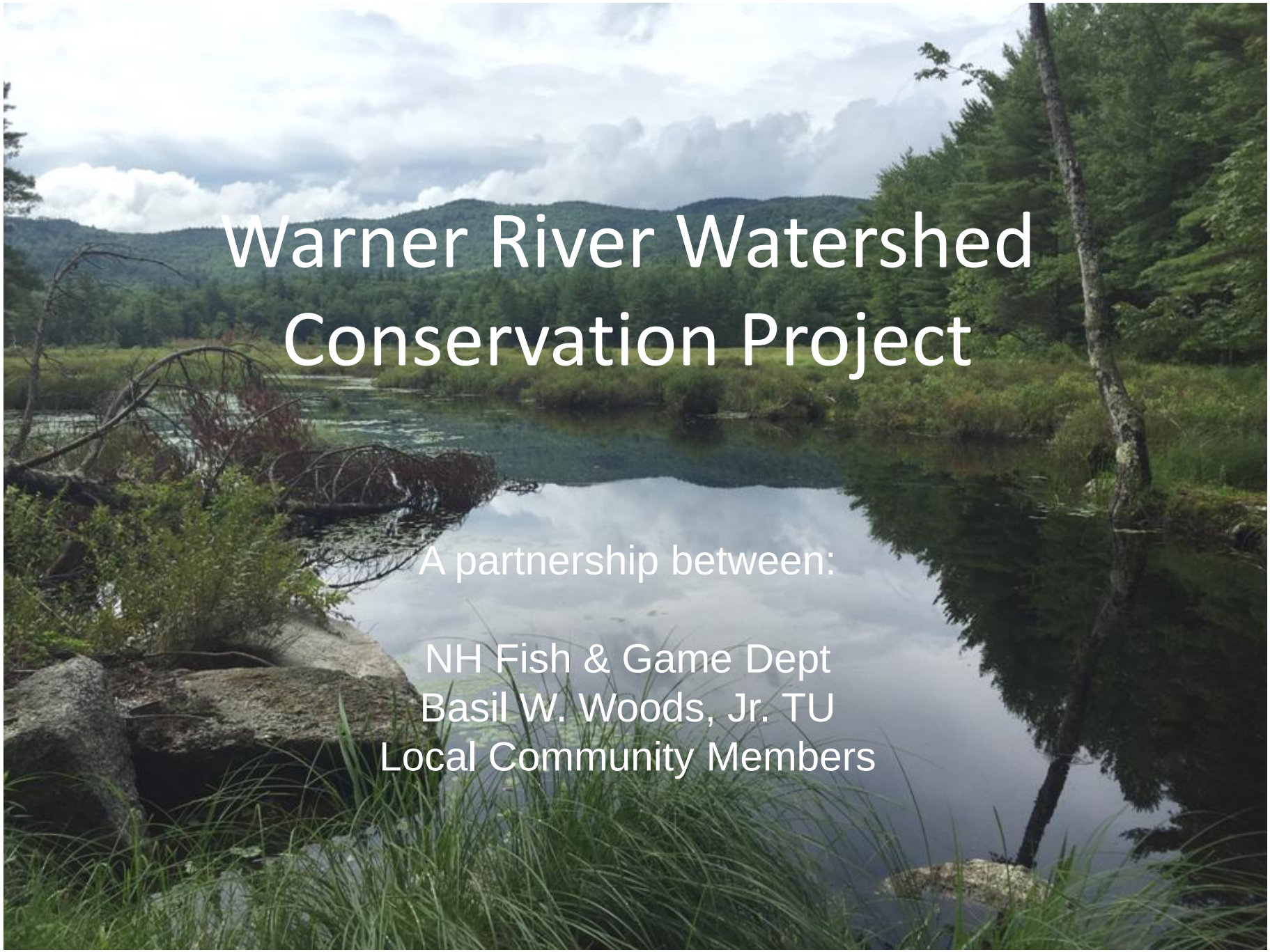
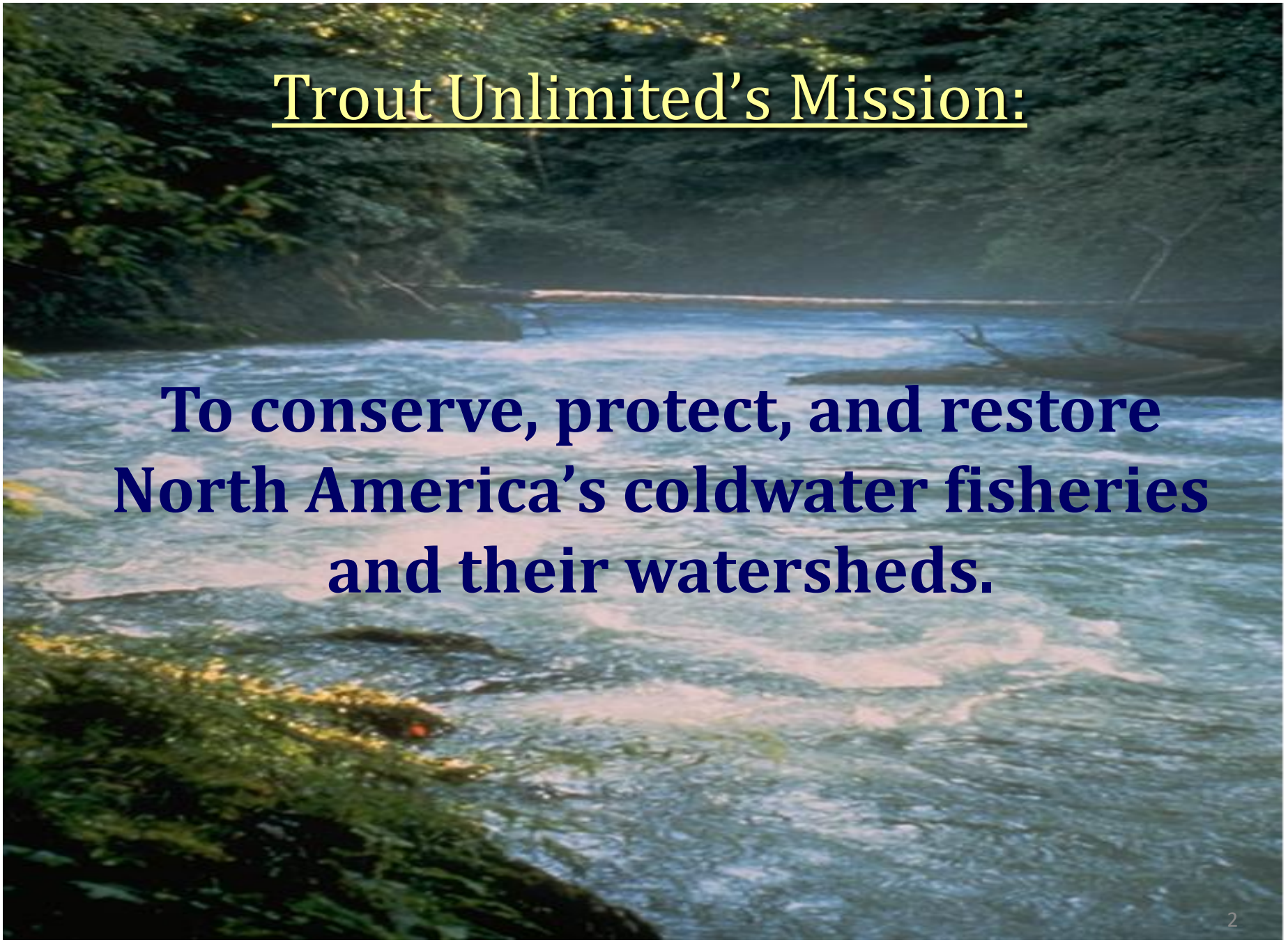

Warner River Watershed
Conservation Project
A partnership between:
NH Fish & Game Dept
Basil W. Woods, Jr. TU
Local Community Members



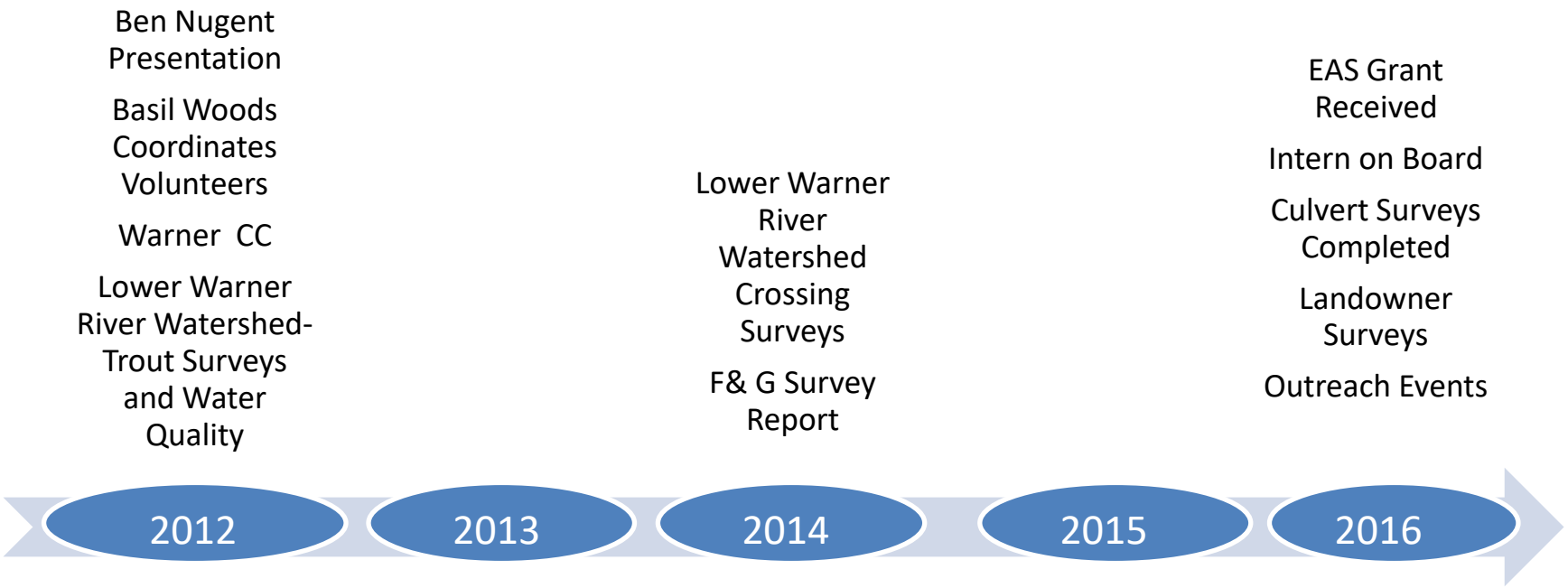
Trout Unlimited's Mission:

To conserve, protect, and restore North America's coldwater fisheries and their watersheds.

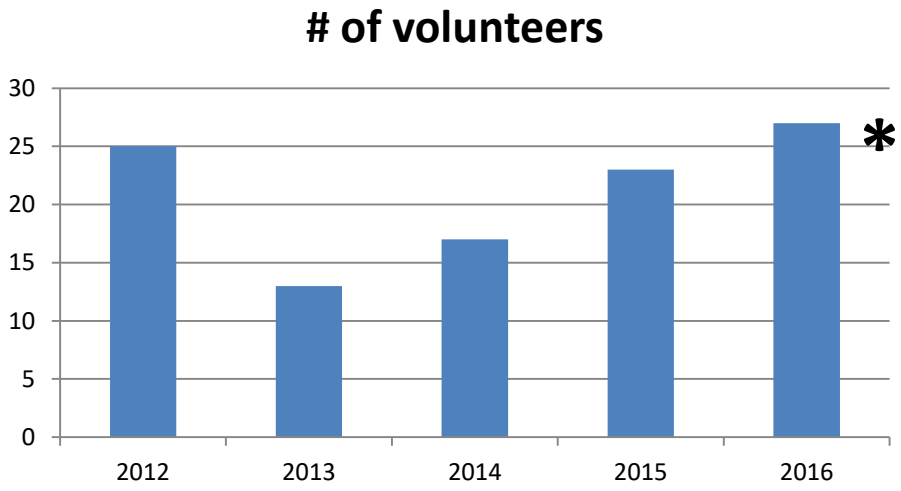
Warner Watershed Conservation Project Goals

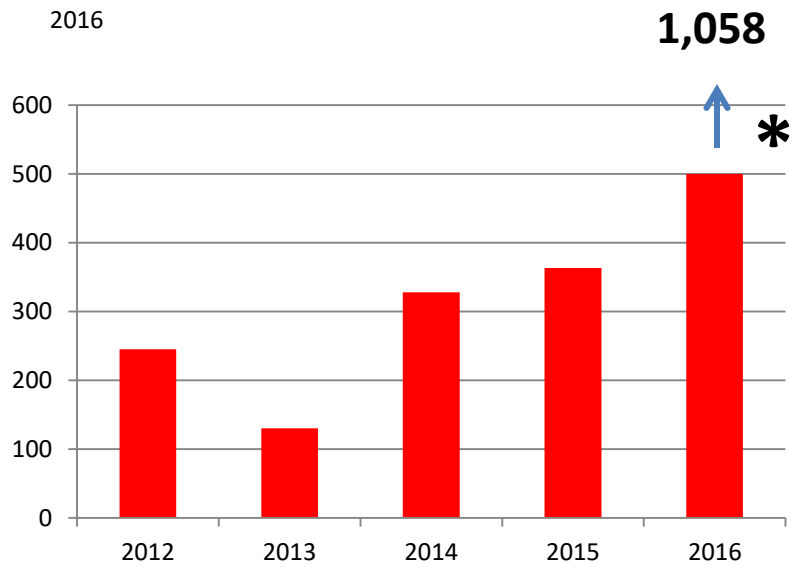
- Ensure sustainability of wild brook trout
  - Foster local landowner and citizen stewardship
  - Implement Sound Stewardship measures- habitat protection, restoration and enhancment projects
- Strengthen Chapter Conservation focus by engaging TU membership and leadership in hands-on project

Timeline


Ben Nugent Presentation
Basil Woods Coordinates Volunteers
Warner CC
Lower Warner River Watershed- Trout Surveys and Water Quality
Lower Warner River Watershed Crossing Surveys
F& G Survey Report
EAS Grant Received
Intern on Board
Culvert Surveys Completed
Landowner Surveys
Outreach Events
2012
2013
2014
2015
2016
Lane River Watershed- Trout Surveys and Water Quality
Lane River Crossings
EAS Grant Submitted

Volunteer Involvement

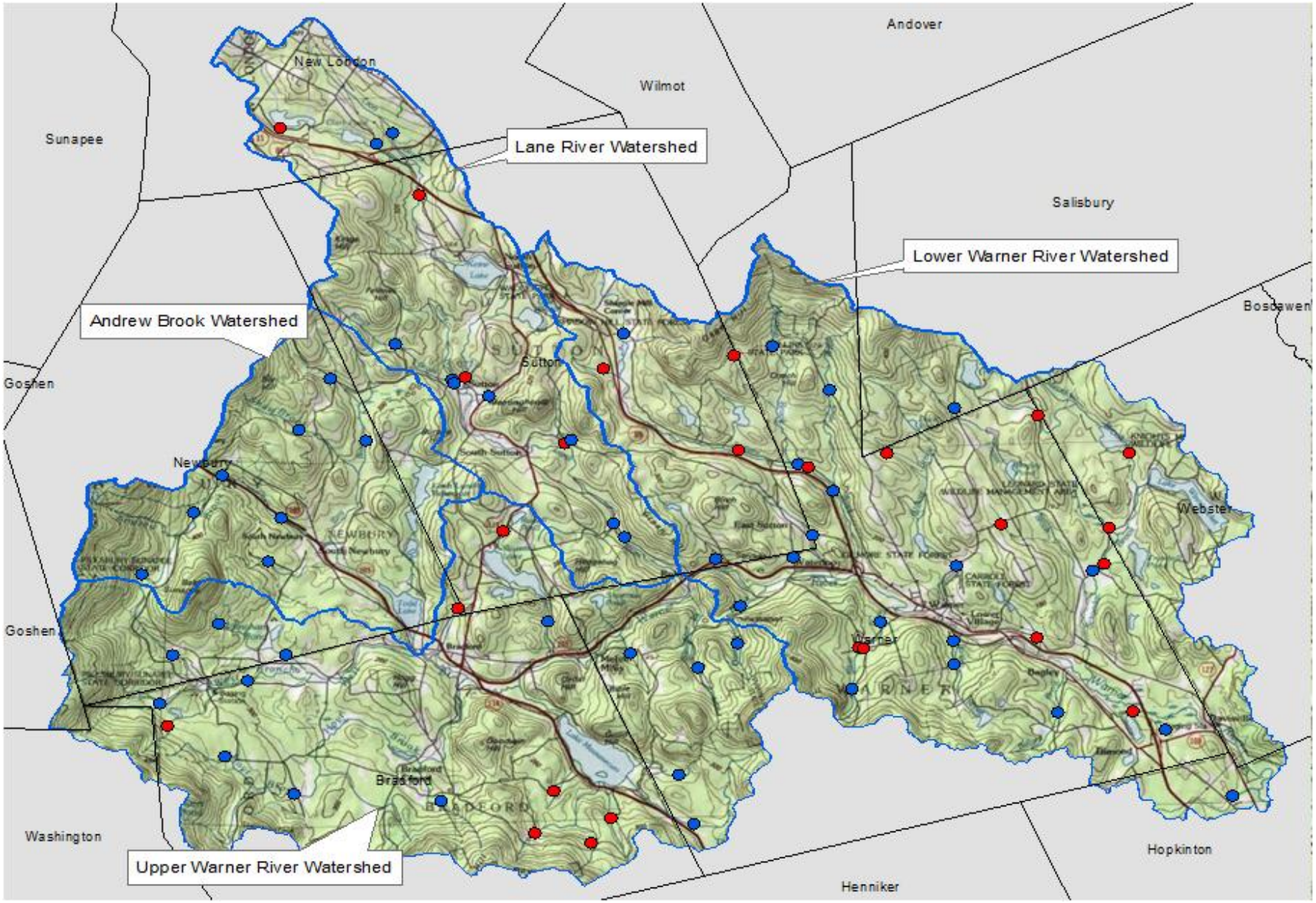




*includes outreach

Partnerships Make A Difference

Warner R. Watershed BT Survey Results



Wild Brook Trout
Sometimes where you expect

Other Places: Not as Much

Thistle Brook: Sutton/Rte114

Silver Creek Junction with Warner River

Kearsarge HS Parking Lot

Brook Trout Stream –Hopkinton Fair Grounds (Sept 2, 2016)

Embrace-A-Stream Grant

- Program: TU National Awards funds to support Chapter Conservation Efforts.
- 2016: $84,941 awarded to 26 Chapters/Councils
- Basil Woods: Funds needed to hire intern to coordinate stream crossing assessment & outreach
- Requested $10,000. Awarded $4000
- First Basil Woods EAS Grant
- Chapter adjusted work scope and provided additional funds for intern.

2016 Warner River Watershed Project Budget

			Budget	Spent
TU National Award:			$4,000	$4,000
Basil Woods Chapter Match:			$5,887	$1,976
Intern	$4397	$1033*		
Matls/Equip	$1490	$946		
In-Kind Labor: (Volunteers, F&G Biologists)			$31,918	$49,096
Donated materials:			0	$80
Total:			$41,805	$51,155

*An additional $3364 reserved to support 2017 intern

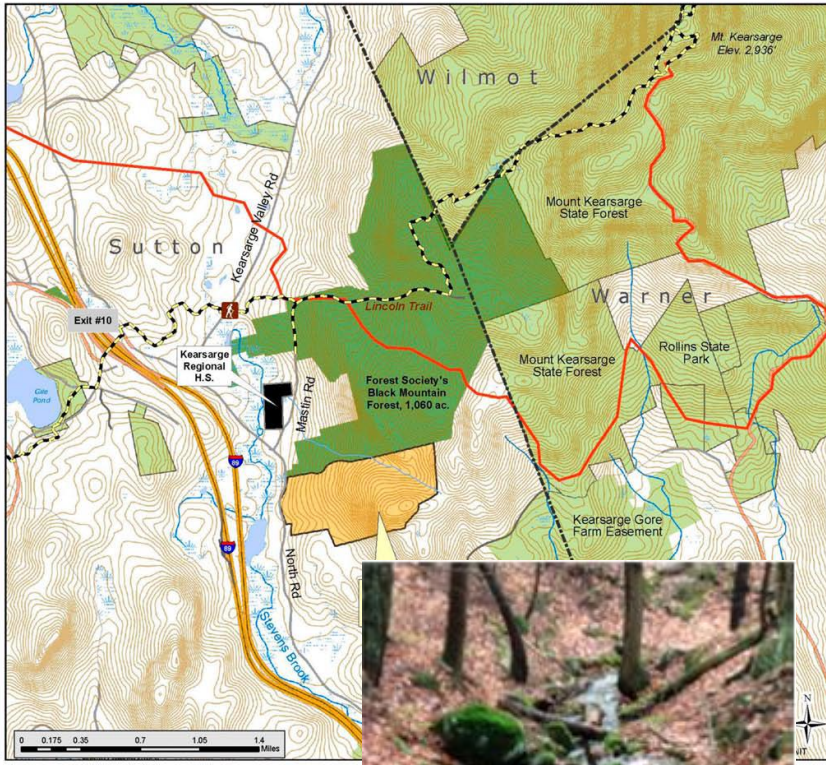
2016 Culvert and Land Owner Surveys

- 2016 Culvert Surveys
  - finished last 56 of 152 culverts with 20
  - total crossings
- 2016 Landowner Surveys:
  - 12 landowners with others postponed to 2017 because of drought

French Brook – July 30,2016

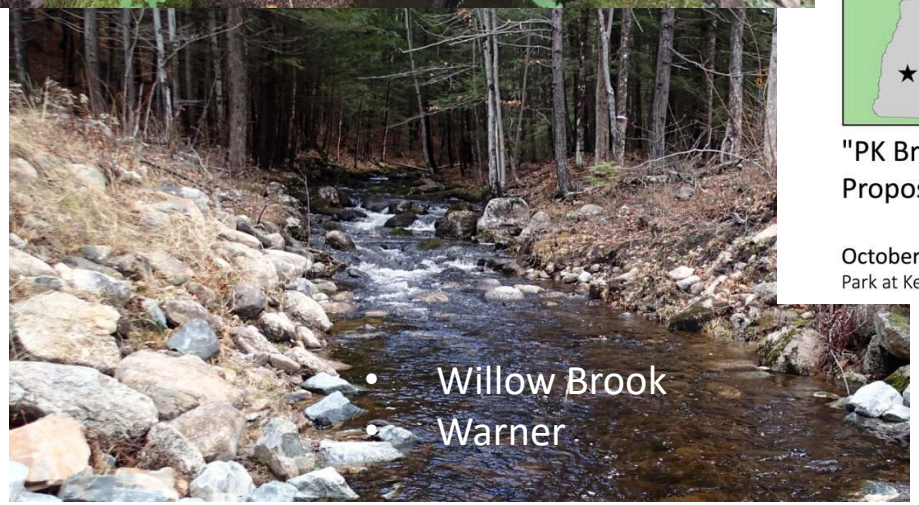
Land acquisition and Easements

Silver Brook
Warner



"PK Brown" Tract Hike
Proposed addition to Black Mountain at M

October 1, 2016, 8:30 AM to 12:00 PM
Park at Kearsarge Regional High School main parking lot at 457



- Willow Brook
- Warner

Outreach and Education

Fall Foliage Festival: 2 days

Hopkinton Fair: 4 days

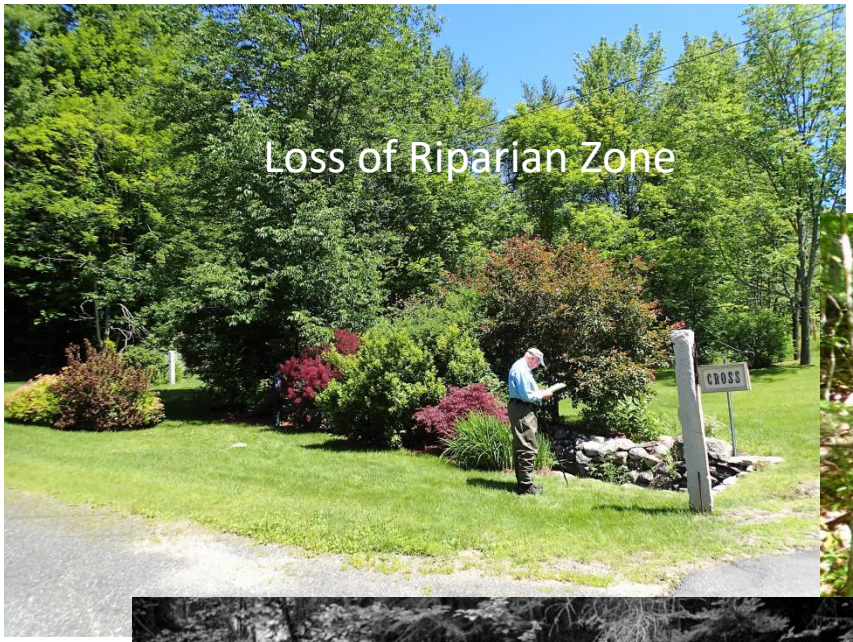
EVENTS

- Main Street Bookends:
  - Fly tying demos/instruction
  - Why do rivers do that – Dr John Field
- Presentations: Warner Men's Club, Basil Woods TU, Sutton Conservation Committee
- Farmers Market
- Hopkinton Fair
- Warner Fall Foliage Festival

What's Next?

- Survey Results
  - Healthy Watershed worth Preserving
  - But in Need of Help – threatened by development and climate change
- Actions:
  - Community and landowner buy-in – continue outreach
  - Identify projects and actions to conserve and protect
  - Continue next year with full time individual (intern) to coordinate meetings with landowners, out reach efforts, and follow-up stream surveys.

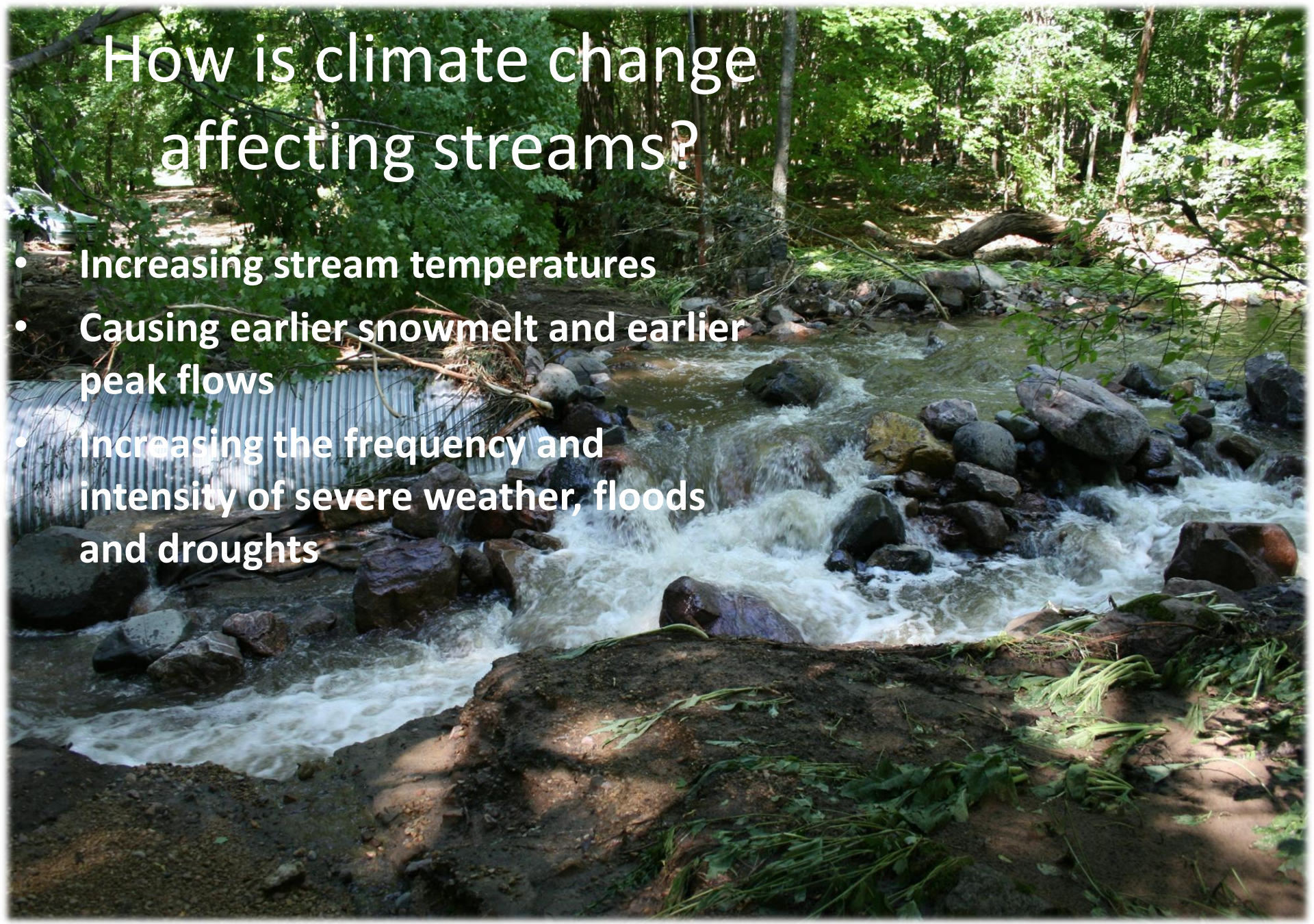
How is Development Affecting Streams



Bradford Pond

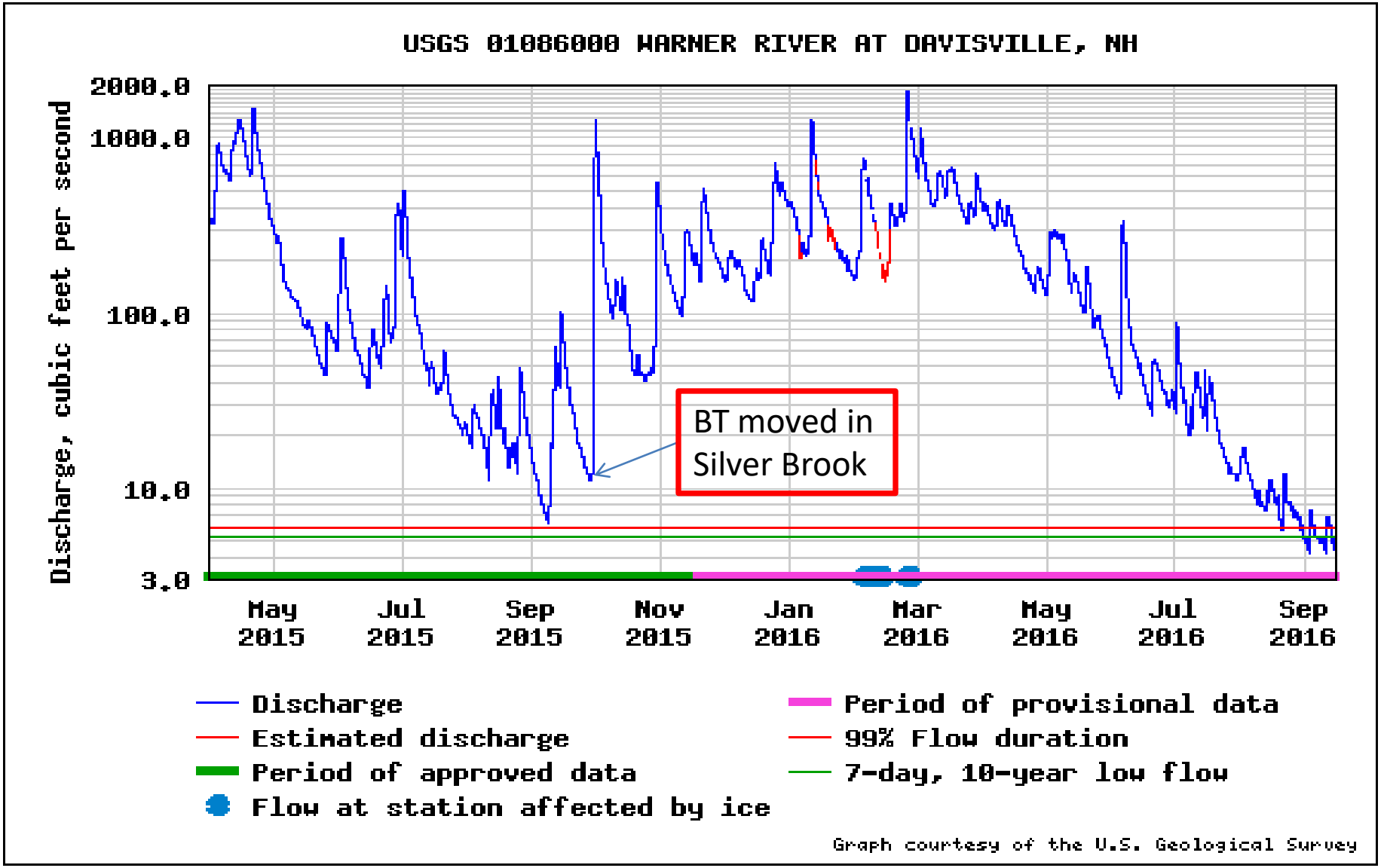
Old Stream Bed Dry

How is climate change affecting streams?



- Increasing stream temperatures
- Causing earlier snowmelt and earlier peak flows
- Increasing the frequency and intensity of severe weather, floods and droughts

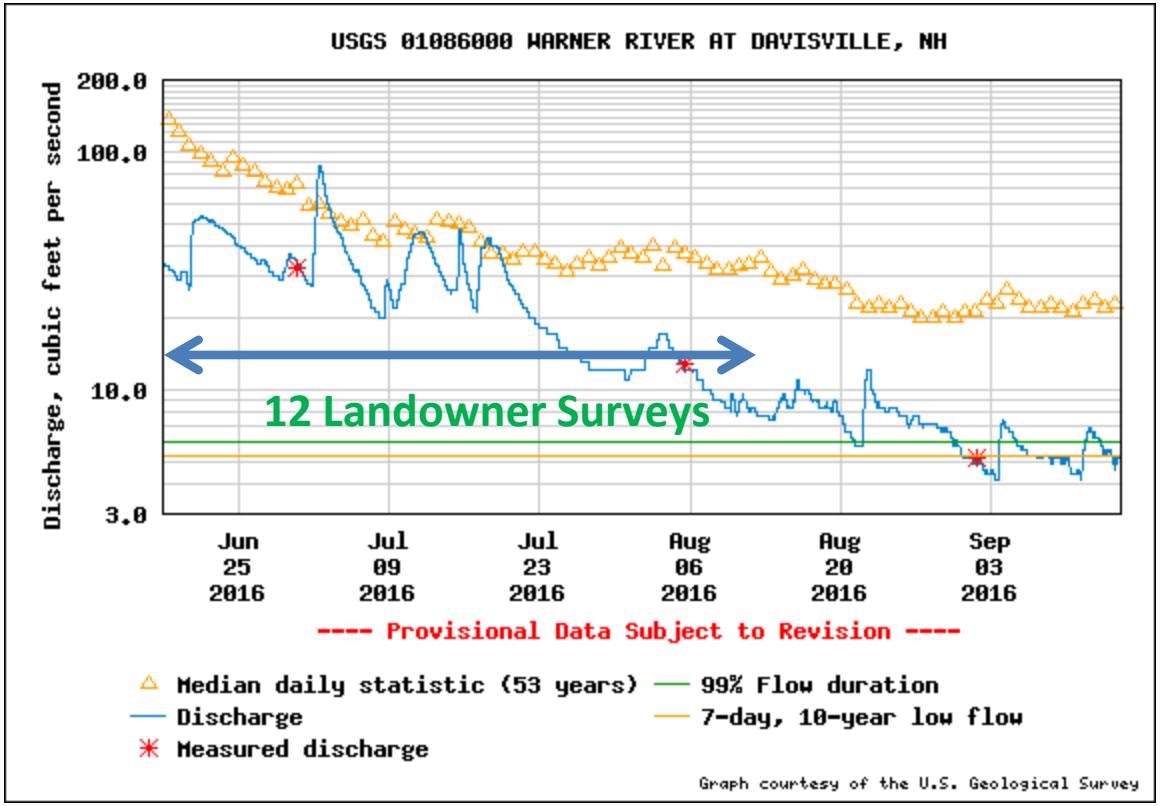
Warner River Stream Gage Showing Drought Conditions in Fall 2016



Silver Creek, Fall 2015

Silver Creek, Fall 2016

Warner River, Davisville, Stream Gage



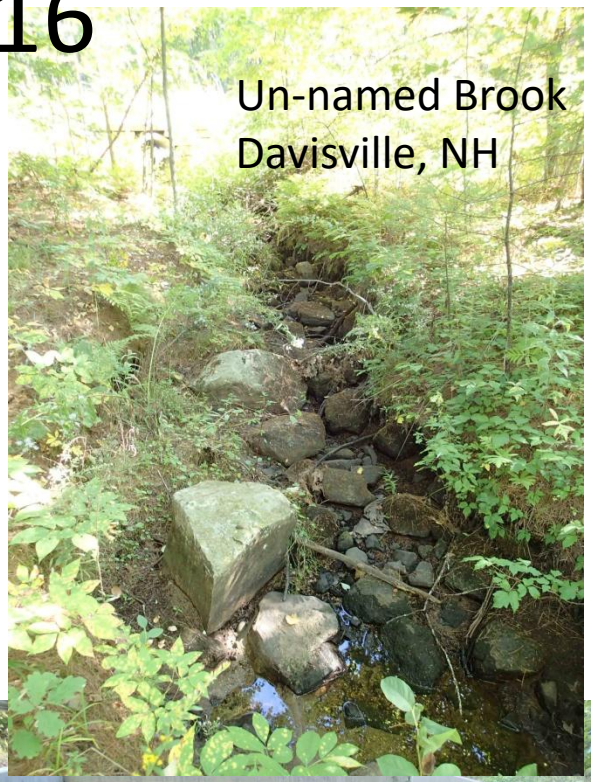
Daily discharge, cubic feet per second -- statistics for Sep 14 based on 53 years of record

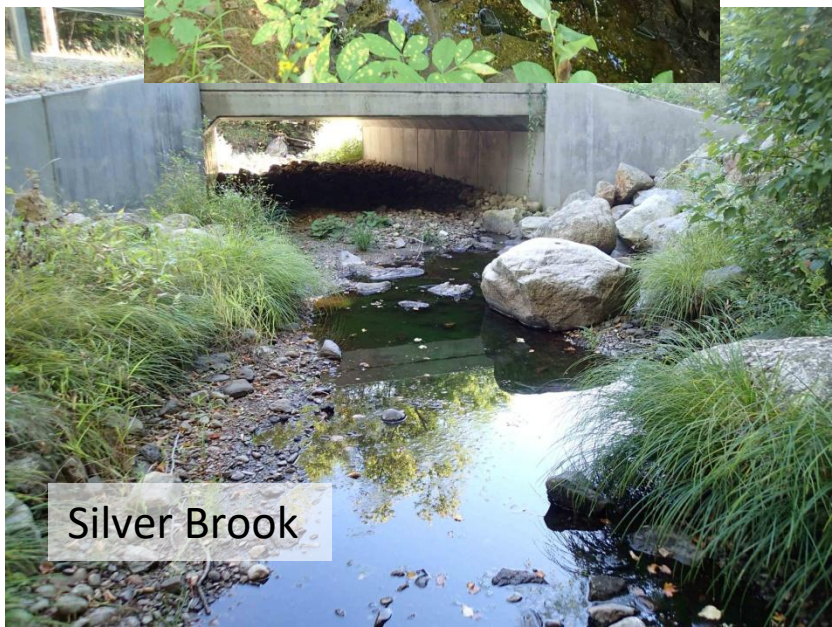
Min (2010)	Most Recent Instantaneous Value Sep 14	25th percen-tile	Median	75th percen-tile	Mean	Max (1960)
4.1	5.1	14	23	56	66	838

Stream Conditions, Fall 2016

French Brook, Warner

Un-named Brook
Davisville, NH





Stream Stewardship

Get Involved

- Stream Dwellers
  - Know your stream
  - Monitor
  - Conserve and Protect
- All
  - Volunteer (VRAP, Town Conservation, F&G, TU)
  - Learn about the Warner R. Watershed
  - Make your voice heard
  - Spend more time out enjoying local streams

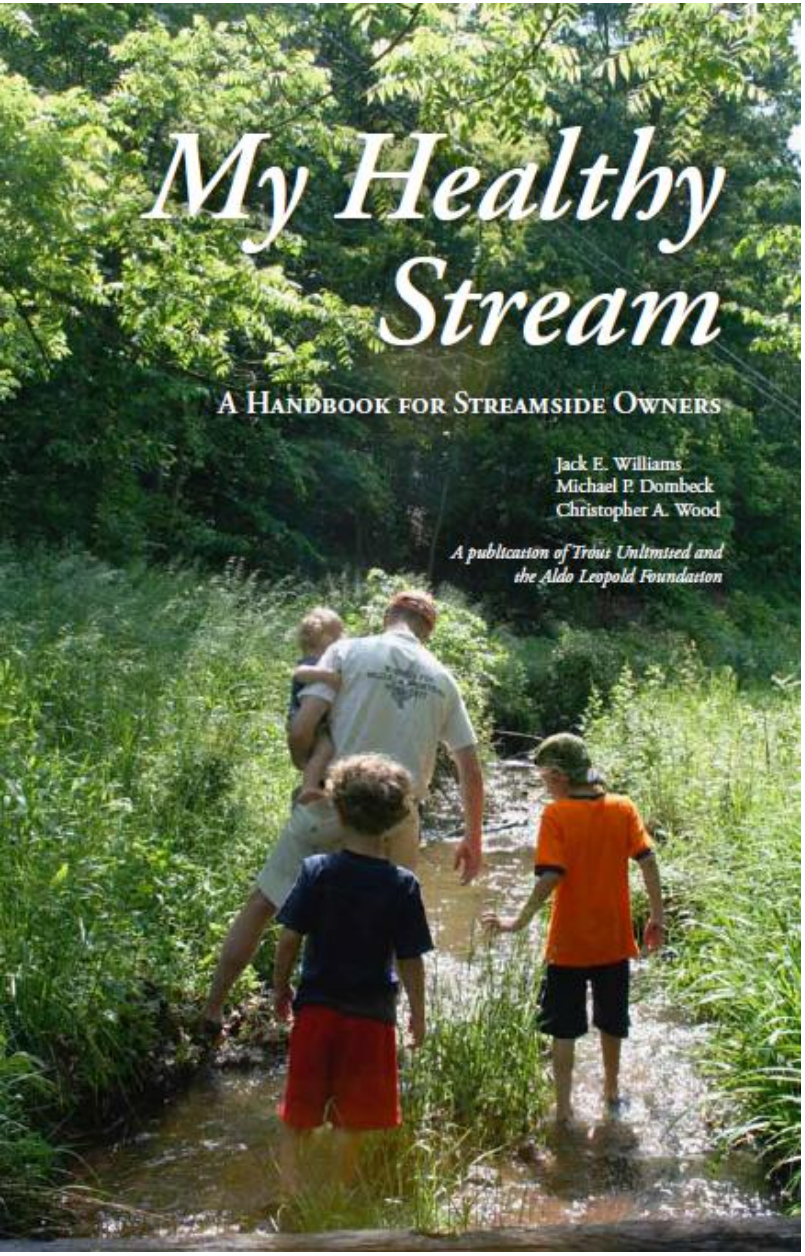
Warner River Nomination

Designation into NH Rivers Management Program

Status as of Feb, 2017:

- Completed the nomination document
- Held public meetings in the five river communities of Bradford, Warner, Sutton, Webster, and Hopkinton.
- Obtained letters of support from all select boards and Conservation Committees as well as many local community members and organizations
- Submittal to DES in May

Local Advisory Committee: Key to conserving and protecting Watershed as well as River.



Streams are the 'life blood' of the land, carrying the water upon which all life depends

Healthy streams require good stewards

This book **-** ***My Healthy Stream*** provides basic principles and practices towards good stewardship

http://www.tu.org/my-healthy-stream

TROUT UNLIMITED

ALDO LEOPOLD FOUNDATION


TROUT UNLIMITED
Basil W. Woods Jr. Chapter
FISH AND GAME
Partnering to Protect and Restore Coldwater Fish Communities

Habitat Requirements

- Stream Opportunists: Found from high gradient mountain streams to slow moving meadow brooks
- Well oxygenated, cold water (<72°F), with consistently high rates of groundwater recharge
- Variety of stream bed materials (boulders to sand)
- Instream wood helps enhance habitat and encourage floodplain engagement

Feeding

- Primarily feeds on all life stages of aquatic and terrestrial insects (e.g. stone fly, caddis fly, may fly, beetles, grasshoppers)
- Smaller trout will feed on zooplankton
- Other fish make up a small part of the diet

Spawning

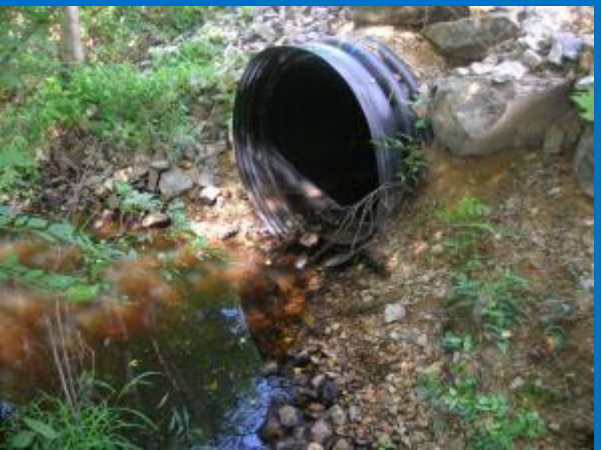
- Typically begins in October
- Brook trout living in rivers/streams will seek cooler, upstream areas
- Adults living in lakes/ponds will migrate into tributaries to spawn
- Females dig small egg pits “redds” in small gravel substrate
- The eggs and milt are simultaneously deposited in the redd and immediately covered
- Eggs incubate and hatch in early spring

Local Impacts to Wild Brook Trout Habitat

McQuesten Brook Clean Up 6/6/16

Loss of Riparian Areas

Barriers



Excessive Sedimentation and Erosion

Impervious Surfaces

Background- Justification for Targeted Wild Brook Trout Surveys

Only 9% of the habitat in the original range of wild brook trout (Georgia to Maine) is presumed to be intact

Fish Species of Greatest Conservation need in the NH Wildlife Action Plan

Keystone species for the EPA for an indicator of coldwater biotic communities

Presence/Absence indicates condition of aquatic habitats

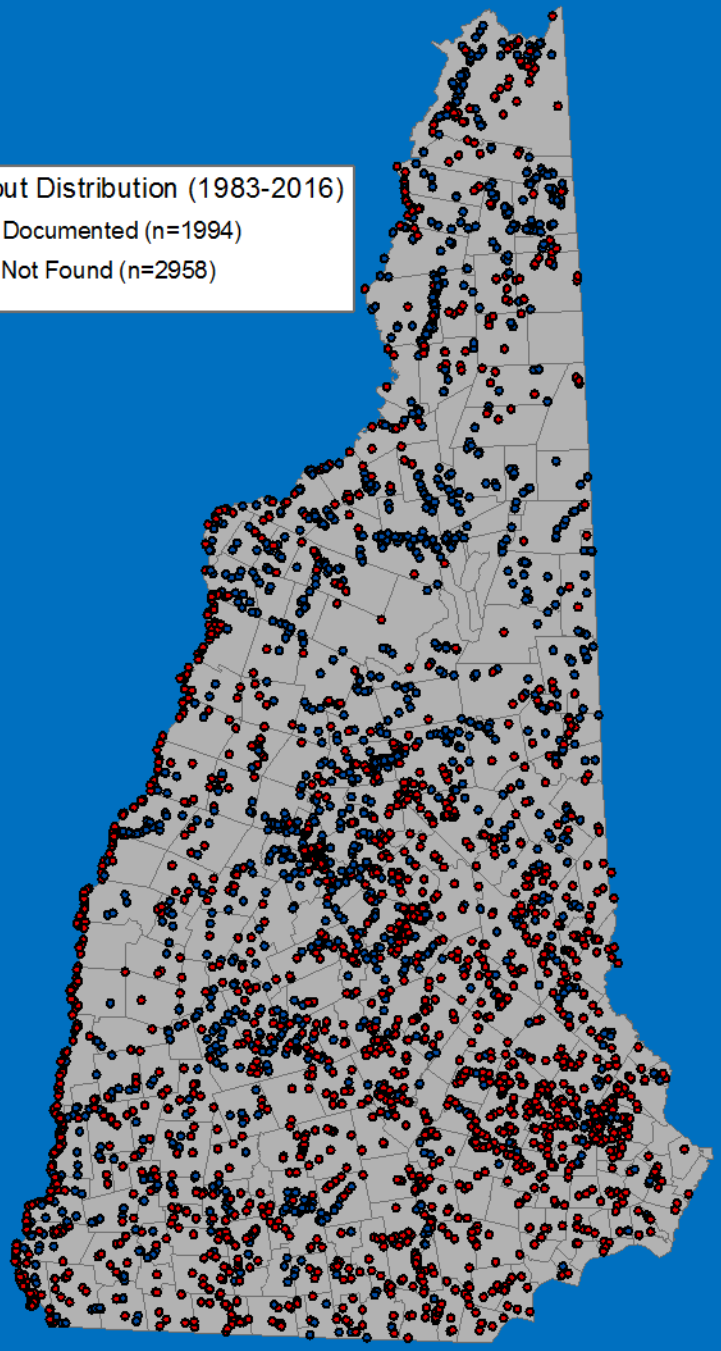
Popular species for anglers

<u>Efforts to restore and protect habitat are in concert with goals to restore and protect water quality, lands, habitat connectivity</u>

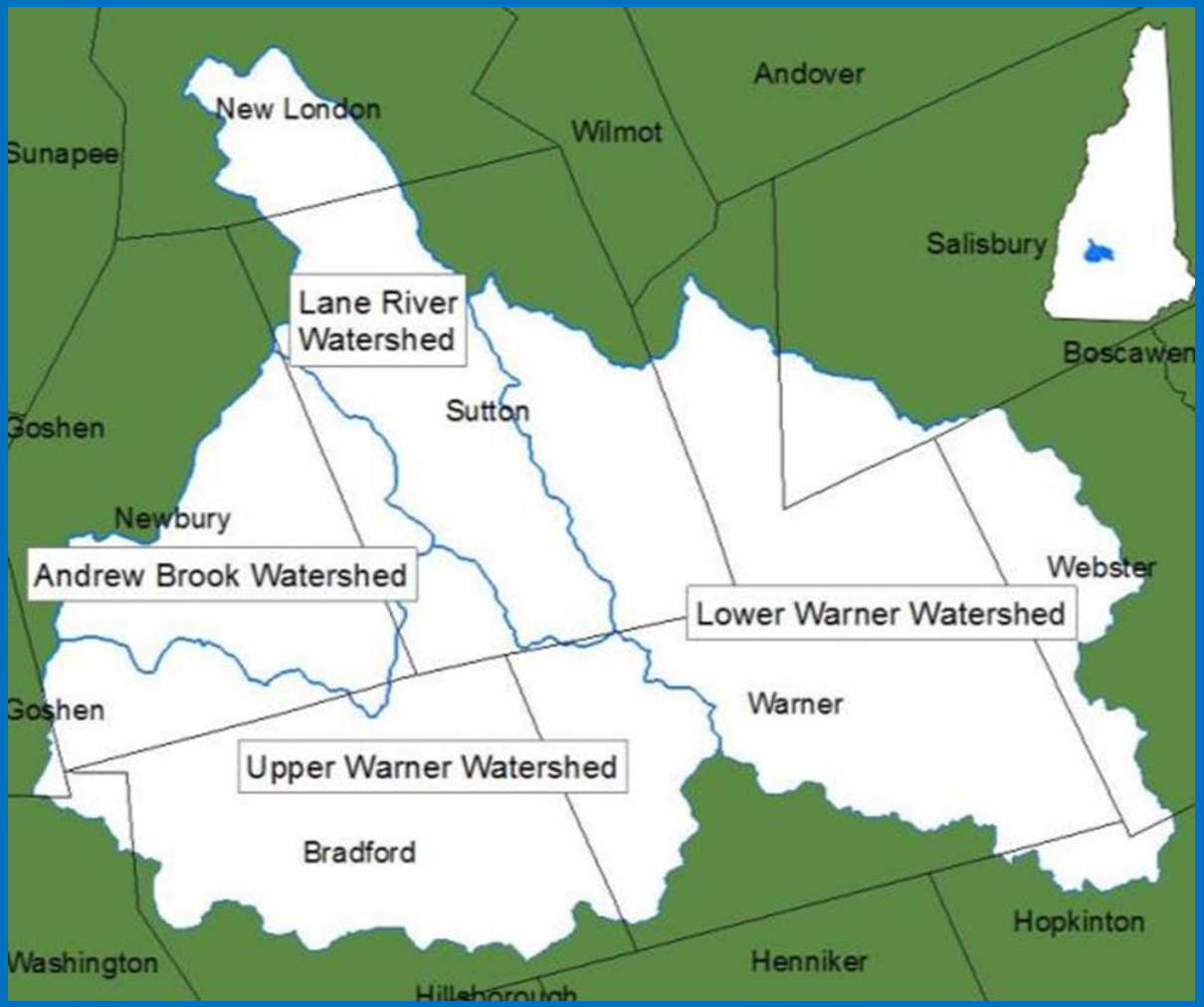
Background- Project Area Selection

Determining where to focus efforts

- Areas with suspected presence of fish species of greatest conservation need
- Areas with limited information
- Areas with strong local interest



The Warner River Watershed Conservation Project

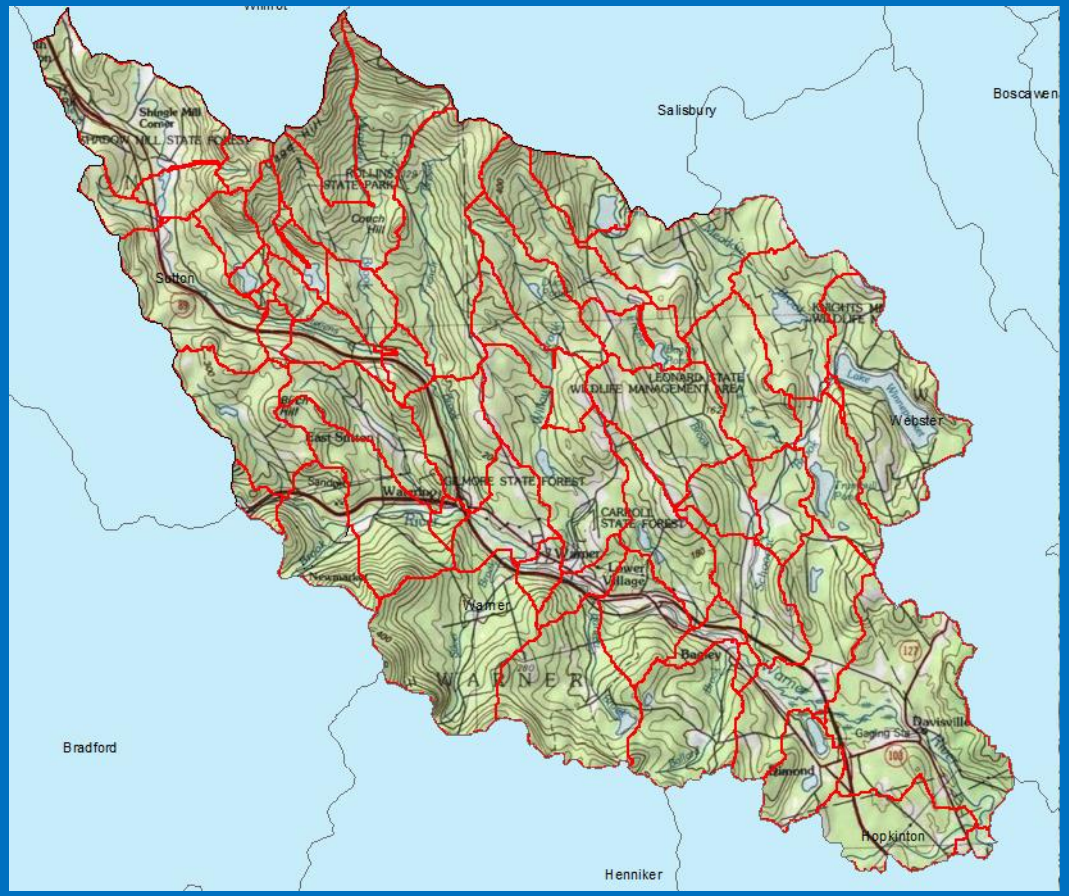


Began in 2012 with representatives from Bails Woods Trout Unlimited, NH Fish and Game and the Warner Conservation Commission

Towns: Bradford, Goshen, Hopkinton, New London, Newbury, Salisbury, Sutton, Warner, Washington, Webster

Project Goal: Ensure the sustainability of wild brook trout throughout the watershed by fostering local landowner and citizen stewardship by implementing sound conservation measures such as habitat protection, restoration and enhancement projects.

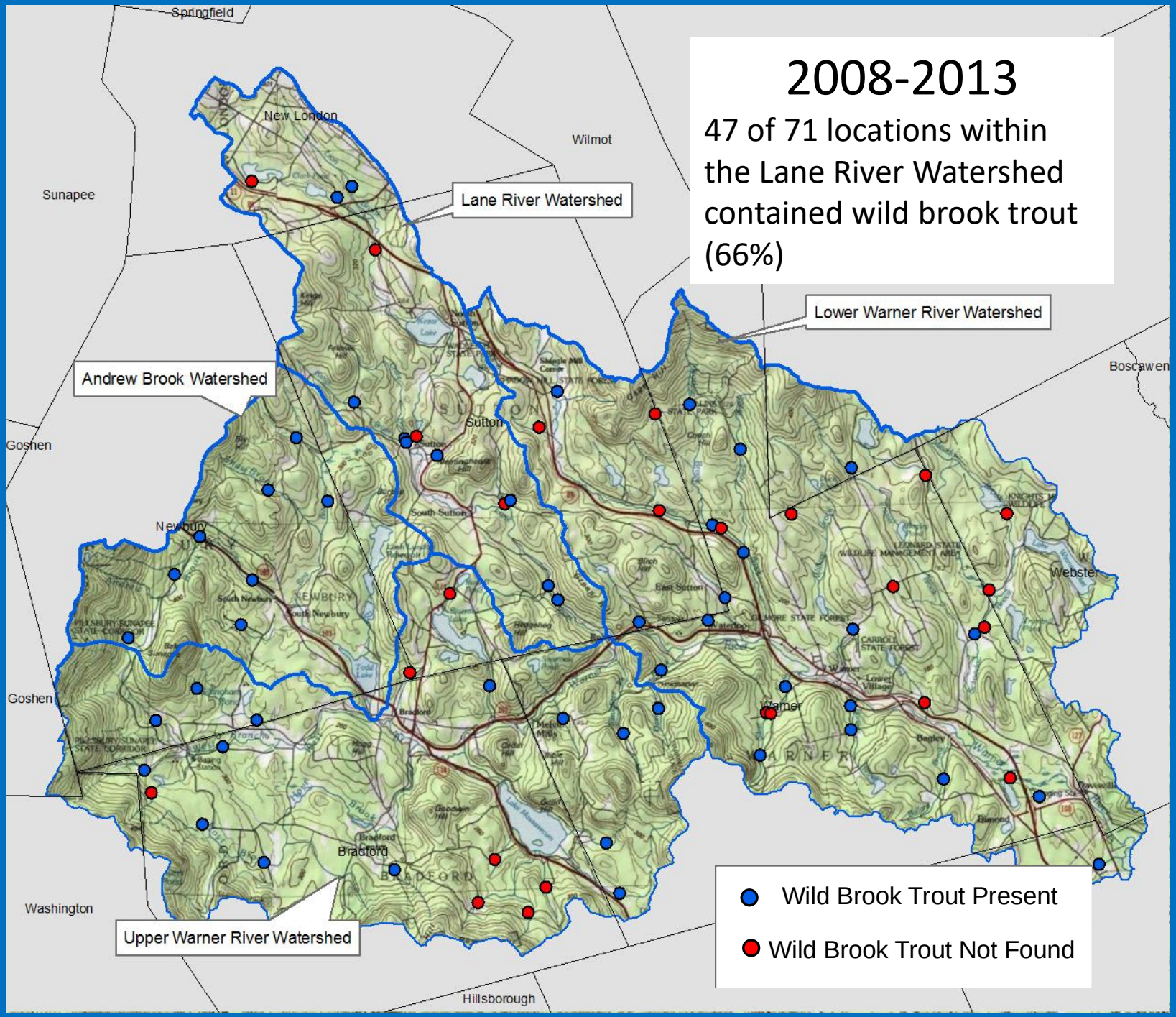
NH Fish and Game Watershed Assessments- Fish species distribution and habitat condition



Watershed sampling protocol:

- Electrofish 100 m in approximate midpoint of every USGS catchment
- Collect aquatic macroinvertebrate samples (NHDES VBAP)
- Comment on observed land use impacts
- Summarize data and promote information to local conservation groups (reports and posters)

Local Involvement: Reduce need for NH Fish and Game staff
Increase the number of locations that can be surveyed
Familiar with land use practices (current/historical)
<u>Develop a greater sense of environmental stewardship/project ownership</u>


2008-2013
47 of 71 locations within the Lane River Watershed contained wild brook trout (66%)
Lane River Watershed
Lower Warner River Watershed
Andrew Brook Watershed
Upper Warner River Watershed
Wild Brook Trout Present
Wild Brook Trout Not Found
Springfield
New London
Wilmot
Sunapee
Goshen
Newbury
Sutton
Bradford
Warner
Webster
Boscawen
Washington
Hillsborough

Water Quality Scores (VBAP) and Wild Brook Trout Presence

Lower Warner River (2012) and Lane River Watersheds (2013)

Excellent Water Quality (0-3.5)

23 survey locations

Wild Brook Trout found at 16 sites (70%)

Good Water Quality (>3.5-4.8)

16 survey locations

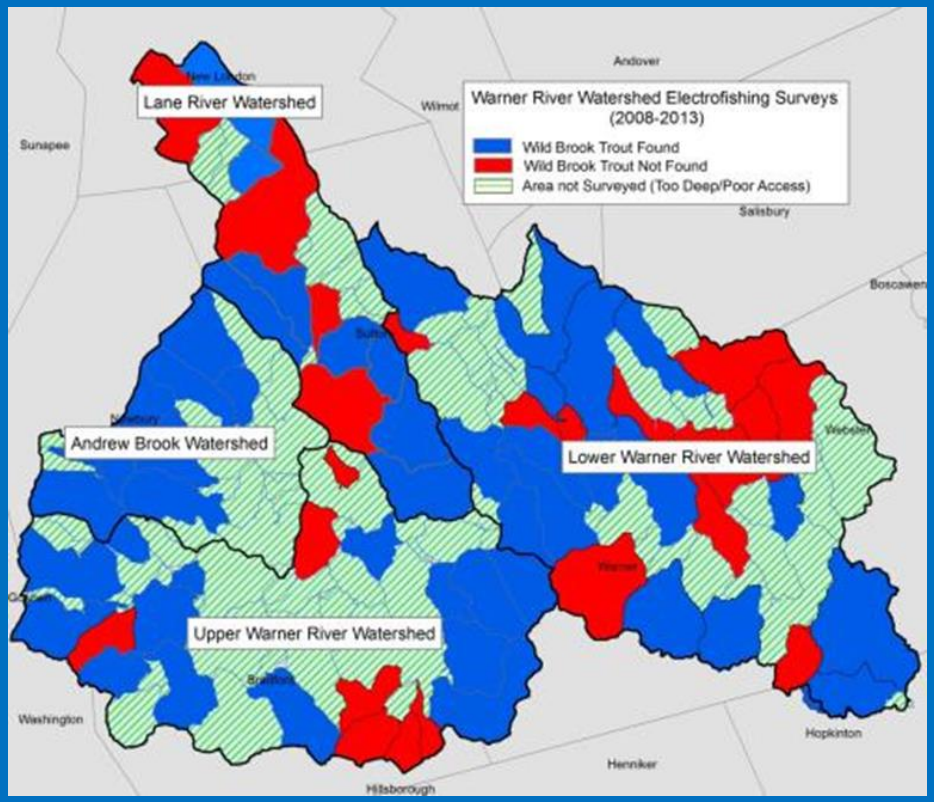
Wild Brook Trout found at 6 sites (38%)

Fairly Poor Water Quality (>4.8)

2 survey locations

Wild Brook Trout found at 0 sites (0%)

Completed Baseline Watershed Assessments- Fish species distribution and habitat condition



Once baseline fish surveys have been completed, the project partners wanted to remain active in the project area.

Projects include:

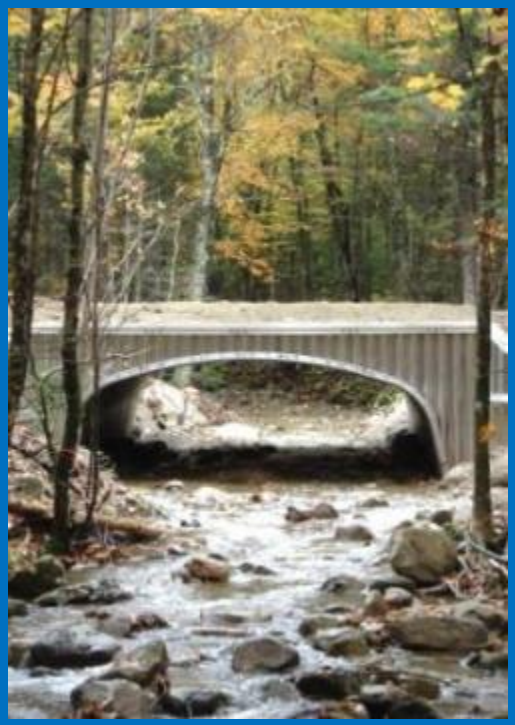
- Public outreach events (farmers markets, old home days, fairs)
- Fish/Aquatic macroinvertebrate/Water Quality (VRAP) index sites
- Warner River Nomination- watershed scope planning
- Landowner engagement (site visits and reports to landowners)
- Road-stream crossing assessments
- Flood Resiliency Workshops

The Problems Associated with Undersized Stream Crossings

- Block fish migration
- Reduce opportunities to (re)colonize areas
- Alter natural erosion and sedimentation rates of a stream
- Amplify natural high and low flow events
- More susceptible to failure and washout

Features of a good stream crossing

- Natural streambed composition in structure
- No change in flow rate and depth
- Appropriately sized to accommodate a variety of flows



- Lower maintenance/often greater longevity
- More stable-more suited to greater flows
- More viable populations of aquatic species

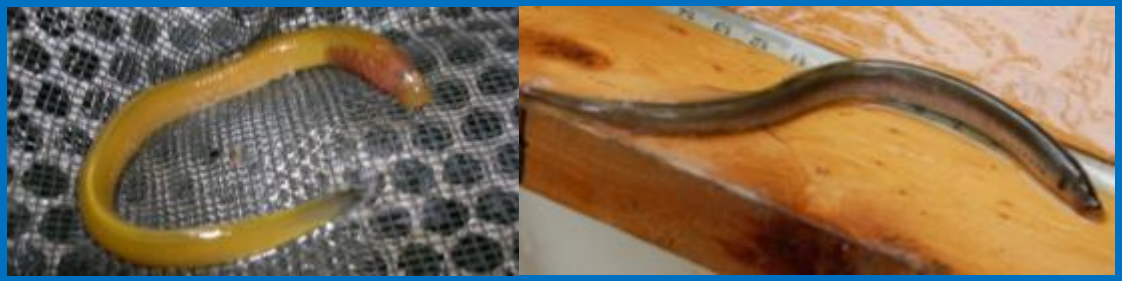
Background

Fish are migratory

Close to half of the fish species of greatest conservation need (NH Wildlife Action Plan) utilize river/stream corridors to reach spawning areas

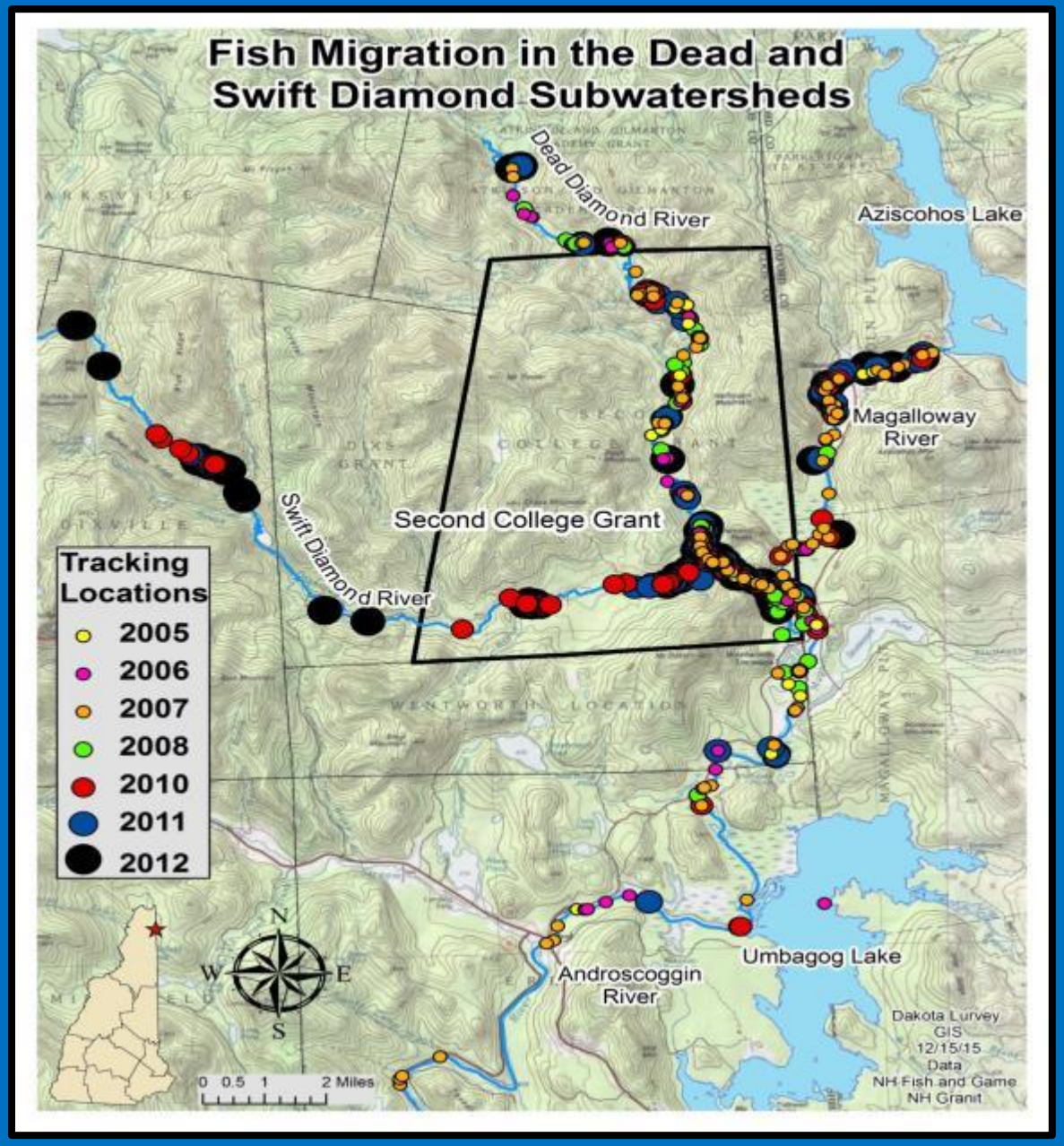
- Alewife
- American Brook Lamprey
- American Eel
- American Shad
- Blueback Herring
- Brook Trout
- Rainbow Smelt
- Sea Lamprey

Rainbow Smelt Tributary Spawning Run



American Brook Lamprey (Juvenile and Adult) Photos Courtesy of Sean Smith

Hydrologic connectivity allows fish to migrate and disperse



One wild Brook Trout traveled over 70 miles in a single year!

Connected river corridors offer access to a variety of aquatic habitats

- Thermal refuge
- Spawning
- Overwintering
- Foraging

Populations are healthier and more sustainable

Wild brook trout in the Dead Diamond System

"Trouts there be good store in every brook, ordinarily 2 and 20 inches."
-John Josselyn, New England Rarities Discovered (1672)

The large size of wild Brook Trout in the Dead Diamond system are now a rarity for New Hampshire

Average length of wild brook trout in NH
= 3.75 inches (1983-2015)

The progression after baseline fish surveys:
Road-Stream Crossing Assessments- volunteer driven effort

Crossing assessments help explain:

Watershed fragmentation

Impacts to aquatic habitat

Structure vulnerability

General condition of structure

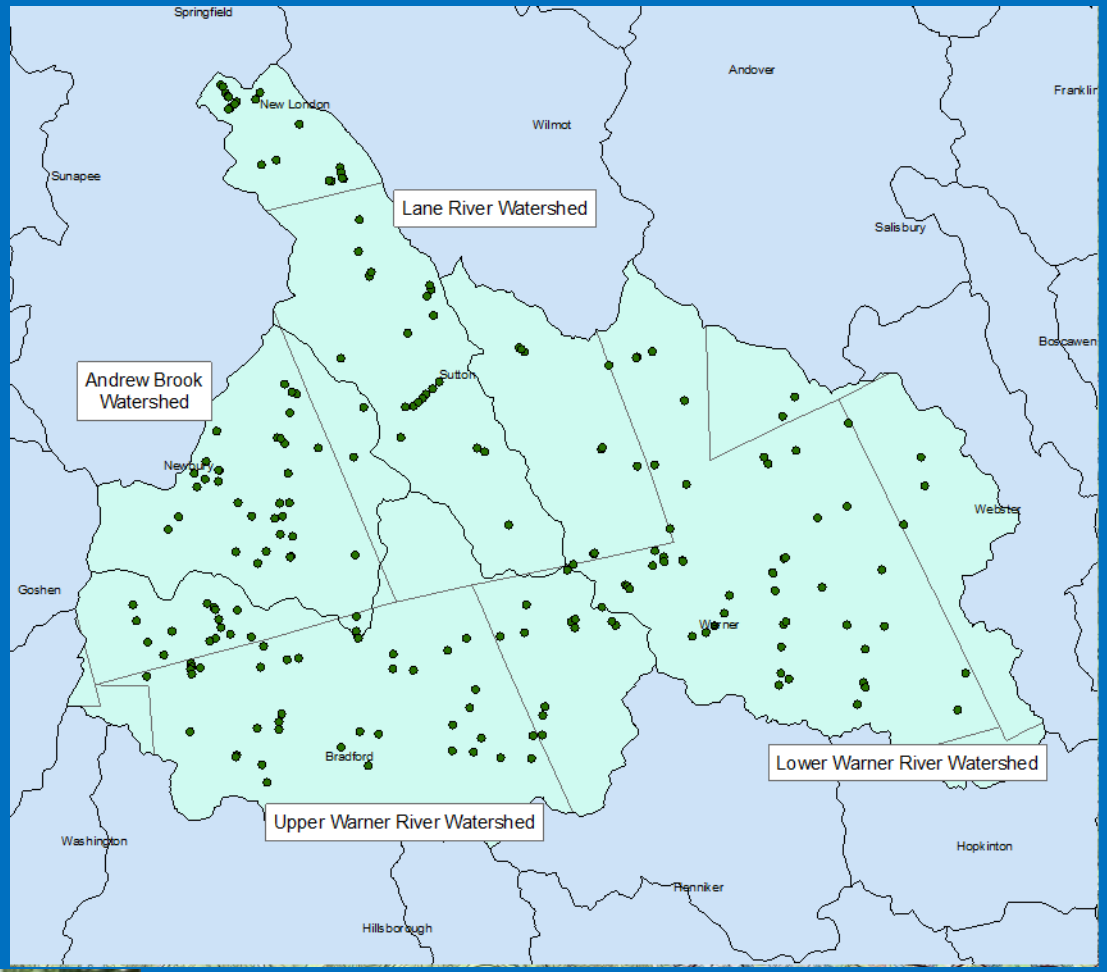
2014-2016 Collective Results

2014-2015 Focus Watersheds:
Lower Warner River
Lane River

2016:
Focus on the Andrew Brook and Upper Warner River watersheds

208 crossings evaluated

Information for over 26,000 variables collected



2014-2016 Collective Results

Warner River Watershed:

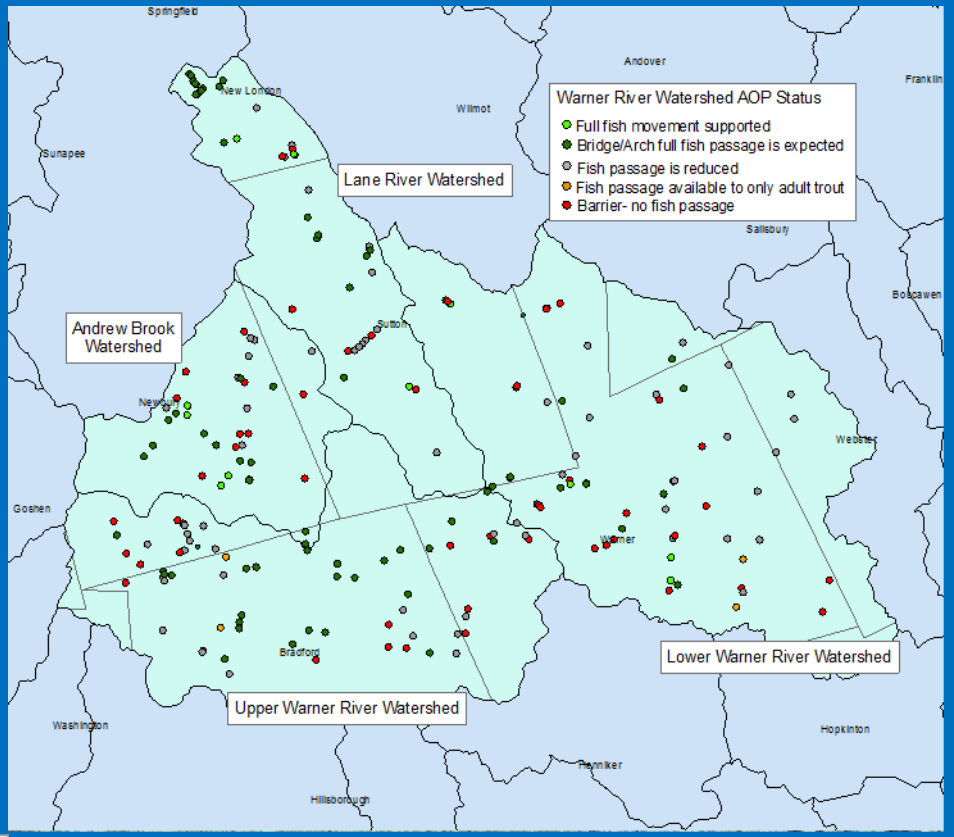
Structure Type:	Arch Structures:	9
	Bridges:	49
	Culverts:	149
	Ford:	1
Condition:	Collapsing:	2.6%
	Eroding:	6.6%
	New:	10.6%
	Old:	58.3%
	Rusted:	21.9%

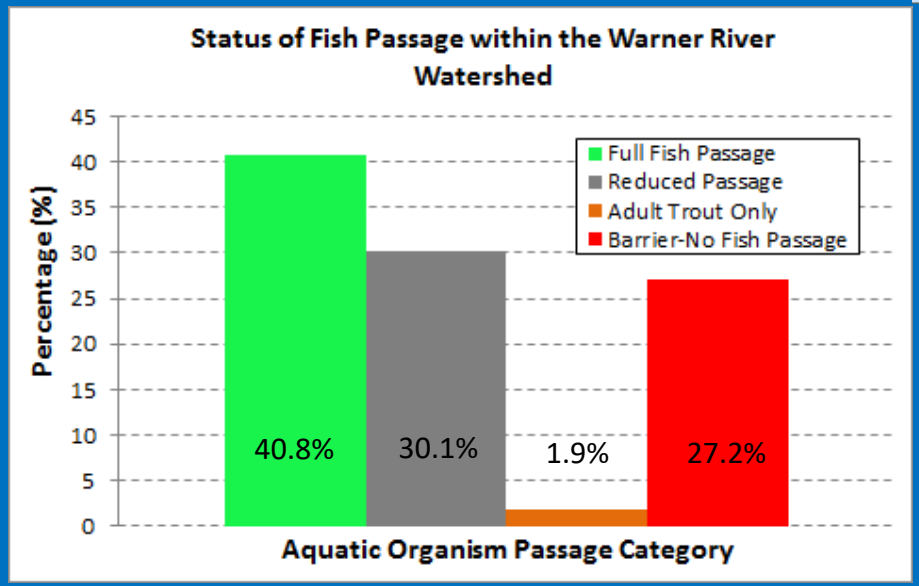
Average culvert width is only 59% of the bankfull width
A minimum width of 120% of the bankfull width is recommended

2014-2016 Collective Results
Warner River Watershed

Aquatic Organism Passage Screening Tool

Provides the ability to help prioritize crossing replacement opportunities





Variables Include:

Outlet drop
Presence of pool
Pool entrance depth
Water depth in culvert
Substrate through structure
Obstructions in structure

Determining Stream Crossing Resiliency and Vulnerability

Stream Works-Trout Unlimited Culvert Model V. 1

This model uses hydraulic (crossing characteristics) and hydrologic (flow estimates) inputs to predict the condition of a crossing at 2, 10, 25, 50, and 100 year flow events

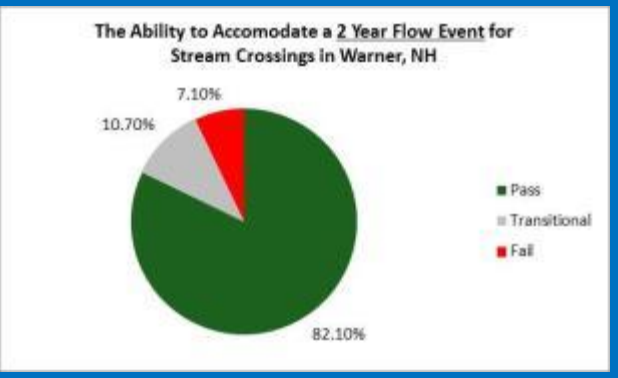
Model Outputs

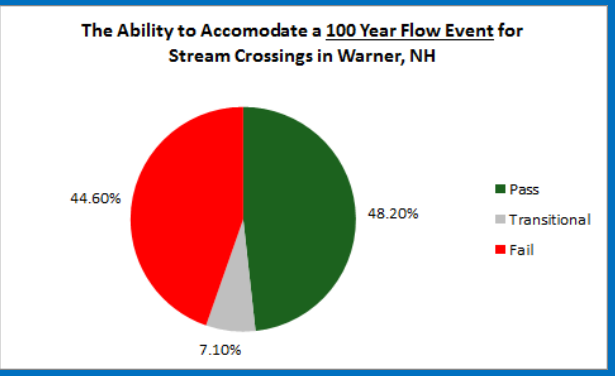
Results determine the level of vulnerability at specific flow events

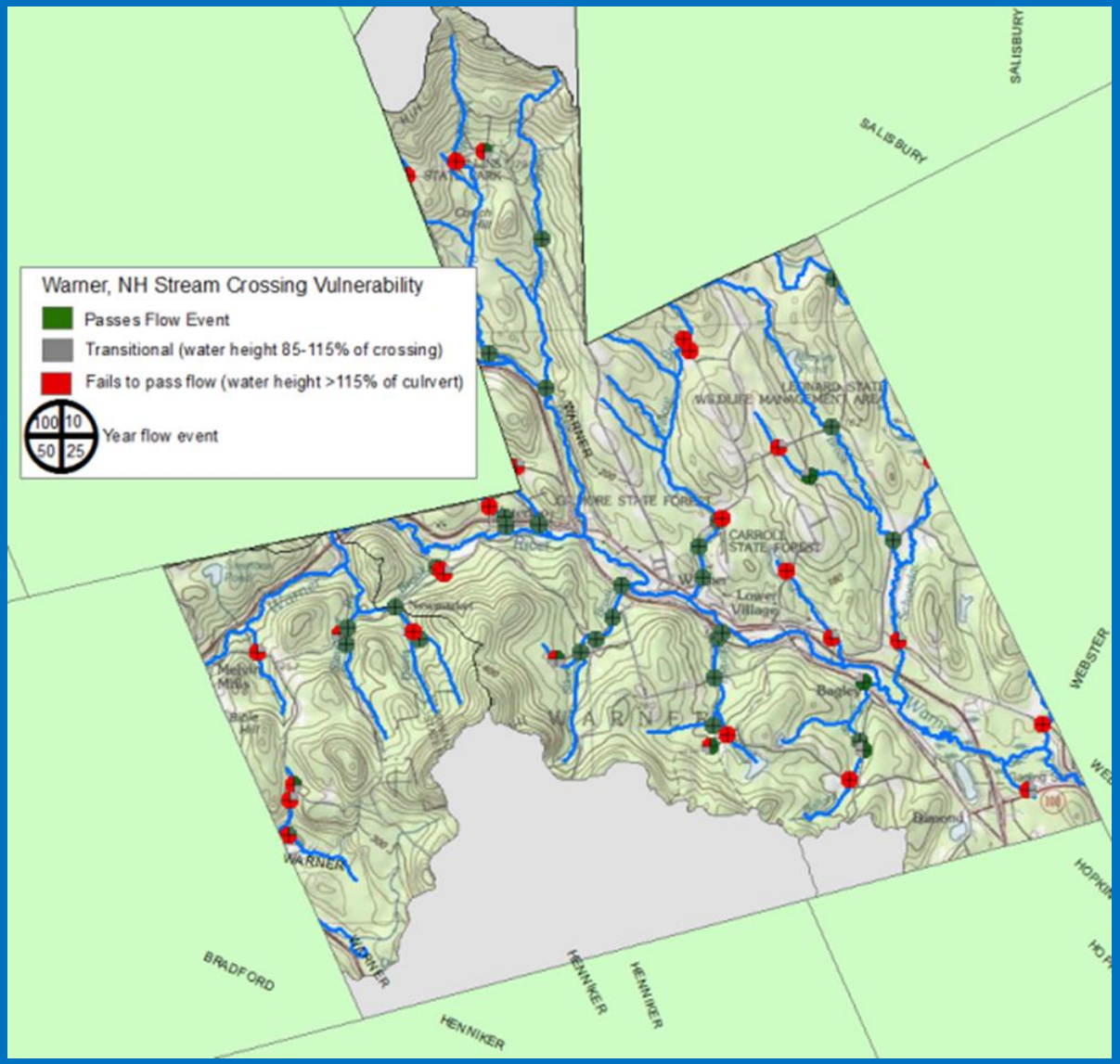
Ratio of headwater depth and interior culvert height:

Pass < 85%
Transitional 85-115%
Fail: >115%

Model Outputs: Warner, NH







Flood Resiliency Workshop in the Warner River Watershed

Pooling resources is often necessary to offset the cost of crossing replacement projects

We plan to host workshops to prioritize projects with:

- Town road agents
- Selectboard members
- Emergency Responders
- Town Conservation Commissions
- Regional Planning Commissions
- NH DOT

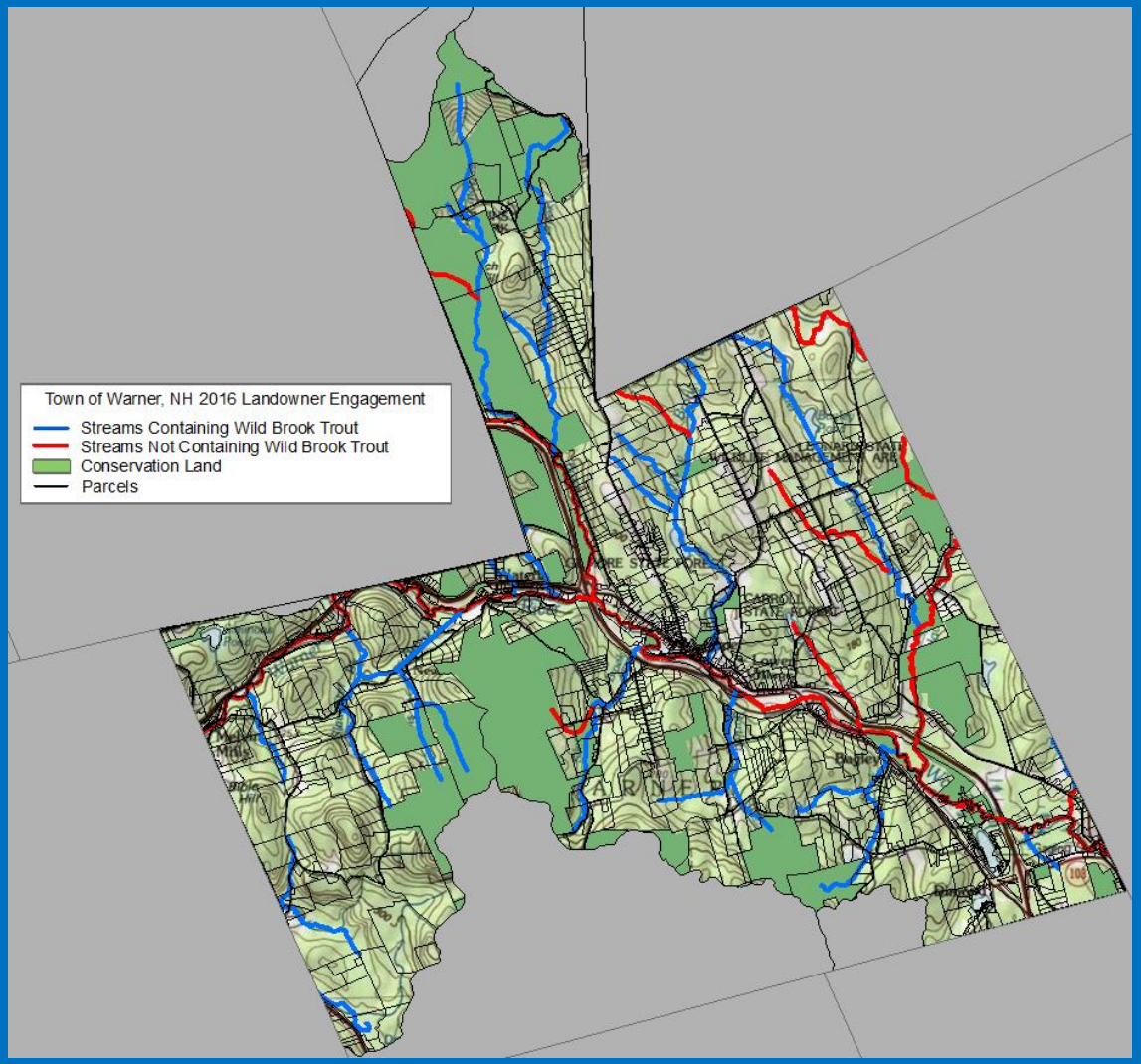
Different objectives may result in the same shared results

Town of Warner Landowner Engagement Project

Fish data and town tax maps were used to identify those who own property along wild brook trout streams in Warner

170 landowners received letters

Landowners were invited to a presentation and encouraged to schedule a site visit



Thanks to Basil W. Woods, Jr. Chapter and National Trout Unlimited for allocating funds to make this effort possible!

Town of Warner Landowner Engagement Project

12 landowners participated in site visits

A full survey was conducted and the benefits of incorporating aquatic ecosystem needs in land use decisions will be discussed

Summary report with recommendations:

- Riparian restoration
- Instream wood additions
- Easements

Expansion to at least Sutton in 2017

Providing Tools and Information

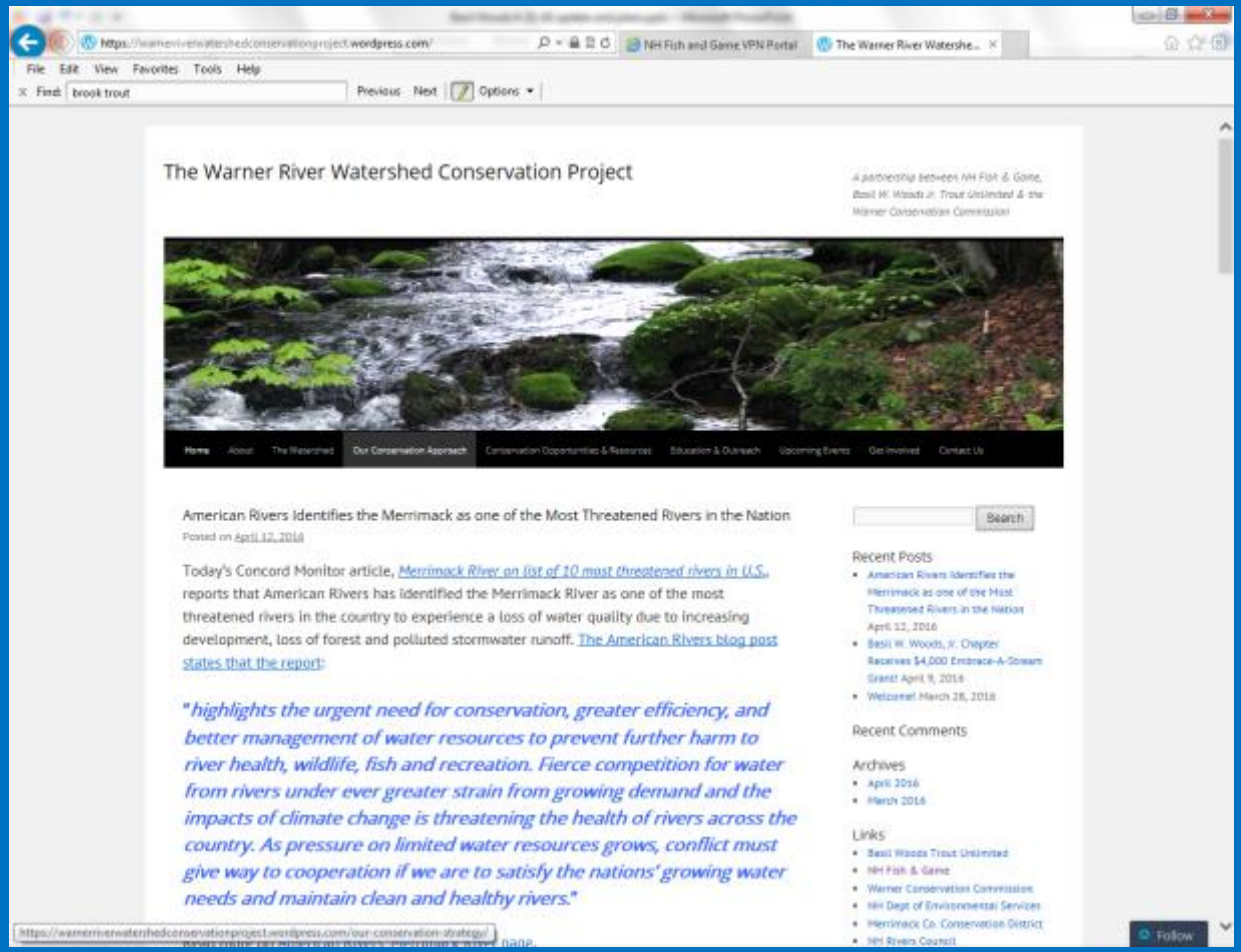
Warner Project Blog

Project Announcements

Project Calendar

Resources section

Fisheries/Macroinvertebrate summary report



Links to the project blog can be found at the Basil Woods and NH Fish and Game websites

Some Anticipated Events and Projects-2017

Landowner site visits Sutton (and potentially surrounding towns)

VRAP, Macroinvertebrate, Electrofishing

Continue to support Warner River Designation (RMPP)

Informational Displays

Wood addition project

Streambed restoration project

Follow the project blog for announcements

Thank You

Ben Nugent

NH Fish and Game Department, Region 2

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(603) 744-5470