic Resource Mitigation Program

New Hampshire by the Numbers



Time	Culverts assessed
2009 – 2014	1087
2014 – 2015 (RPCs)	1040
2015 (NHGS summer interns)	1323

Total: 3450 (~21.5% of state)

*Of known crossings in the state

Intersection of NHD and road network

Many more crossings that we do not know about

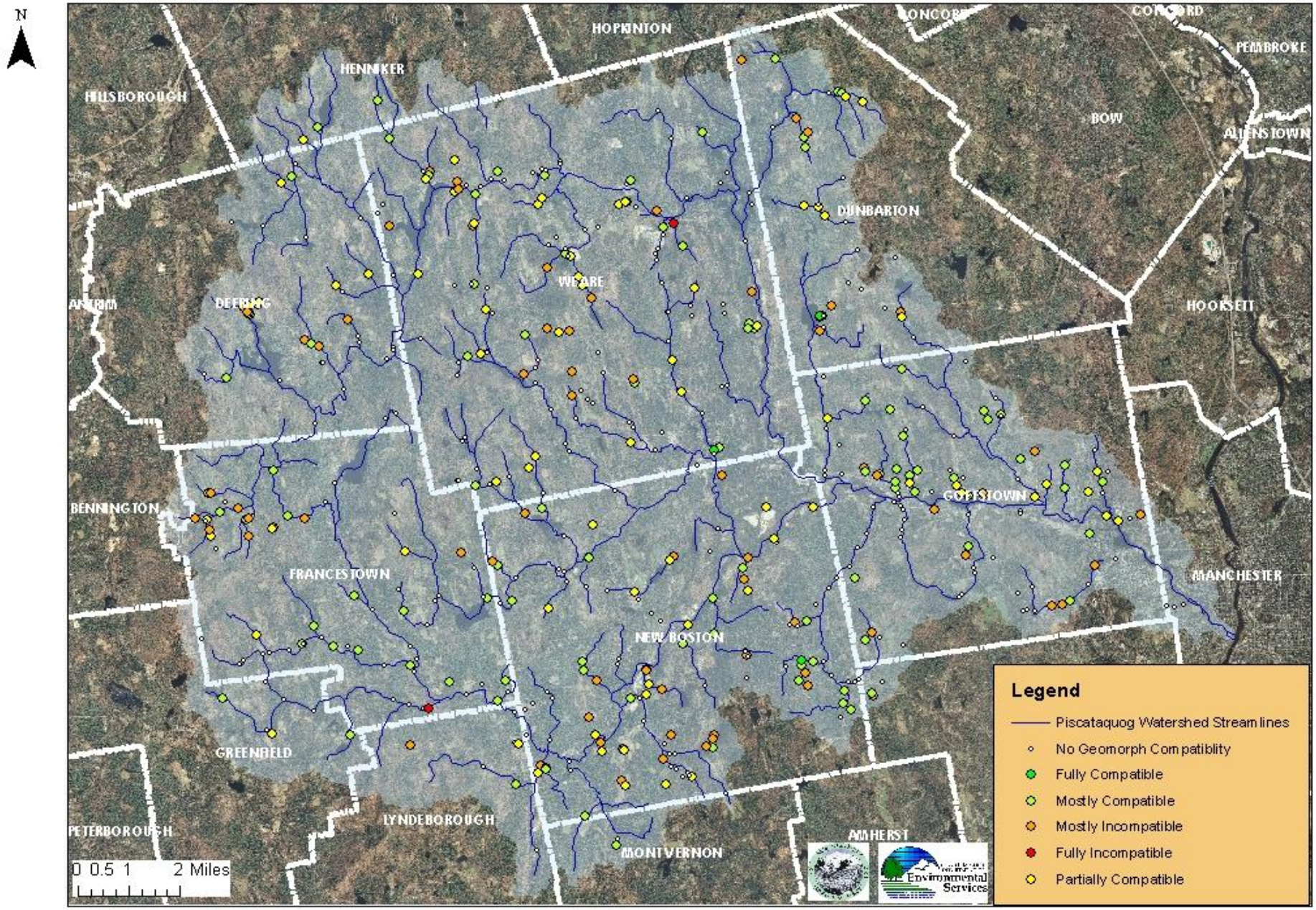
Geomorphic Compatibility

Category Name	Screen Score	Threshold Conditions	Description of structure-channel geomorphic compatibility
Fully compatible	$20<GC\leq25$	n/a	Structure fully compatible with natural channel form and process. There is a low risk of failure. No replacement anticipated over the lifetime of the structure. A similar structure is recommended when replacement is needed.
Mostly compatible	$15<GC\leq20$	n/a	Structure mostly compatible with current channel form and process. There is a low risk of failure. No replacement anticipated over the lifetime of the structure. Minor design adjustments recommended when replacement is needed to make fully compatible.
Partially compatible	$10<GC\leq15$	n/a	Structure compatible with either current form or process, but not both. Compatibility likely short term. There is a moderate risk of structure failure and replacement may be needed. Re-design suggested to improve geomorphic compatibility.
Mostly incompatible	$5<GC\leq10$	% Bankfull Width + Approach Angle scores ≤ 2	Structure mostly incompatible with current form and process, with a moderate to high risk of structure failure. Re-design and replacement planning should be initiated to improve geomorphic compatibility.
Fully incompatible	$0\leq GC\leq5$	% Bankfull Width + Approach Angle scores ≤ 2 **AND** Sediment Continuity + Erosion and Armoring scores ≤ 2	Structure fully incompatible with channel and high risk of failure. Re-design and replacement should be performed as soon as possible to improve geomorphic compatibility.

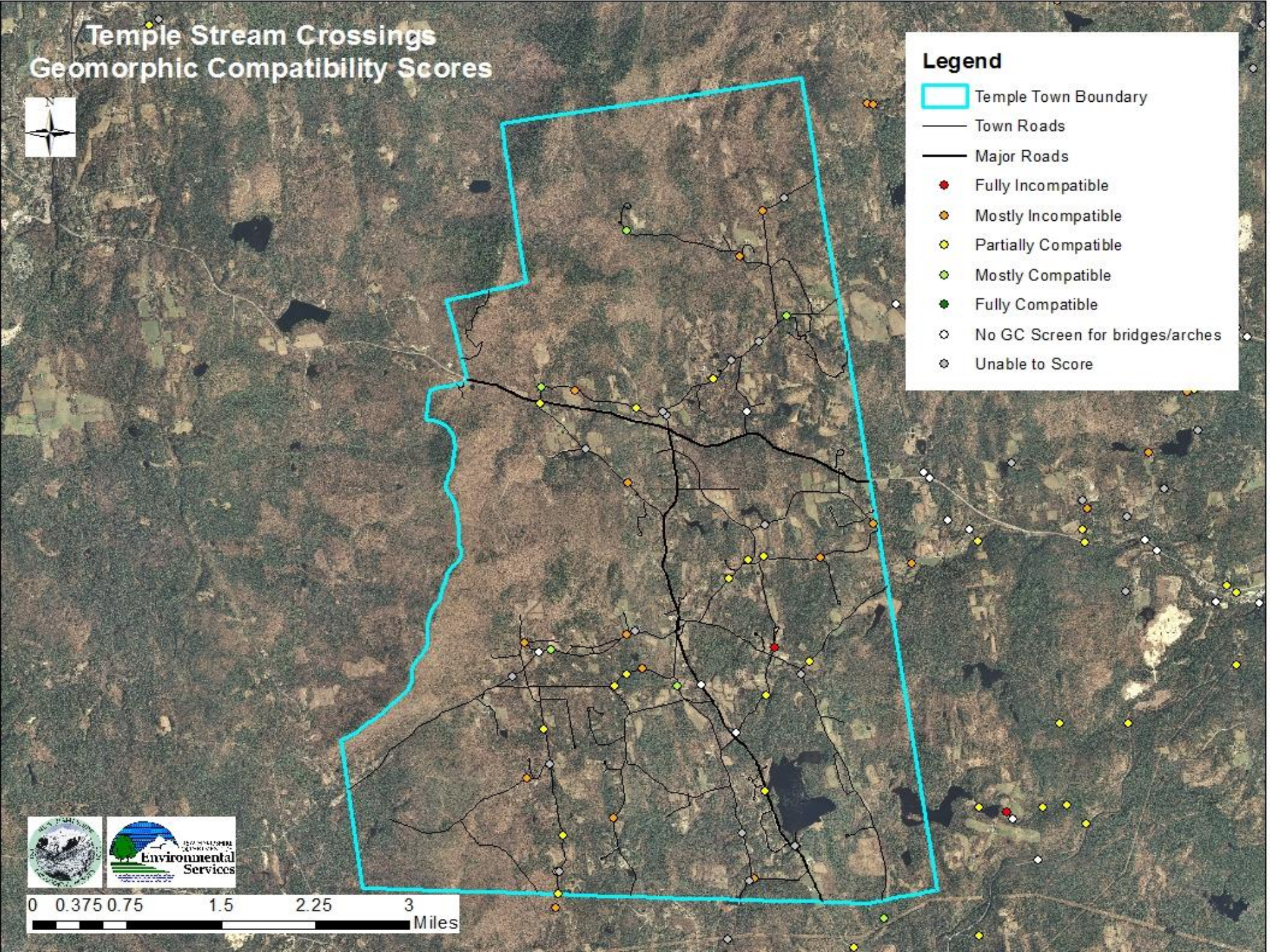
Aquatic Organism Passage (AOP) Compatibility

VT Aquatic Organism Passage Coarse Screen	Full AOP	Reduced AOP	No AOP	
Updated 2/25/2008	**for all aquatic organisms**	**for all aquatic organisms**	**for all aquatic organisms except adult salmonids**	**for all aquatic organisms including adult salmonids**
AOP Function Variables / Values	**Green (if all are true)**	**Gray (if any are true)**	**Orange**	**Red**
Culvert outlet invert type	at grade **OR** backwatered	cascade	free fall **AND**	free fall **AND**
Outlet drop (ft)	= 0		> 0 , < 1 ft **OR**	≥ 1 ft **OR**
Downstream pool present			= yes (= yes **AND**	= no **OR** (= yes **AND**
Downstream pool entrance depth / outlet drop			n/m ≥ 1)	n/a < 1) **OR**
Water depth in culvert at outlet (ft)				< 0.3 ft
Number of culverts at crossing	1	> 1		
Structure opening partially obstructed	= none	≠ none		
Sediment throughout structure	yes	no		

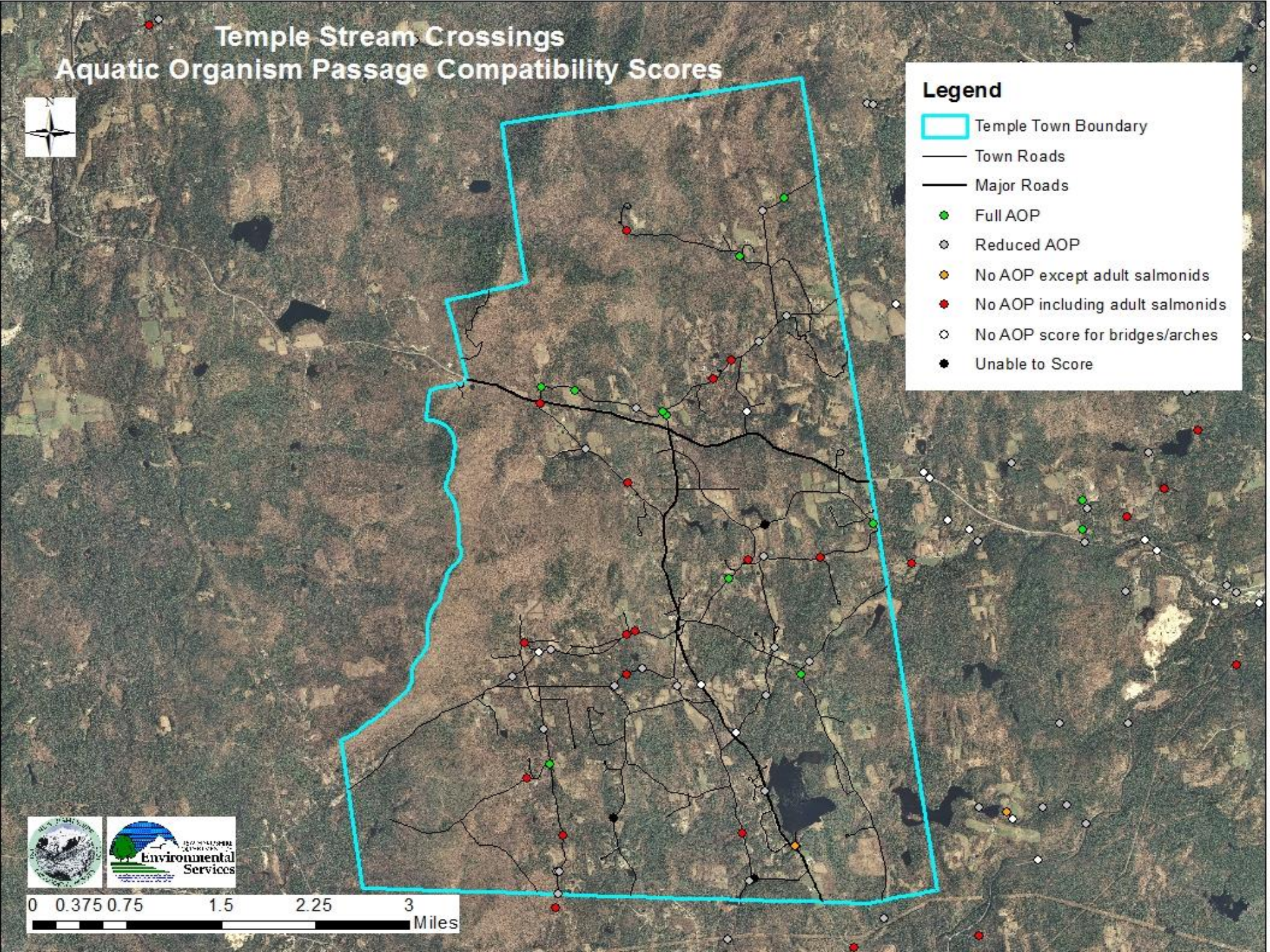
Results of Geomorphic Compatibility Rankings
Piscataquog River Watershed



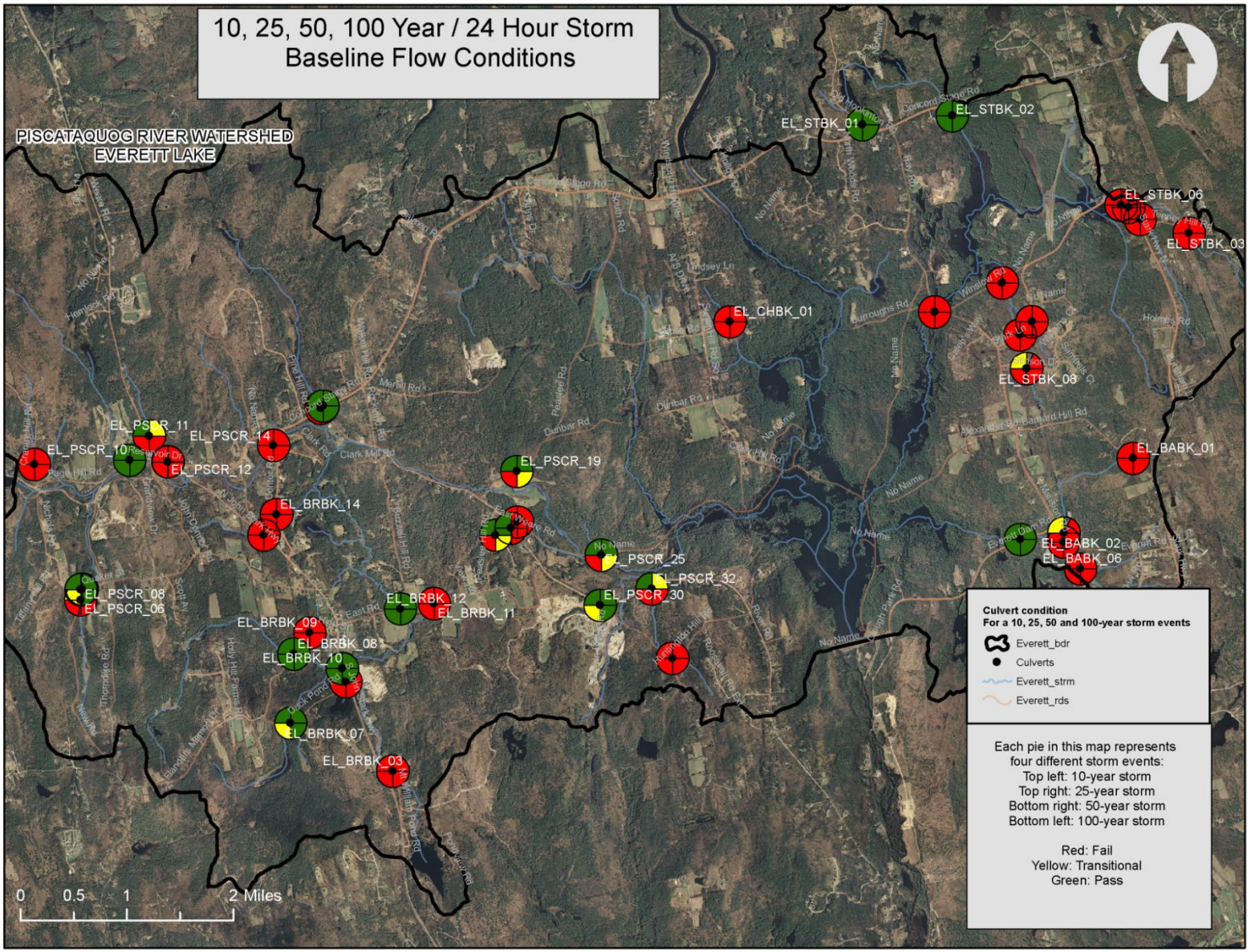
Temple Stream Crossings
Geomorphic Compatibility Scores

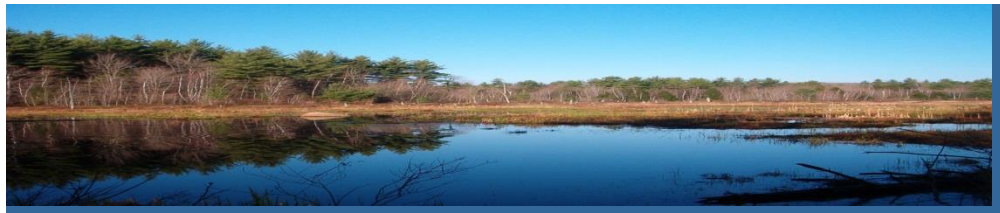


Temple Stream Crossings
Aquatic Organism Passage Compatibility Scores



Community Based Assessment Tool



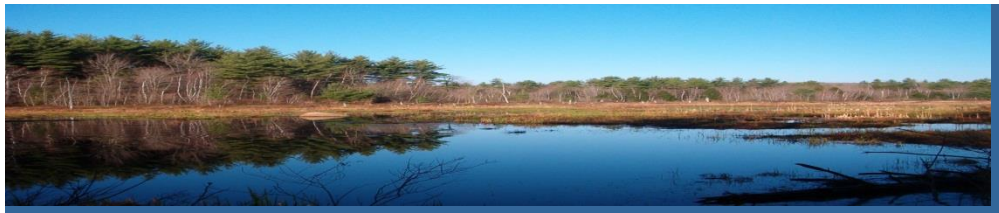


NHDES
Aquatic Resource Mitigation Program

Stream Passage Improvement Program

Assist and provide funds for improving a state/municipal crossing that is deemed eligible for the stream mitigation program – instead of paying into ARM Fund

Road engineers utilize information for mitigation grants to replace deficient crossings to address infrastructure needs, safety and aquatic organism passage.



NHDES
Aquatic Resource Mitigation Program

For Additional Information

www.des.nh.gov/wetlands

(603) 271-2147

- Rules, forms, fact sheets
- Mitigation checklist
- Draft easement language
- Calculator for ARM payment
- Ledger of payments received
- ARM application packet
- ARM Fund annual reports
- Watershed awards/disbursal reports