Watershed Scale Crossing Assessment to Promote Community Restoration Priorities

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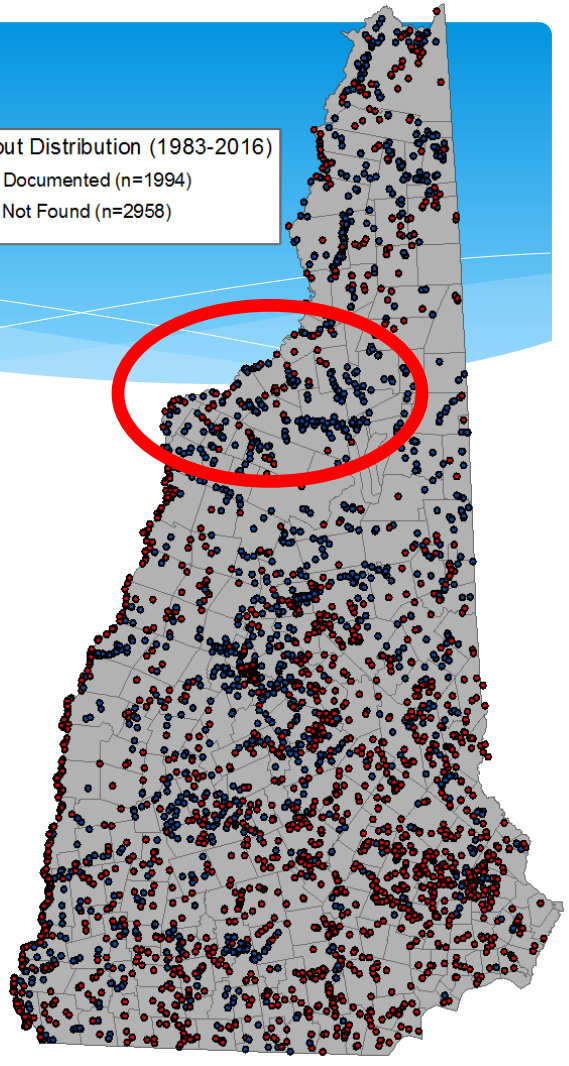
North Country Council
Community Planning and Development

Presentation Overview

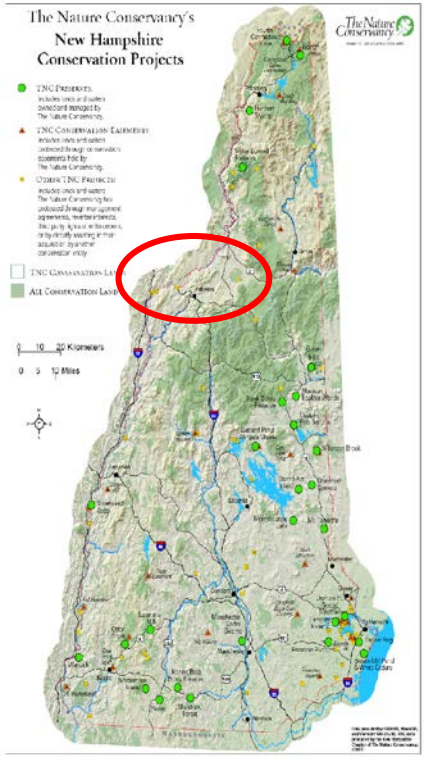
- Modeling AOP, Geomorphic Compatibility & Hydraulics Results
- Community Workshops
- Next Steps

Why Here?



- **Completed Assessments**
  - Eastern Brook Trout Joint Venture
  - Natural Resource Inventories
  - Clean Water Healthy Trout
- **Designated River-NHDES**
- **High need (N=781)and logical next step**
- **Many partners**

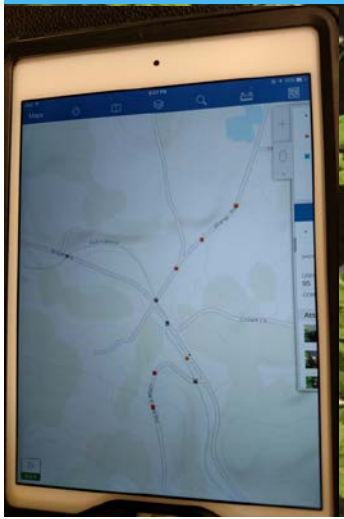
Ammonoosuc Watershed



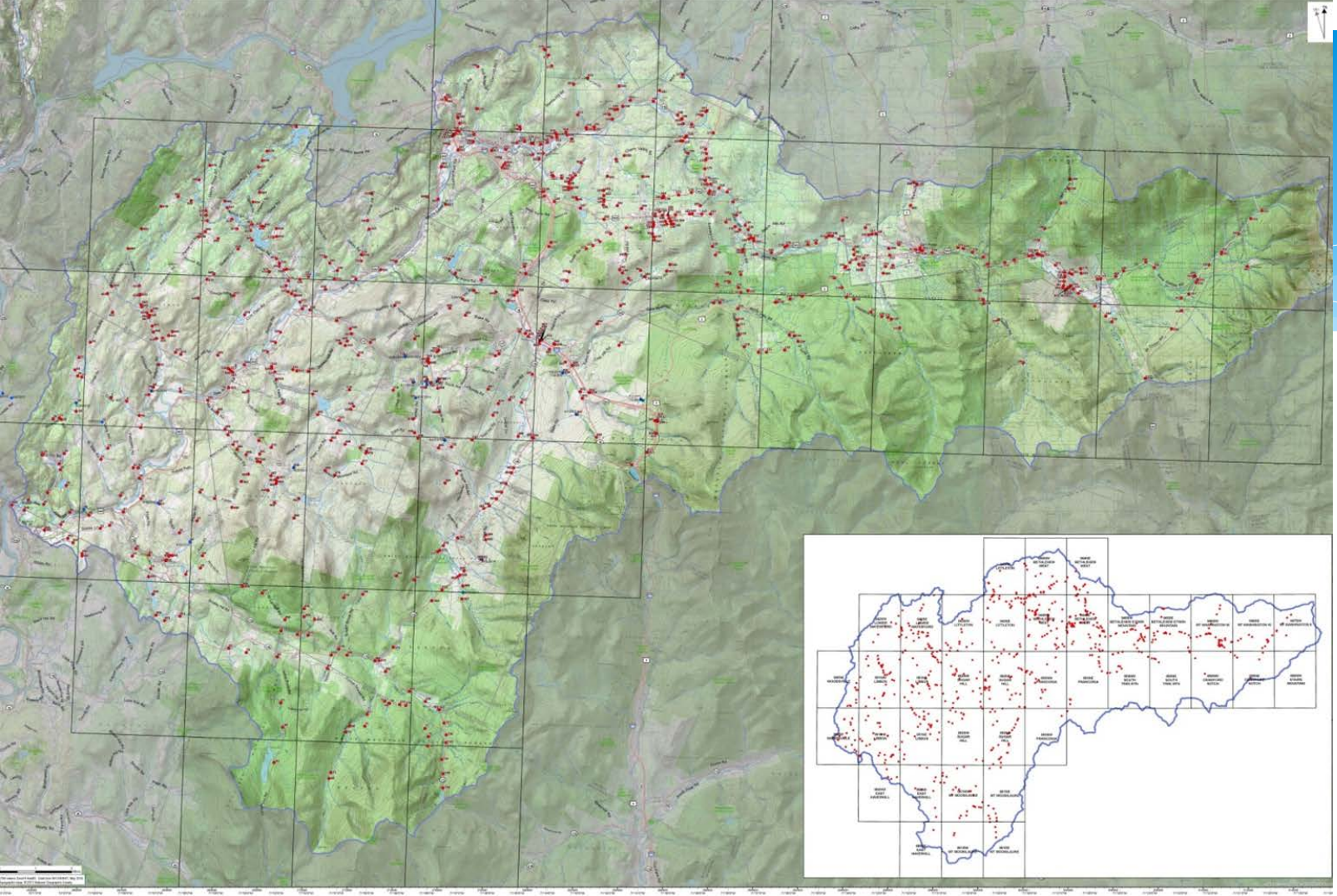
16 Towns

741 Stream Crossings

Stream Crossing Assessments



- Worked with state agencies – More focused restoration efforts
- Data Collection – AOP, Geomorphic Compatibility, Hydraulic Capacity
- Fish and other aquatics are good for road integrity–**Transportation for All**

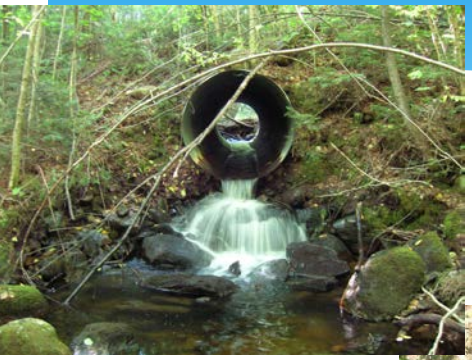


2016 Ammo Stream Crossings






Aquatic Organism Passage



Wildlife Action Plan

American Brook Lamprey (Juvenile and Adult) Photos by Sean Smith

~50% Greatest Conservation Need fish spp. utilize river/stream corridors

- Alewife
- American Brook Lamprey
- American Eel
- American Shad
- Blueback Herring
- Brook Trout
- Rainbow Smelt
- Sea Lamprey

High Quality Habitat

Water Quality

Large Wood

Riparian Vegetation

Thermal Refuge

Deep Pools

Structure Diversity

Spawning Grounds

Gravel Substrate

In-Stream Vegetation

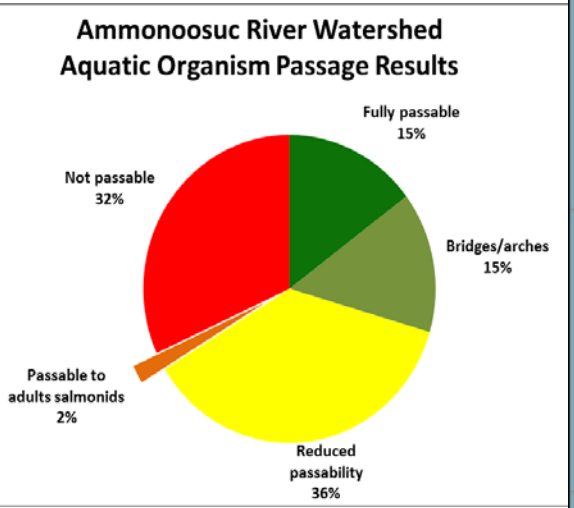
Water Velocity

Features of a Good Stream Crossing

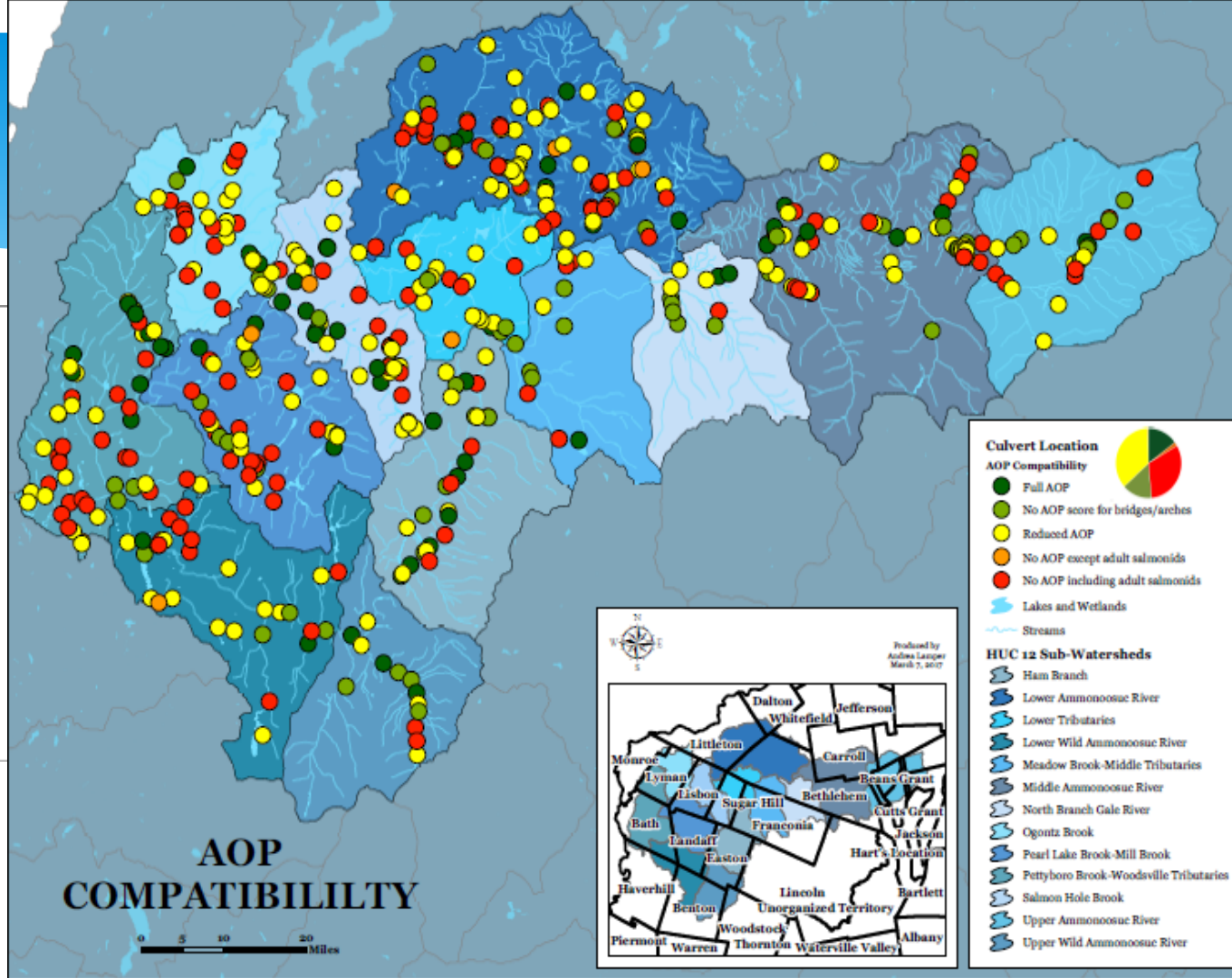
- Natural streambed composition
- No change in flow rate and depth (US=DS)
- Properly sized to handle most flows

- Lower short term maintenance, lower community cost
- Increased public safety
- Increased streambank stability and spp sustainability

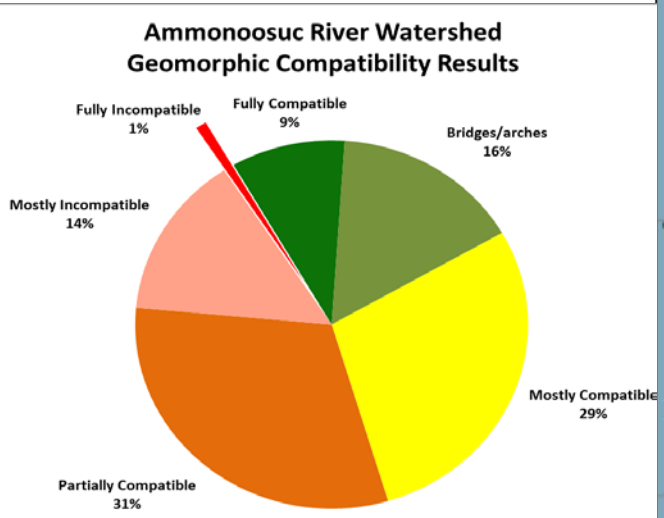
Aquatic Organism Passage



Thank you
PSU student Andrea Lamper
March 2017



Geomorphic Compatibility



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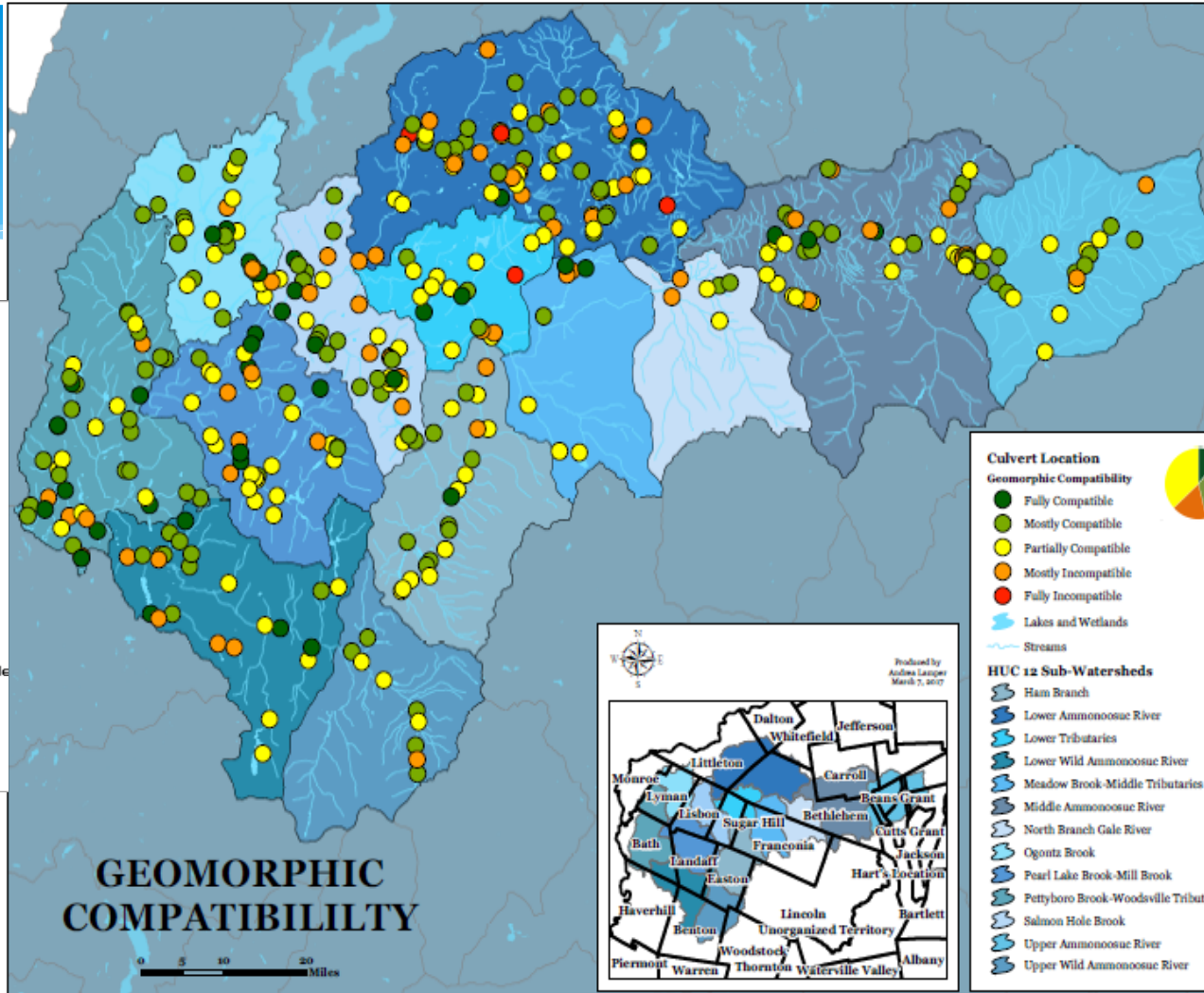
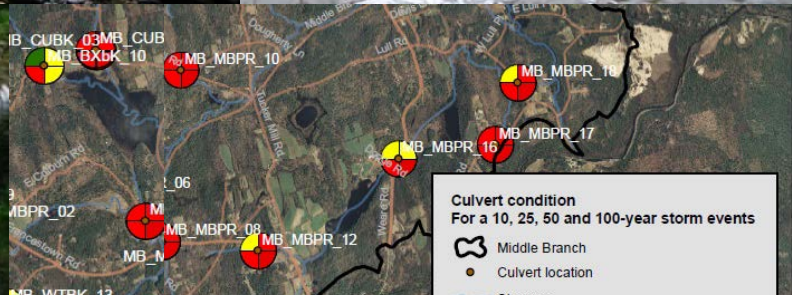


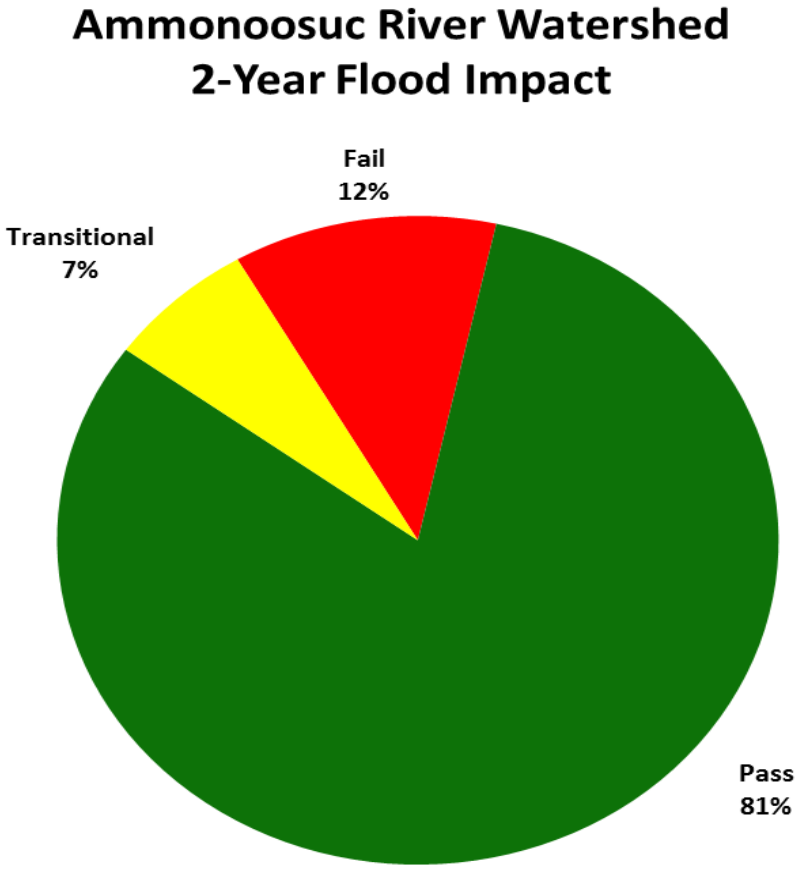
Infrastructure Vulnerability

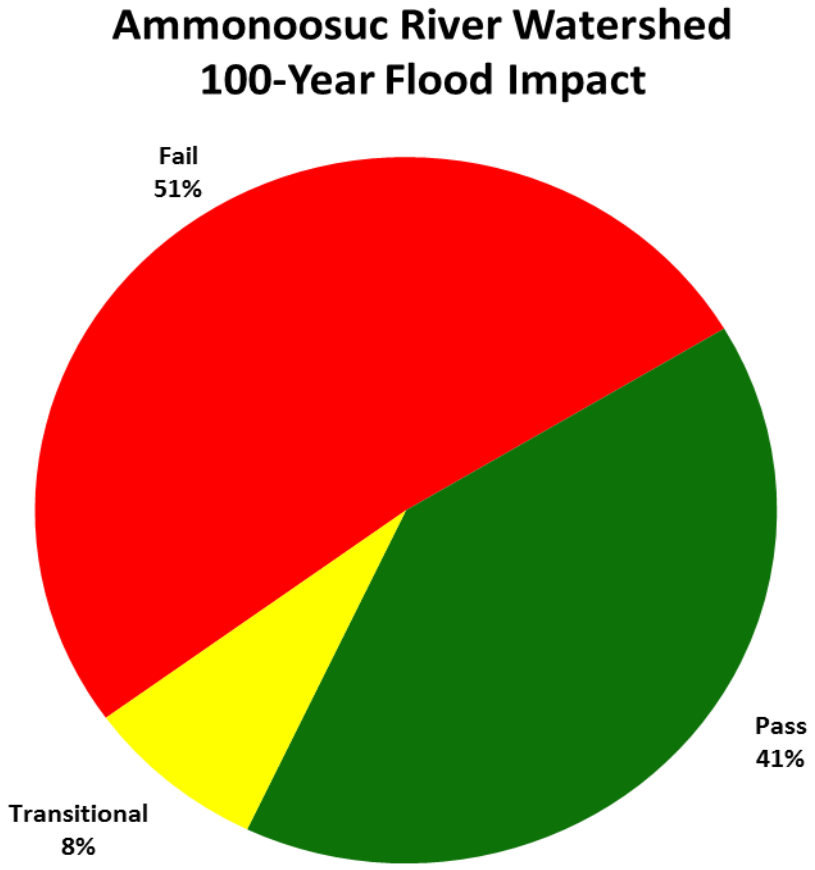
Stream Works – TU Culvert Model V. 1

Uses crossing characteristics and flow estimates to predict the resilience of a crossing at 2, 10, 25, 50, and 100-year flow events



Hydraulic Model Results:





Community Engagement

- Community Champions = 350+ hours!
- Youth Service Learning (64 students)
- Stewardship Ethic
- Successful, Stable Infrastructure and Healthy Habitat

From Data to Action

GEOMORPHIC_COMPATIBILITY	AOP_STATUS	2 YR	10 YR	25 YR	50 YR	100 Y
Mostly Compatible	Reduced AOP	P	F	F	F	F
Mostly Compatible	Full AOP	P	P	P	T	F
Partially Compatible	No AOP including adult salmonids	T	F	F	F	F
Partially Compatible	No AOP including adult salmonids	P	P	T	F	F
Fully Compatible	Full AOP	P	P	P	P	P
Mostly Compatible	Reduced AOP	P	T	F	F	F
Mostly Compatible	No AOP including adult salmonids	P	F	F	F	F
Fully Compatible	Reduced AOP	P	P	T	F	F
No GC Screen for bridges/arches	No AOP score for bridges/arches	P	P	P	P	P
Mostly Incompatible	Reduced AOP	P	F	F	F	F
Fully Compatible	No AOP including adult salmonids	P	P	T	T	F
Fully Compatible	No AOP including adult salmonids	P	P	P	P	P
Fully Compatible	Reduced AOP	F	F	F	F	F
Mostly Compatible	Reduced AOP	P	P	T	F	F
Partially Compatible	Reduced AOP	T	F	F	F	F
Mostly Compatible	Reduced AOP	P	P	P	P	P
Fully Compatible	Full AOP	P	P	T	T	F
Unable to Score	No AOP including adult salmonids	F	F	F	F	F
Mostly Compatible	Full AOP	T	F	F	F	F
Partially Compatible	No AOP including adult salmonids	F	F	F	F	F
Mostly Compatible	No AOP including adult salmonids	F	F	F	F	F
Mostly Incompatible	No AOP including adult salmonids	P	P	P	P	T
Mostly Compatible	No AOP including adult salmonids	P	P	T	F	F
Mostly Compatible	No AOP including adult salmonids	P	F	F	F	F
Mostly Compatible	No AOP including adult salmonids	P	T	F	F	F
No GC Screen for bridges/arches	No AOP score for bridges/arches	#N/A	#N/A	#N/A	#N/A	#N/A

Community Workshops

Challenges

* Limited capacity
* Long process
* Competing needs
* Misperceptions
* Long-term investment
* Need more champion recruits
* Systems thinking

Design

* Participatory
* Interpret data
* Identify actions and individuals
* Demystify process
* Foster collective action
* Connect with resources

Opportunities

* Lessons learned are transferable
* Replicable
* Build on momentum
* Resources are available
* Collaboration

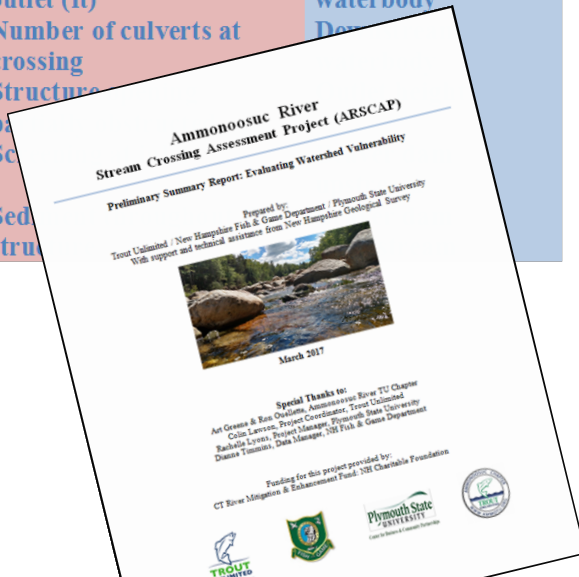
Community Workshops

Data Interpretation:

- Basic stream and river function
- Results from *2016 Ammonoosuc River Stream Crossing Assessment Project Report*
- Prioritize and identify potential restoration sites

The focus will be to enable participants to understand model variables and results of the assessment, evaluate vulnerable town infrastructure, and prioritize to initiate restoration projects.

Geomorphic	AOP	Other
Number of culverts	Culvert outlet invert type	Crossing type
Upstream dimensions	Outlet drop (ft)	Material
Upstream bankfull width	Downstream pool present	Condition
Angle of stream flow approaching	Downstream pool entrance depth	Water depth
Culvert slope compared with channel slope	Water depth in culvert at outlet (ft)	Upstream waterbody
Upstream bed deposition	Number of culverts at crossing	
Upstream deposits taller than 0.5 bankfull height	Structure	
Steeper Segment within 1/3 mile upstream		
Downstream bed scour undermining the structure		
Downstream bank heights are significantly taller than upstream banks		
Upstream bank erosion		
Downstream bank erosion		
Upstream bank armoring		
Downstream bank armoring		

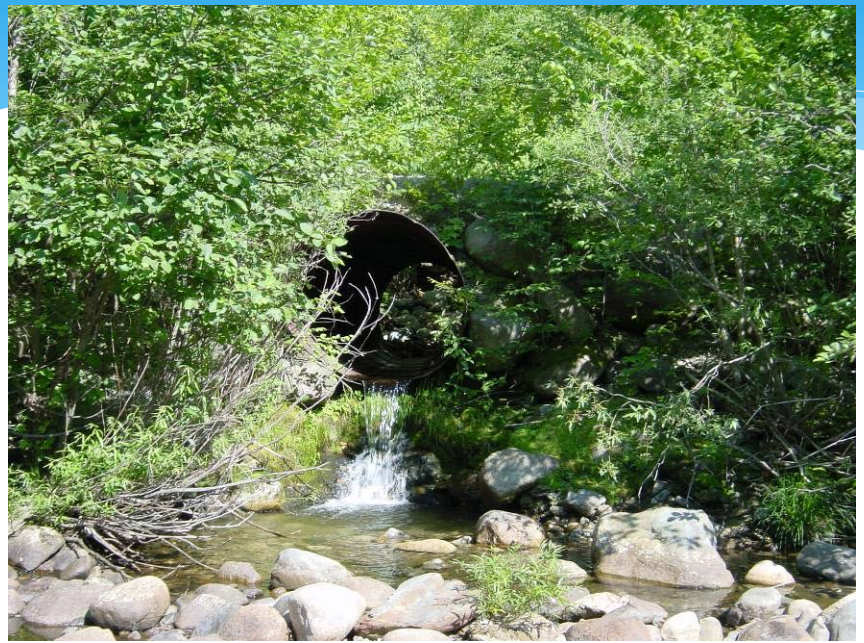


Long-Term Restoration Strategy

- Develop strategies that avoid unnecessary expenses
  - Benefits w/ pre-planning and proactive restorations
- Project financing, grants and mitigation
- Develop “working groups”
- Presentations from engineers, state permit agents, and potential funding agencies

Outcome:

Slide Brook Culvert Restoration
~ May 2010



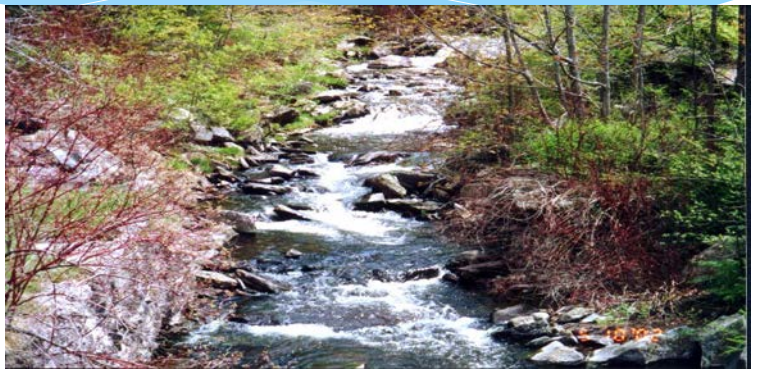
Pre-replacement – looking upstream ~ 2006

Post-replacement – looking upstream ~ 2010

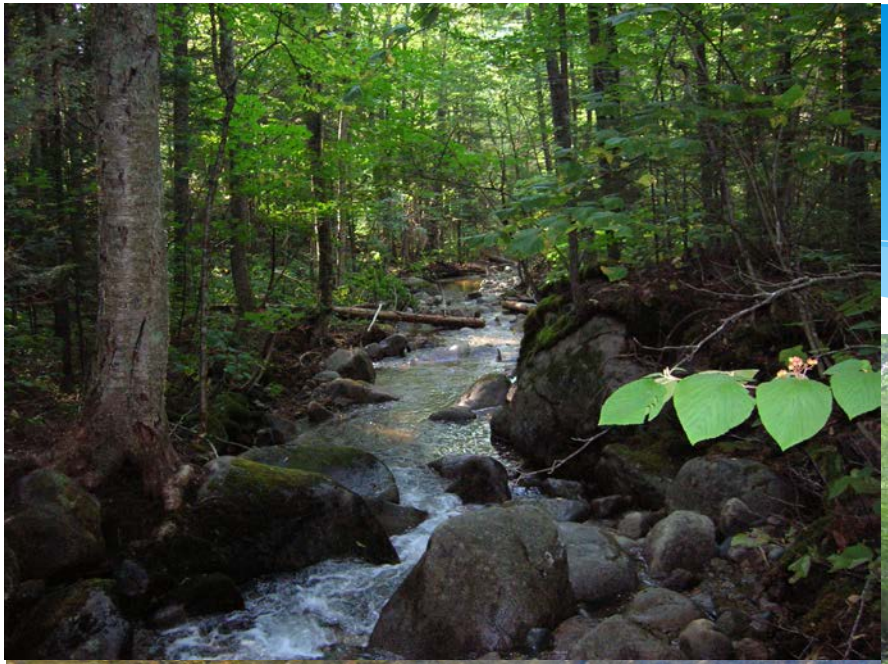
Working with towns to prioritize road crossings that are important for all users.

A Balanced “Ecosystem” Reduces Vulnerability!

- Increase habitat connectivity
- Improve habitat quality and flood resilience
- Support species diversity & productivity



Questions?



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