
What's Swimming?
Protecting New Hampshire's Aquatic Habitats and the Species that Depend on Them

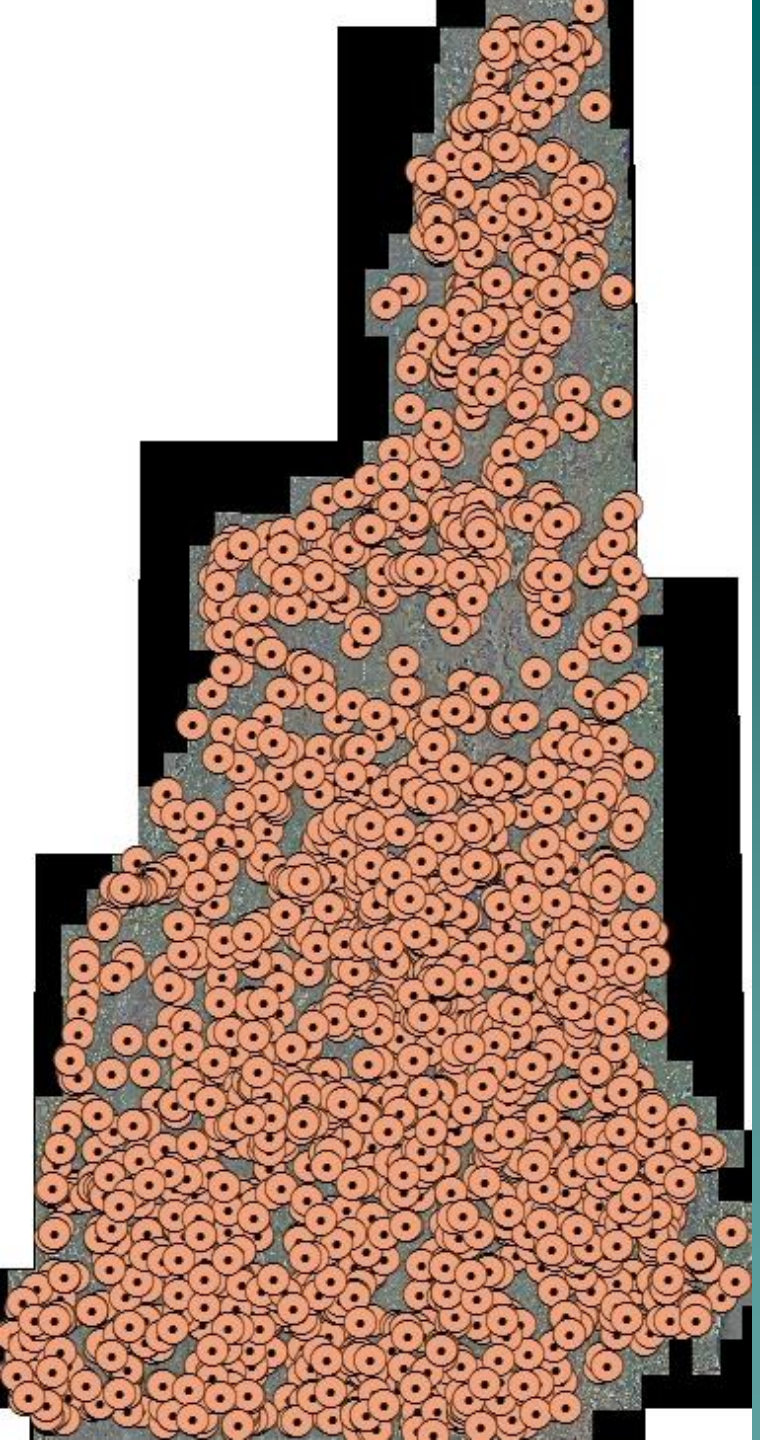
Goals for this presentation:

- Introduce New Hampshire's fish species of conservation concern and the habitats where they live.
- Discuss the land protection strategies that will be most beneficial for protecting aquatic species and habitats.
- Get some feedback on how to best communicate priorities for aquatic species and habitat protection.

The back story . . .

The 2005 Wildlife Action Plan was the first attempt to evaluate the status of fish species in New Hampshire since the early 1980's.

Prior to the survey work in the 80's, the last comprehensive survey of fish species in New Hampshire was done in the late 1930's.



Fish Survey Database

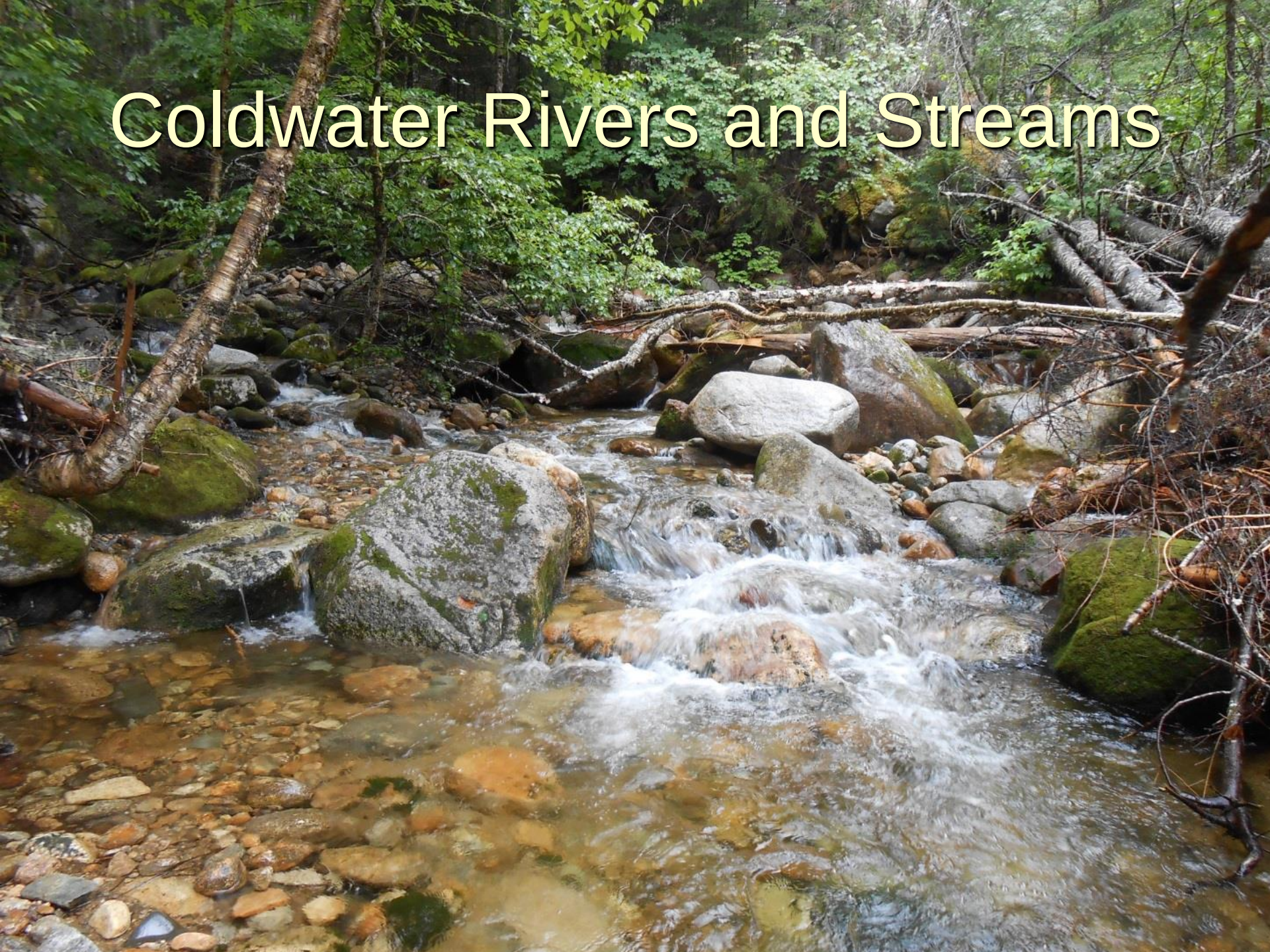
There are over 3,600 records in the NHFG Fish Survey Database.

Over 2,600 surveys have been conducted since 2005.

NH Wildlife Action Plan Fish Species List

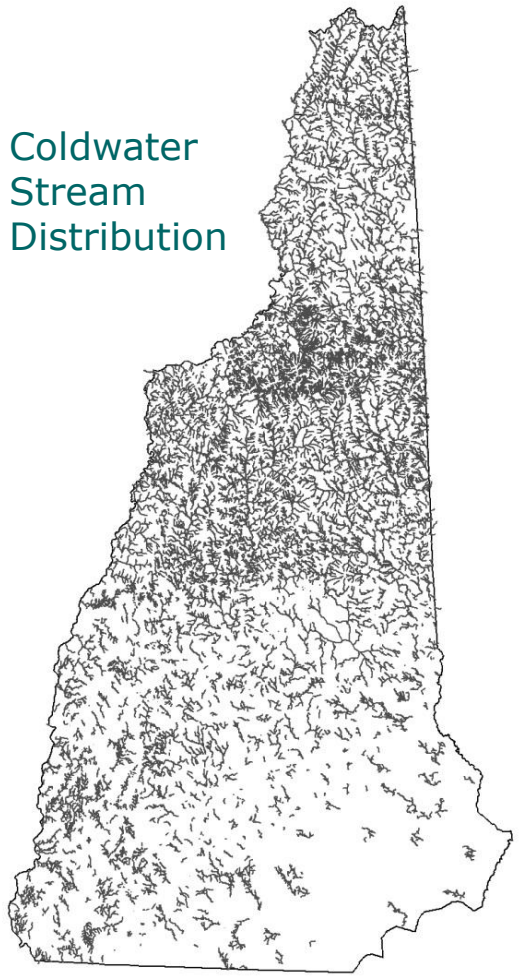
(Revised 2015)

- Alewife
- American Brook Lamprey (Endangered)
- American Eel
- American Shad
- Atlantic Salmon (extirpated)
- Atlantic Sturgeon
- Banded Sunfish
- Blueback Herring
- Bridle Shiner (Threatened)
- Brook Trout
- Burbot
- Finescale Dace
- Lake Trout
- Lake Whitefish
- Sunapee Trout (extirpated)
- Northern Redbelly Dace
- Rainbow Smelt
- Redfin Pickerel
- Round Whitefish
- Sea Lamprey
- Shortnose Sturgeon
- Slimy Sculpin (removed)
- Swamp Darter
- Tessellated Darter (removed)

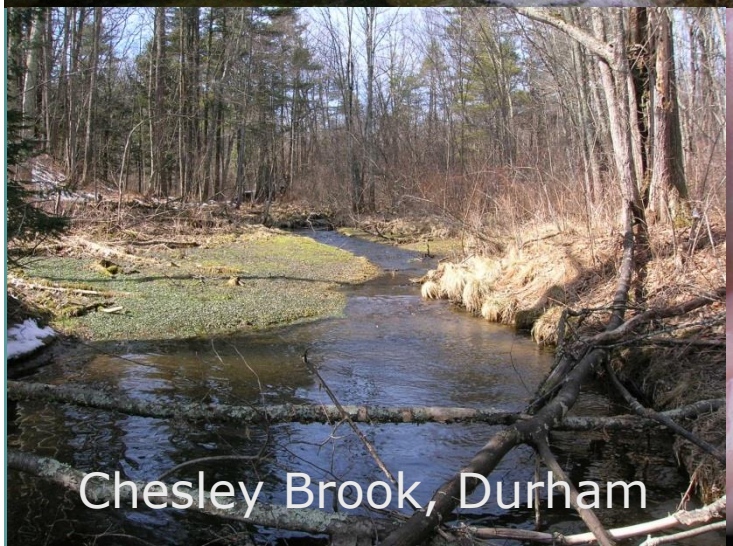

Coldwater Rivers and Streams


Longnose sucker

Coldwater
Stream
Distribution

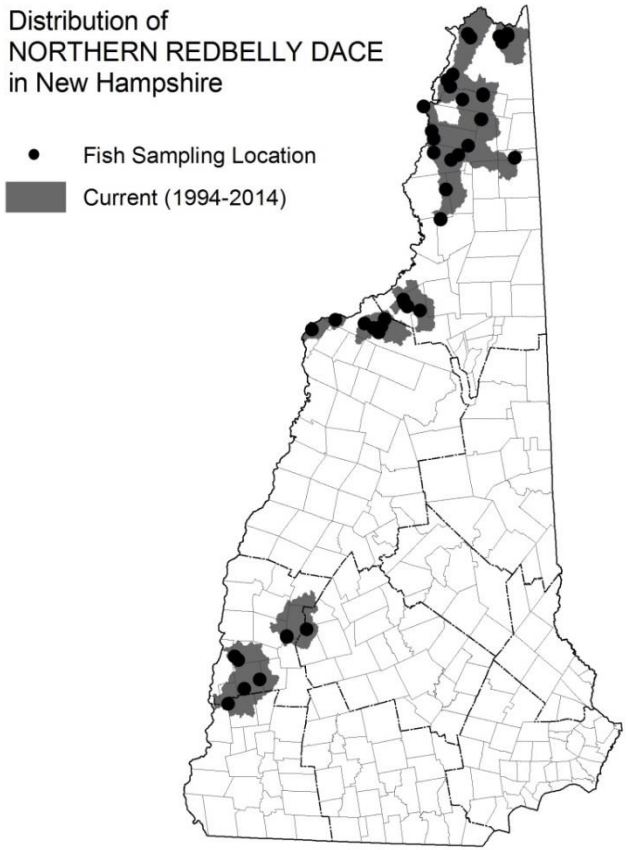


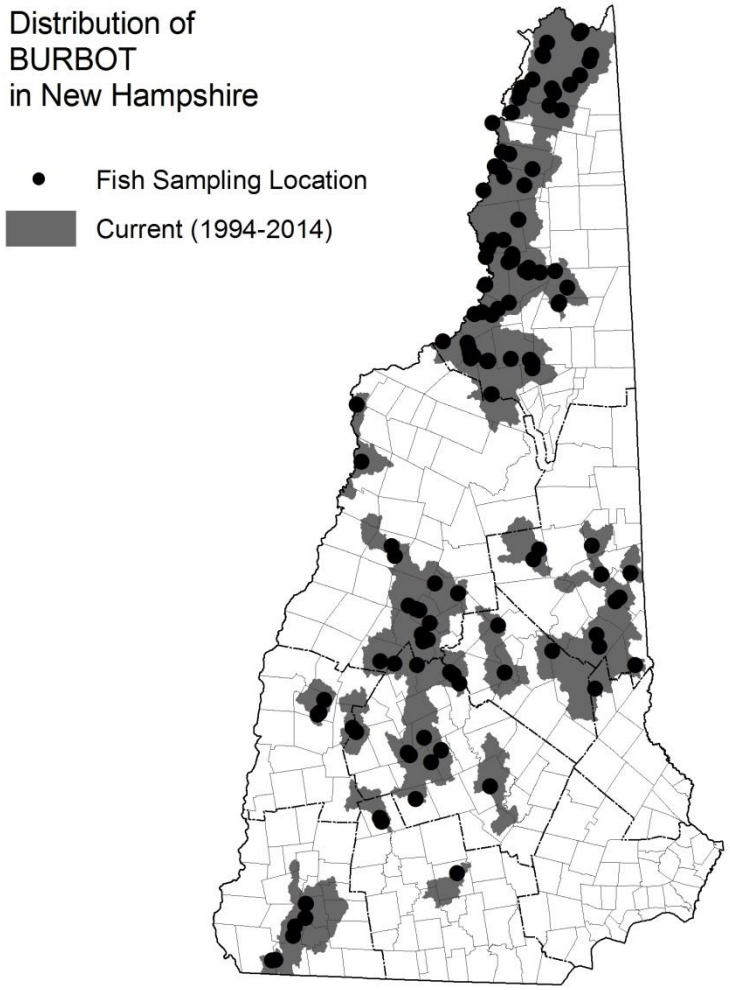

Nash Stream, Odell


Chesley Brook, Durham

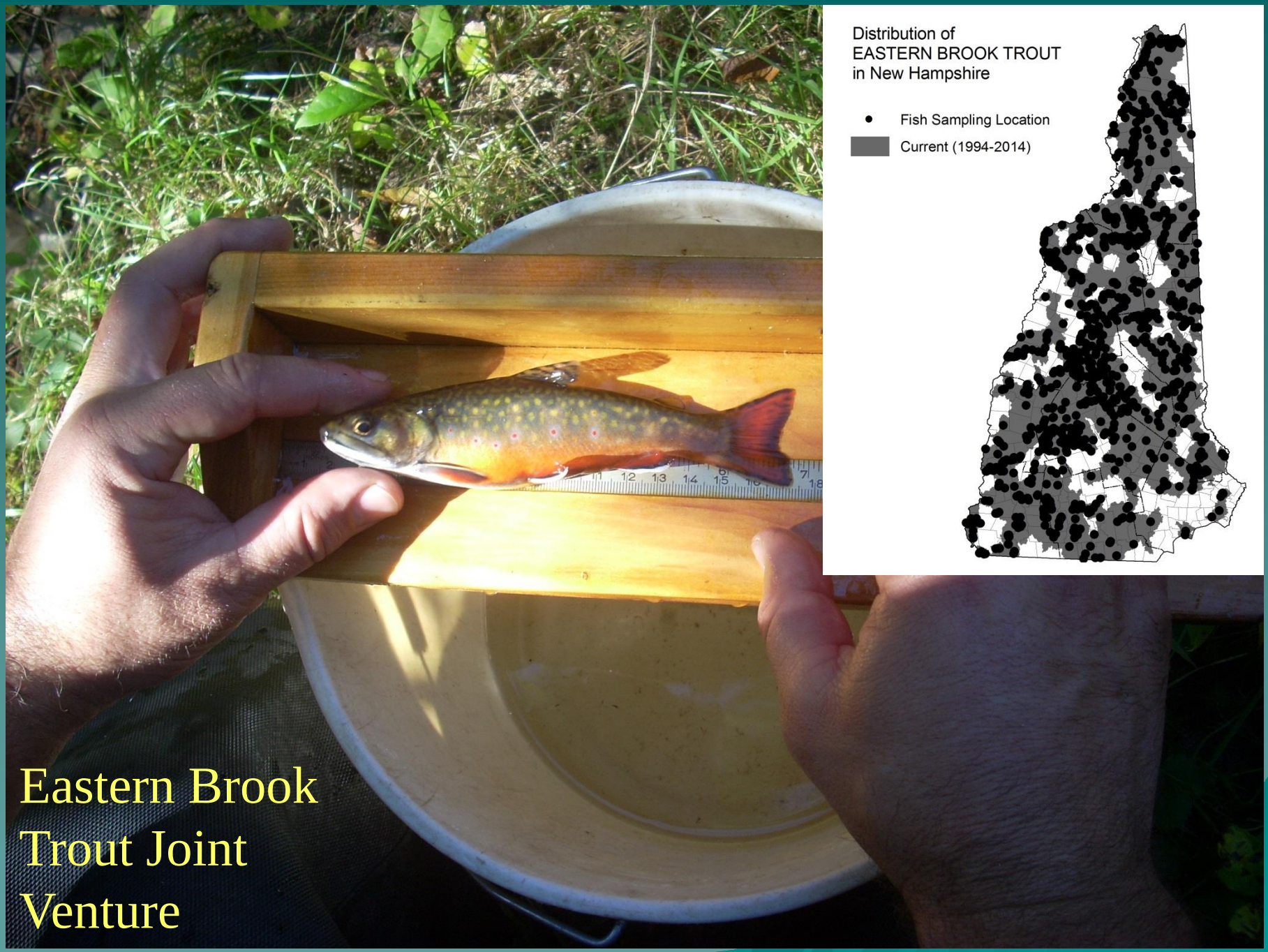

Slimy sculpin

Coldwater Minnows

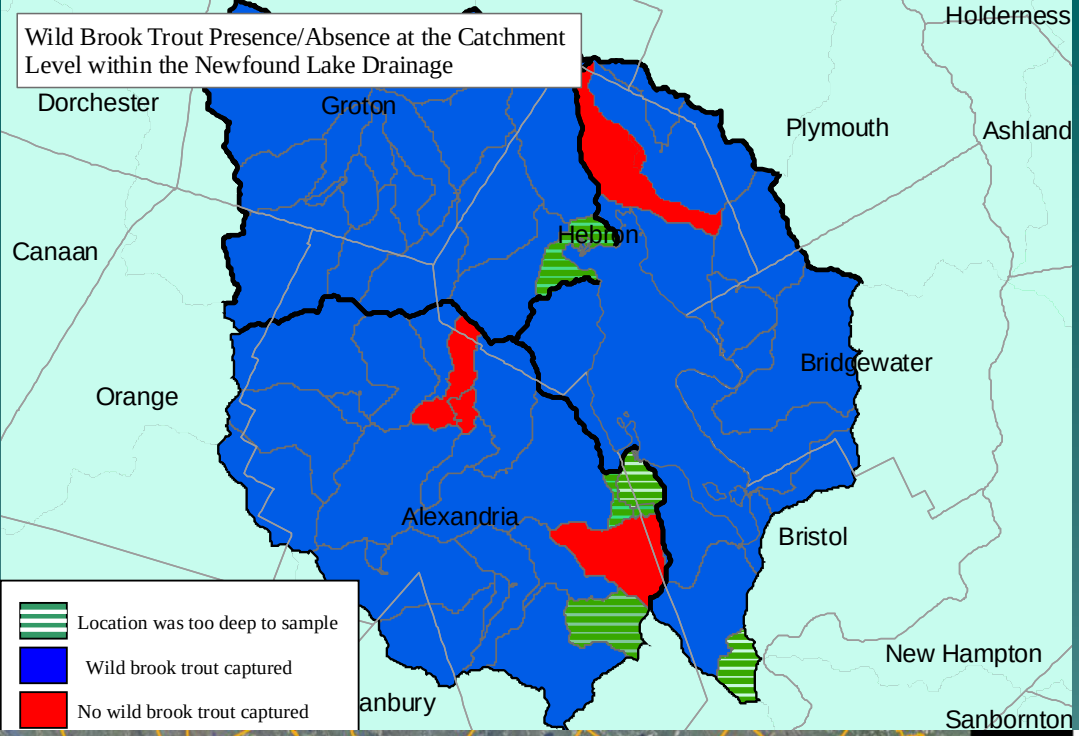




Burbot inhabit both riverine habitats and coldwater lakes.

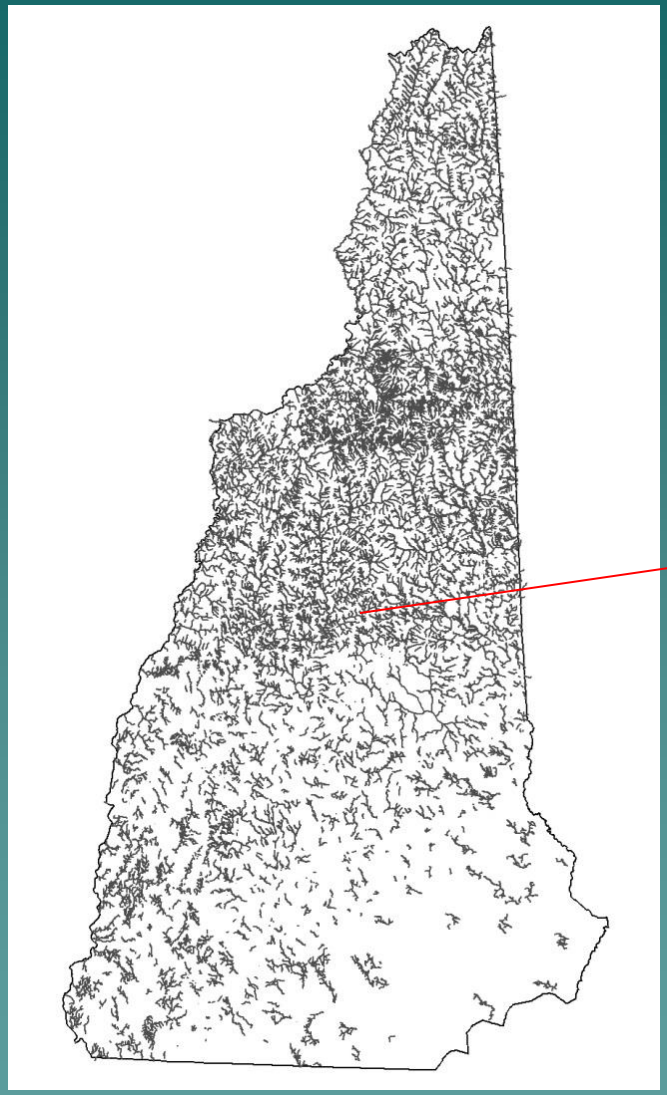


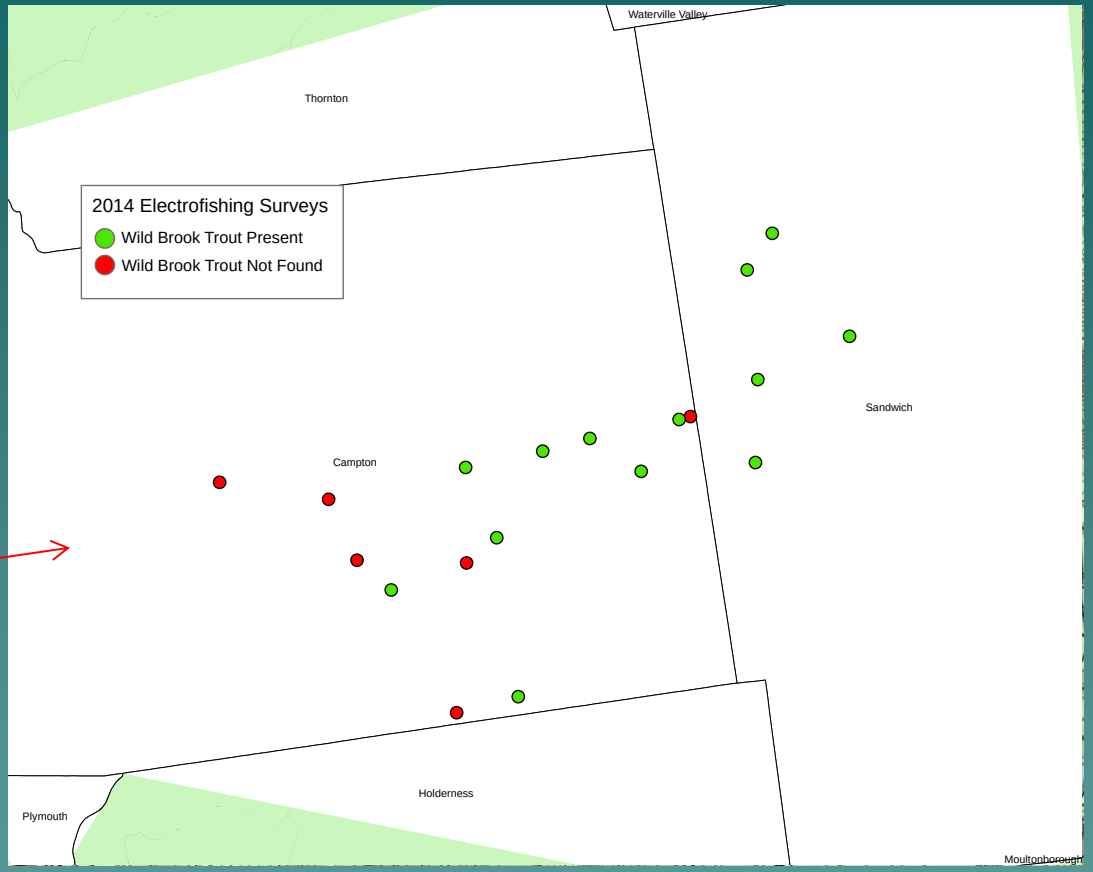
Eastern Brook Trout Joint Venture



Coldwater stream habitat protection can be accomplished at many scales.

Beebe River Watershed





In 2014, the Conservation Fund (TCF) purchased over 5,000 acres adjacent to the White Mountain National Forest encompassing over 50% of the Beebe River watershed. In 2016 the project was awarded a Forest Legacy Grant from the USDA Forest Service.

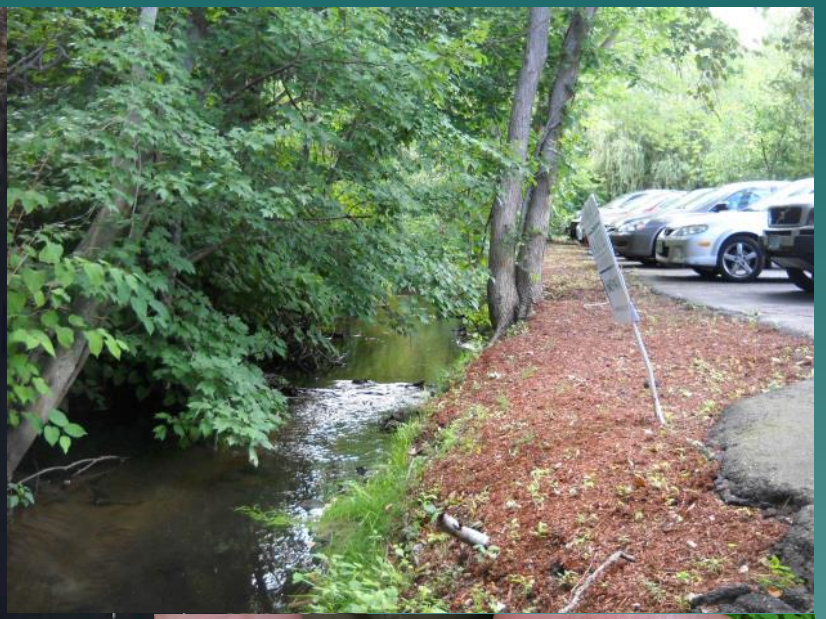
Aquatic Organism Passage Results

- No impact to passage
- Indeterminate
- No passage for any salmonid

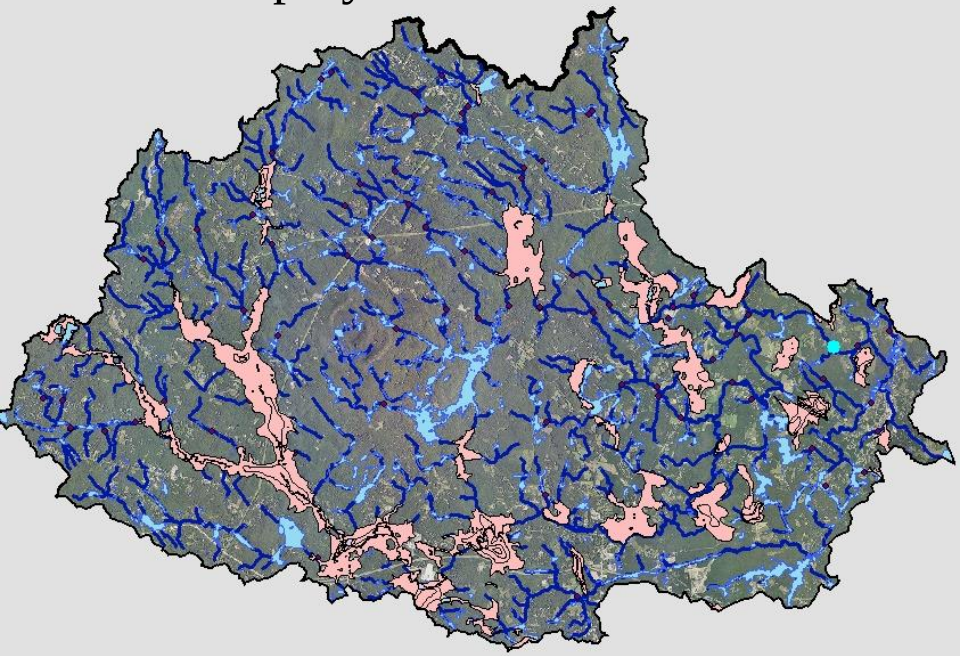
Sandwich

Campton

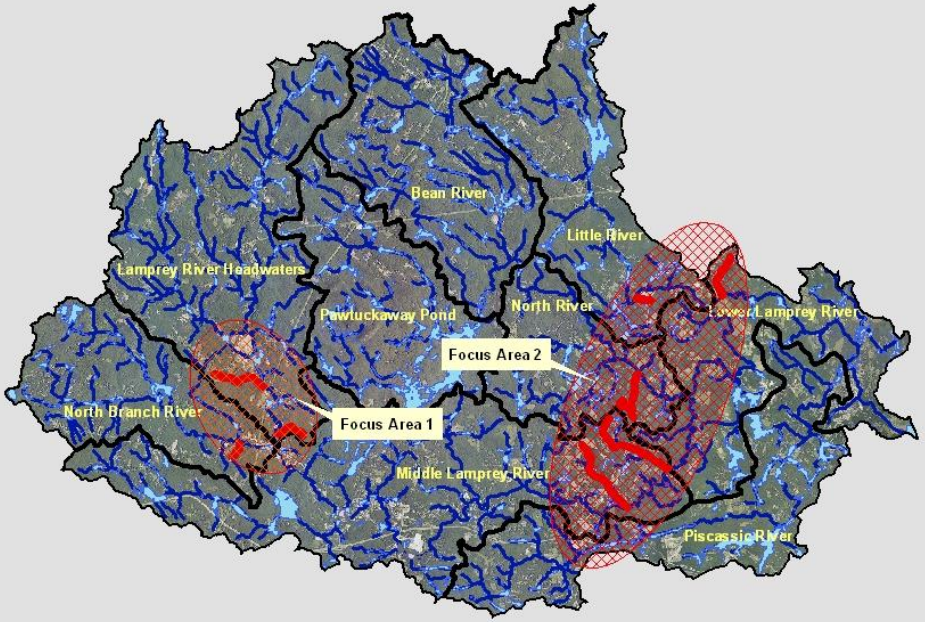
McQuesten Brook Geomorphic Assessment and Watershed Restoration Plan



Stratified drift aquifers in the Lamprey River Watershed



Brook trout focus areas



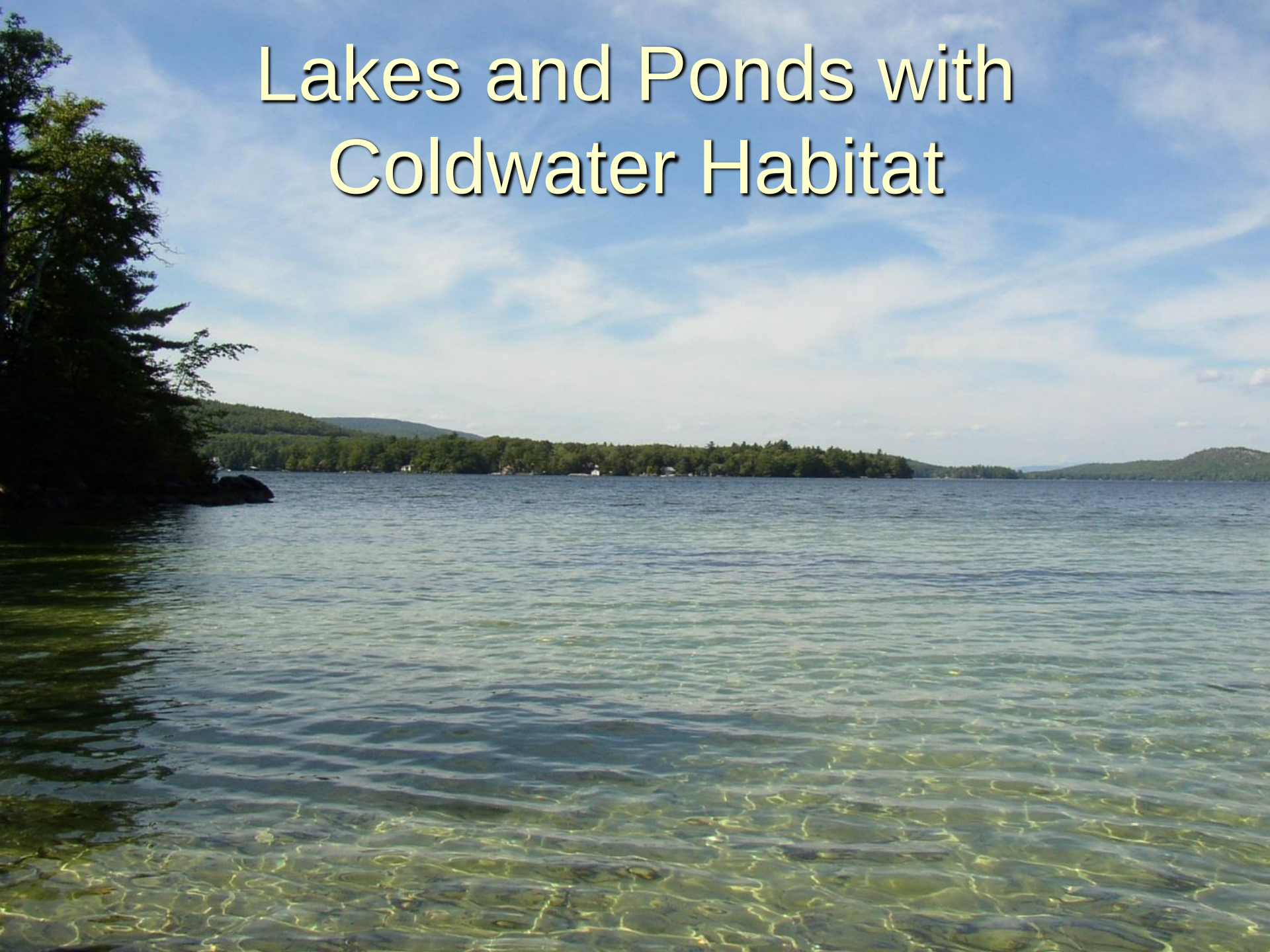
Groundwater Protection

Brook trout depend entirely on spring fed streams in southeastern New Hampshire

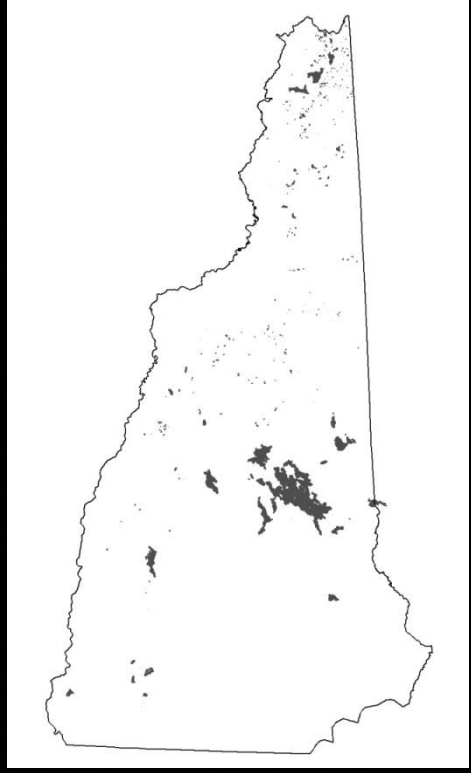
Not all spring fed streams are created equal

Depending on the source of groundwater, spring fed streams can be surprisingly resilient or extremely sensitive habitat.

A driveway culvert and excavation within the stream channel resulted in subsurface flow downstream.


Lakes and Ponds with
Coldwater Habitat

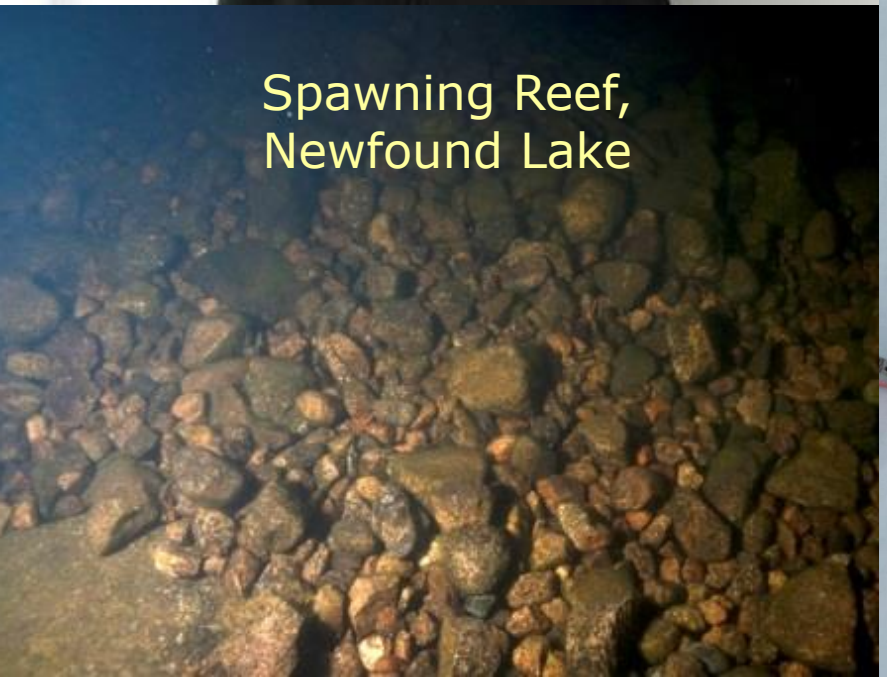
Distribution of Lakes and Ponds with Coldwater Habitat



Lake trout, Nubanusit Lake


State Record Burbot


Round whitefish, Newfound Lake


Spawning Reef, Newfound Lake


Lake whitefish, Squam Lake

An Ounce of Protection vs. a Pound of Cure

- In the densely developed Croton watershed development pressures and the high cost of land have limited the DEP's ability to undertake protection mechanisms such as land acquisition.
- By contrast, the Catskill/Delaware system, covering 1,600 miles, remains unfiltered, making it the largest unfiltered water supply in the US.
- Construction cost for a filtration plant large enough to support the Catskill/Delaware system is estimated to be $6 - $10 billion dollars.
- Although the total cost of watershed programs are difficult to quantify, it is not more than $100 million a year.

http://www.pwconserve.org/issues/watersheds/newyorkcity/

Stormwater Management

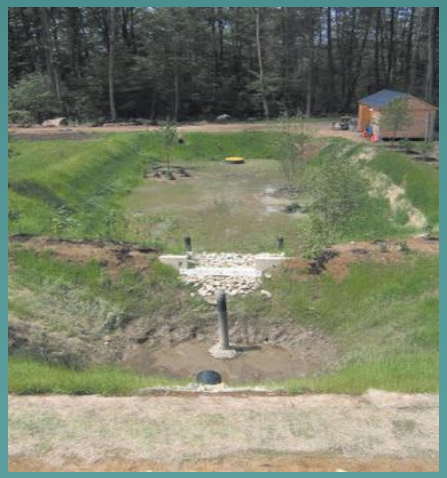
Disconnecting stormwater runoff from headwater streams will have lasting benefits for aquatic habitats and water quality.

U.S. Forest Service publication: Environmentally Sensitive Road Maintenance Practices for Dirt and Gravel Roads. Available: **http://www.fs.fed.us/eng/pubs/pdf/11771802.pdf**

Low Impact Development

- UNH Stormwater Center (http://www.unh.edu/erg/cstev/about_us.htm)
- 2005 Data Report shows that low impact development designs (LID) performed better than traditional designs like retention ponds.
- Porous asphalt reduces runoff and improves groundwater recharge.

Gravel wetland

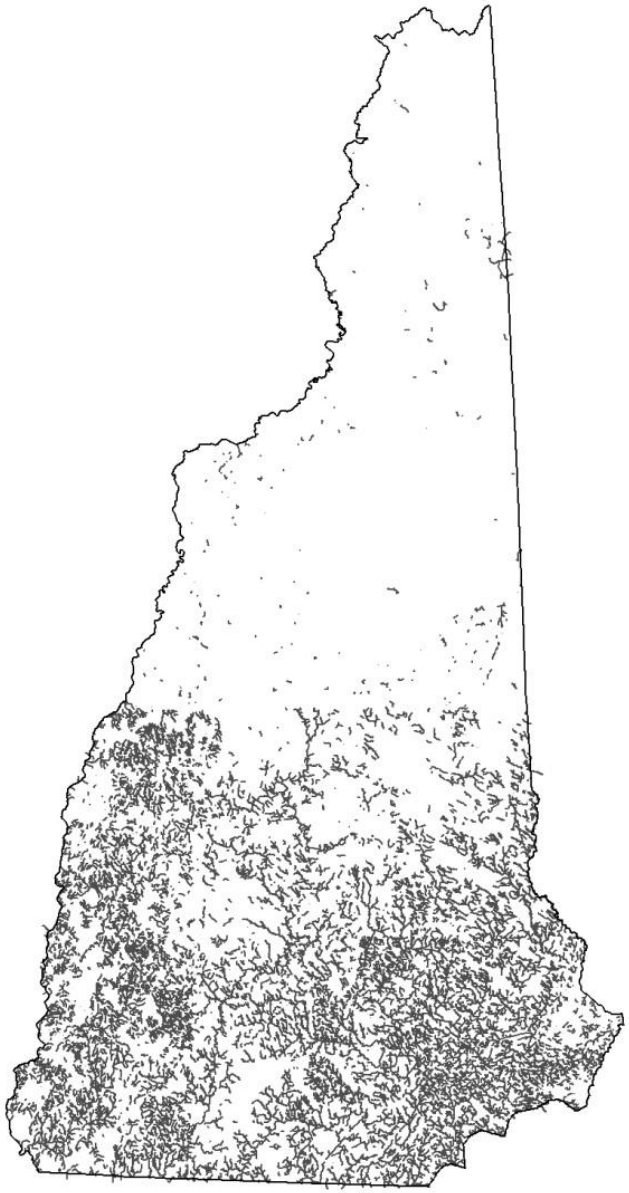


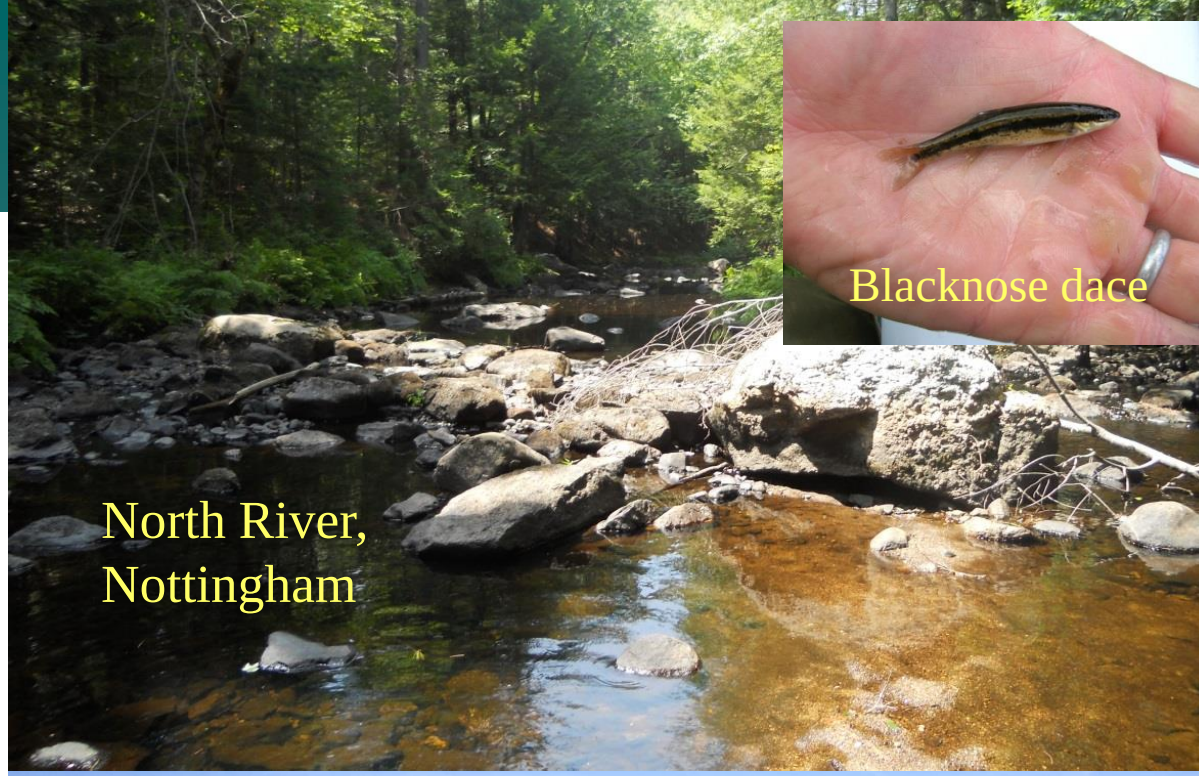
Bioretention Pond

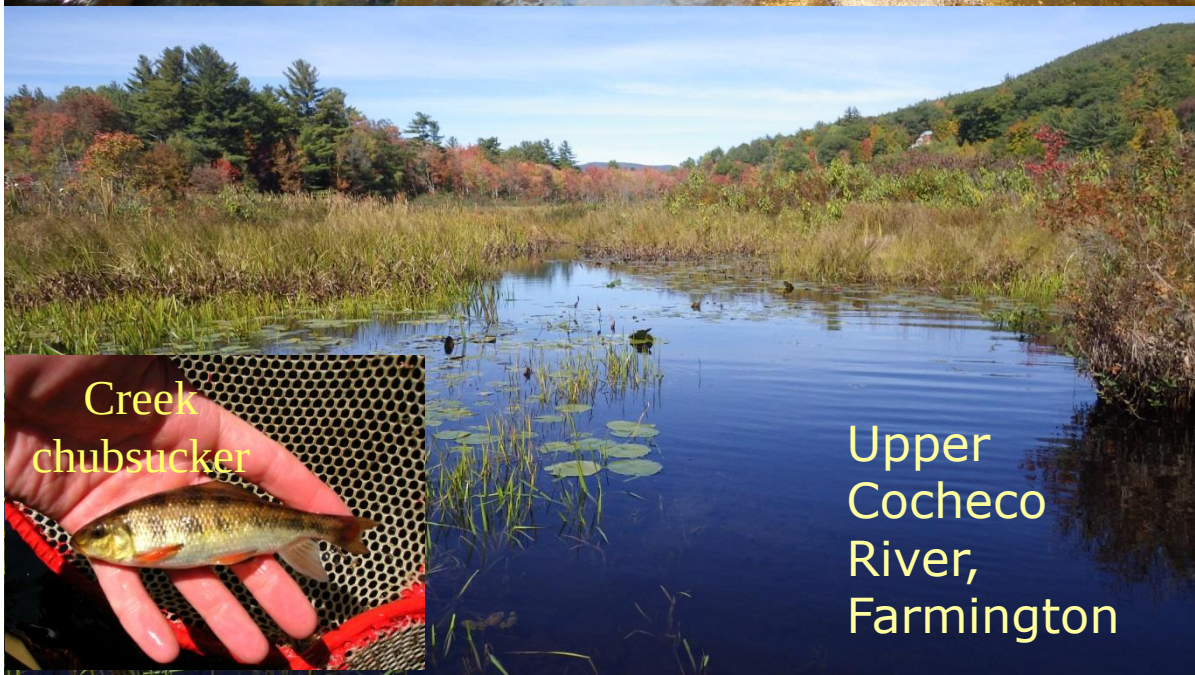
ADS Infiltration System

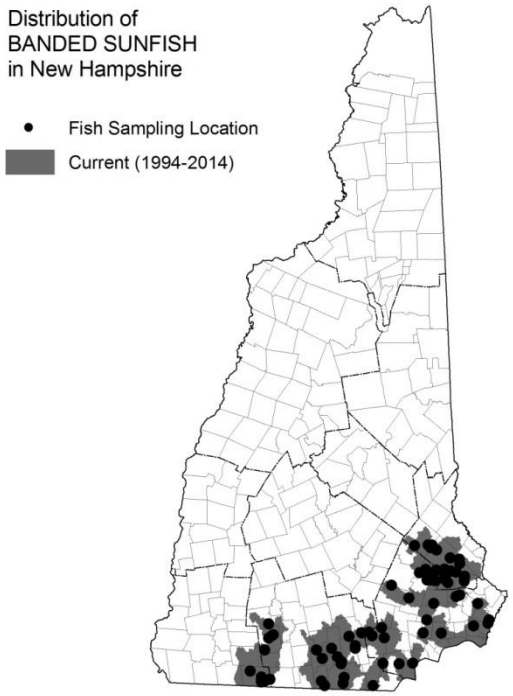

Warmwater Rivers and Streams

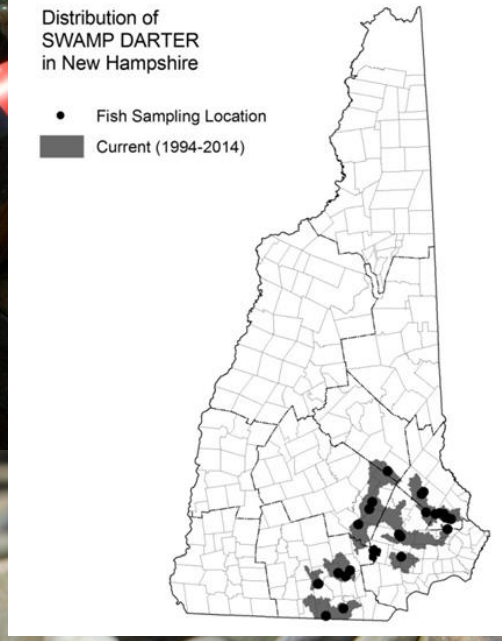
Distribution of warmwater rivers and streams



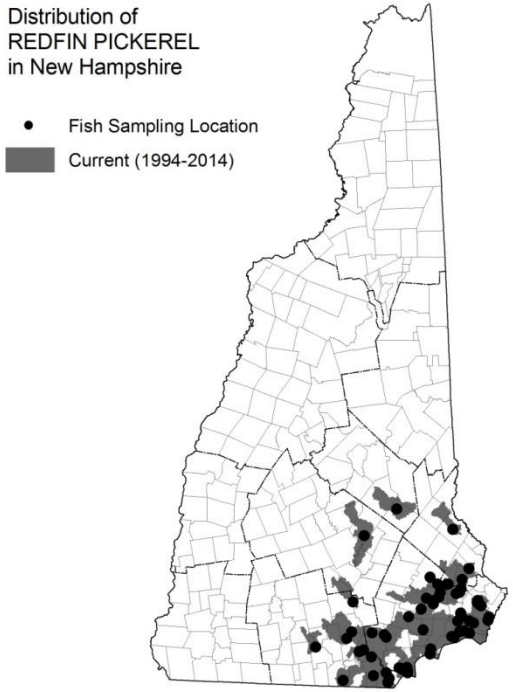




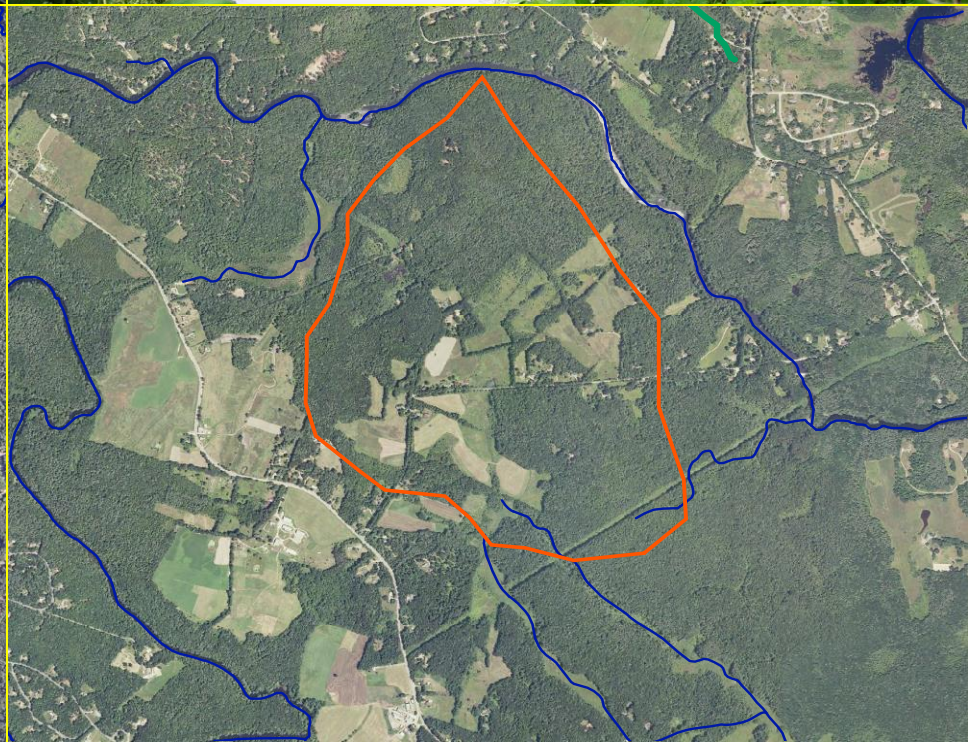




Fish species of concern in warmwater stream habitat



Protect Headwater Streams!



Riparian Zones and Healthy Fish Communities

Removing vegetation along waterbodies results in:

- Alterations to natural aquatic habitats
- Increased water temperature
- Increased pollution/sediment introduction rates
- Reduction of stream bank stability
- A loss of cover for fish and wildlife

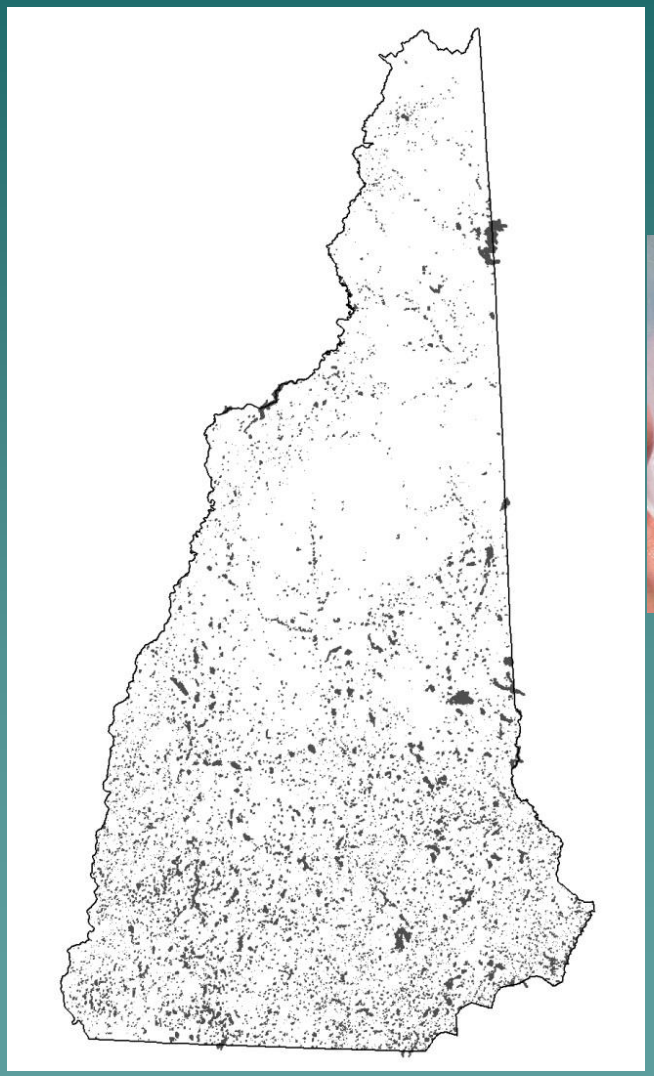
Riparian buffers should range from 15 m to 300 m depending on the location and the desired level of protection.

Riparian buffers have great habitat benefits in addition to protecting water quality.

Sometimes impacts to riparian zones may be minor at one location, but the cumulative effects of degraded riparian buffers throughout a watershed can lead to declines in habitat quality as one moves further downstream.

Warmwater Lakes and Ponds

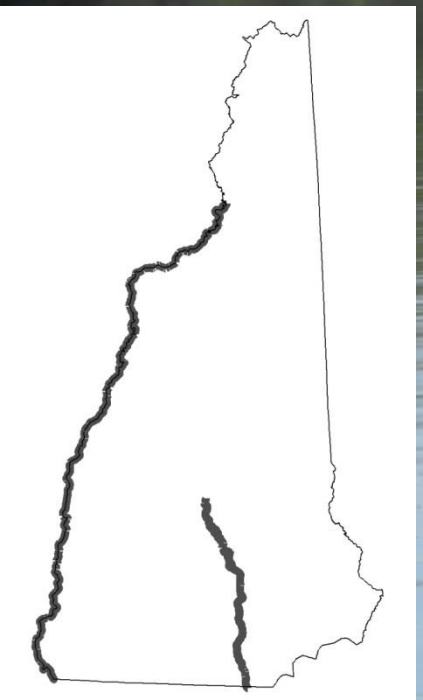
Distribution of warmwater lakes and ponds



Submerged aquatic vegetation is critical habitat for many species

Undeveloped shorelines are both valuable real estate and critical habitat for aquatic species.

Large Warmwater Rivers



Diadromous Fish Species of Concern

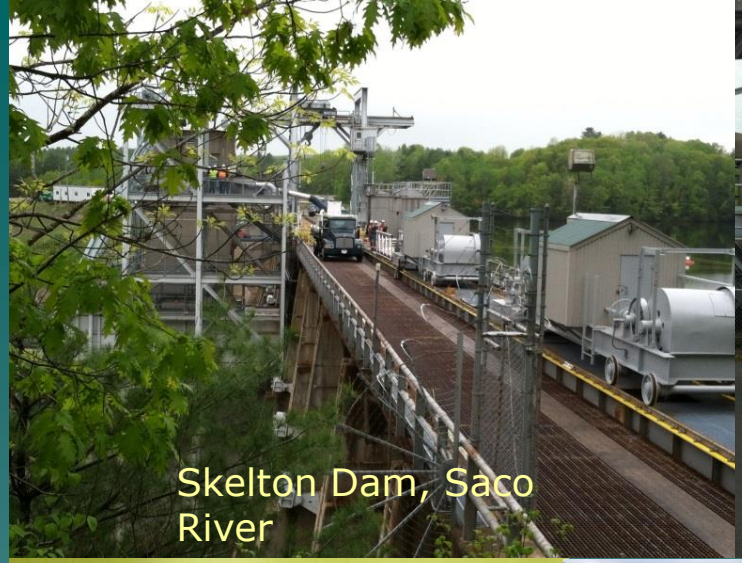
Sea lamprey

River Herring

American Shad

American Eel

Diadromous Fish Restoration



Skelton Dam, Saco River

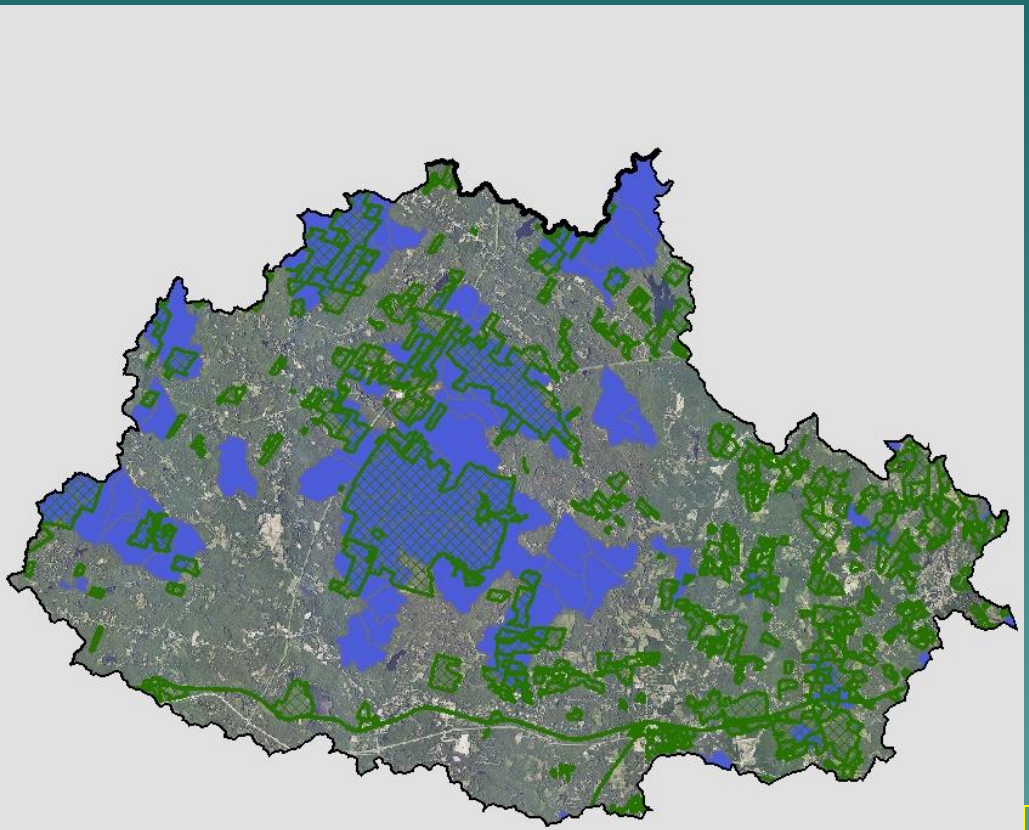
Lockwood Dam, Kennebec River

Lowell Fish Lift

Stocking River herring in the Nashua River

Stocking 3,000 adult river herring into Winnisquam Lake

The Importance of Planning

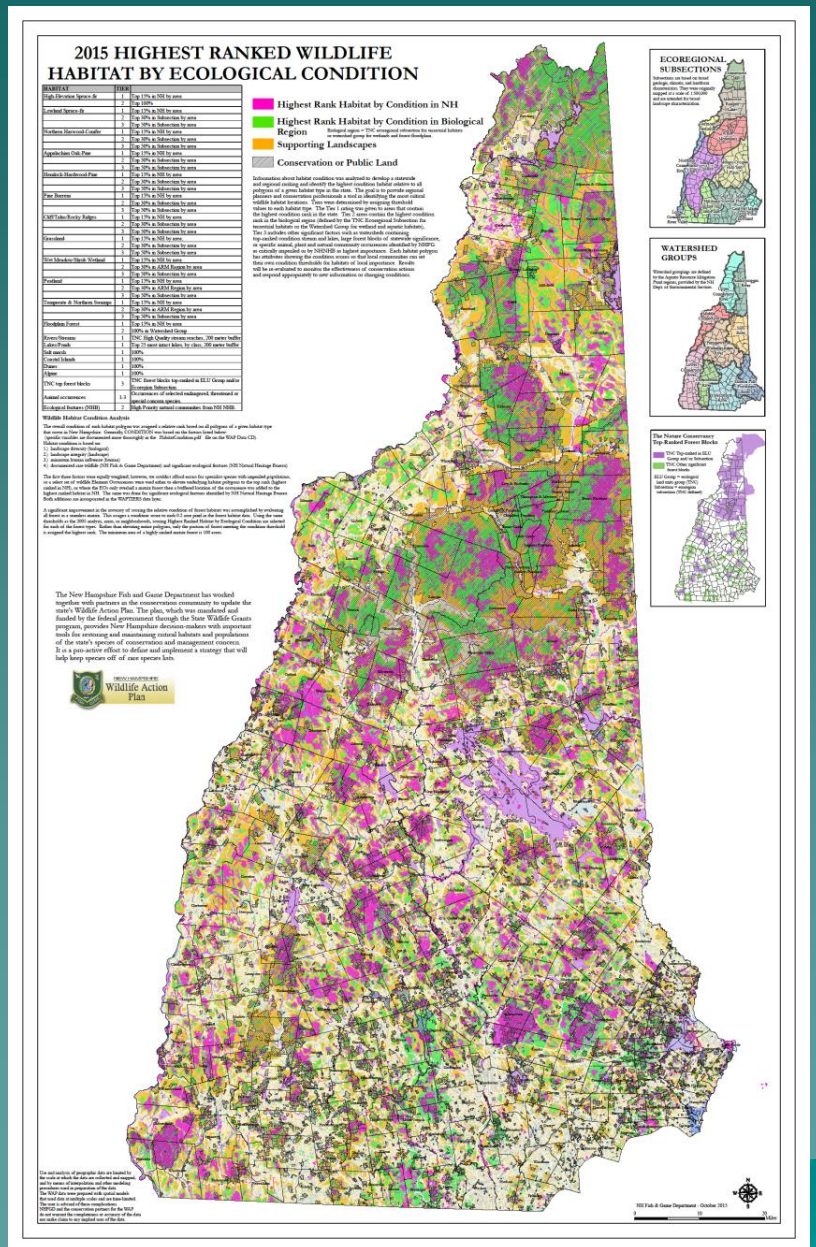


Remaining catchments with less than 6% impervious surface coverage (blue) in the Lamprey River watershed. Existing conservation land is outlined in green.

- A study in Maryland showed that brook trout were not present in watersheds with greater than 4% impervious land cover.
- Three of six brook trout populations monitored over time were extirpated in the last 15 years.
- The extirpations coincided with increases in urbanization and impervious surfaces.
- A USGS study showed impacts to aquatic invertebrates at impervious surface coverages of between 5 and 10%.

Land protection alone cannot prevent declines in aquatic habitat and water quality.

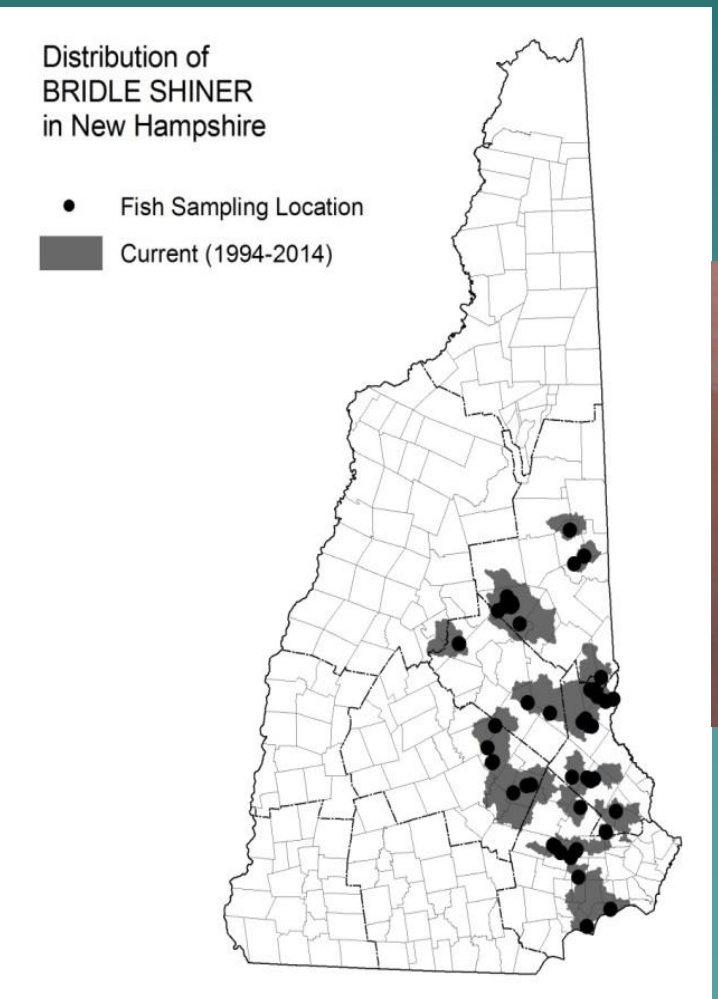
Interpreting Wildlife Action Plan Maps



Raising Awareness

Awareness leads to conservation.

The Bridle Shiner
(State Threatened)



Bridle Shiner- State threatened species

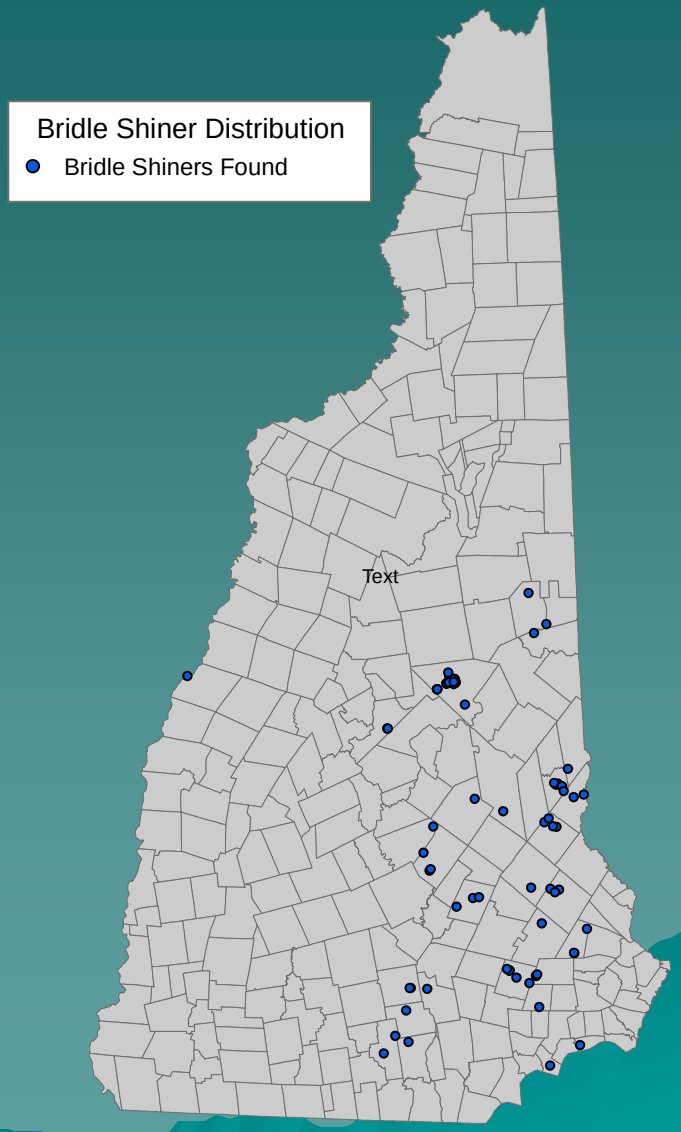
Lifespan: Rarely exceeds two years

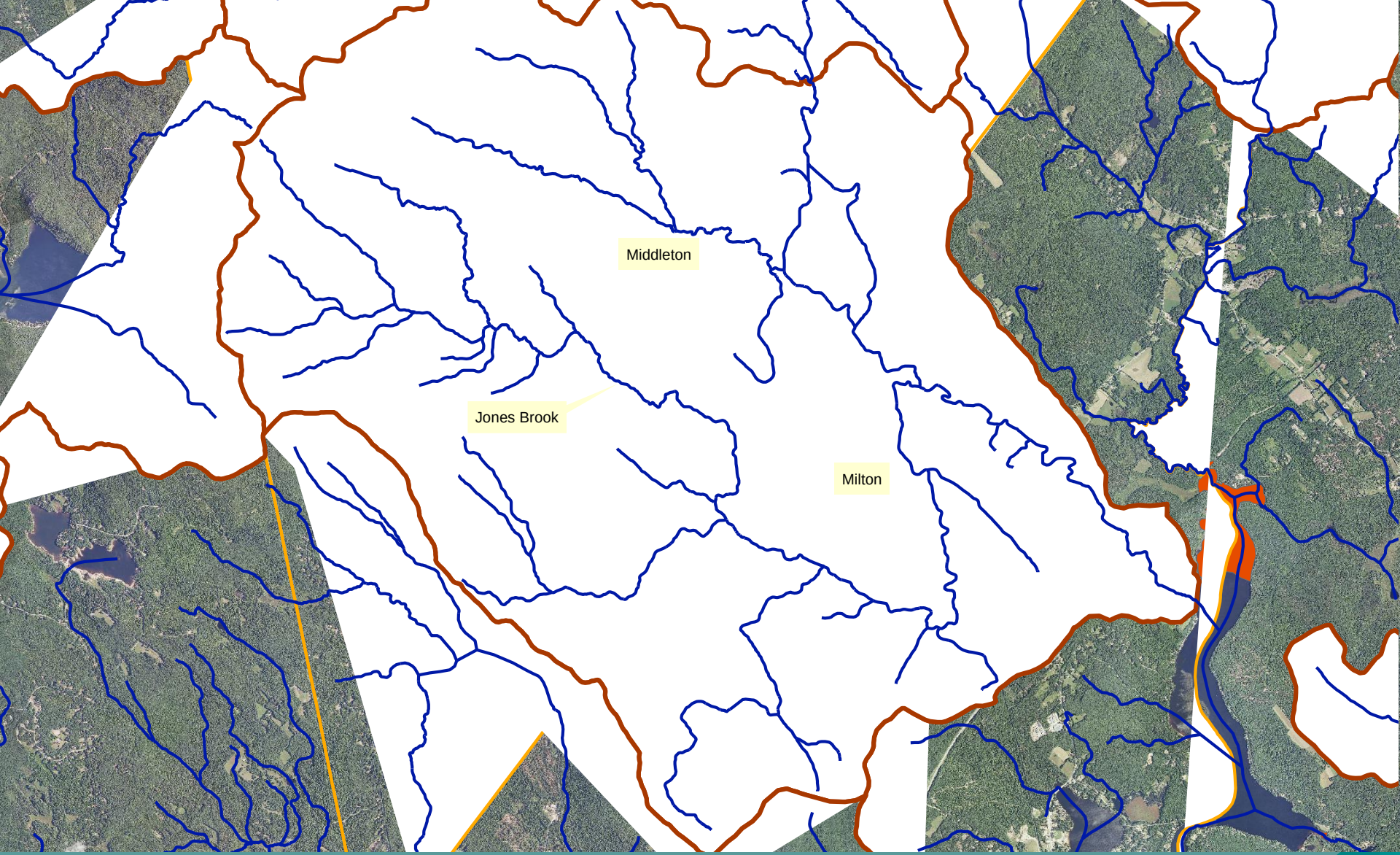
Habitat: Dense aquatic vegetation (including variable milfoil), provides spawning, nursery, and foraging habitat, as well as refuge from predators.

Records from the 1930's and 1940's indicate the species was found in 30 waterbodies. Currently found in 8 of those waterbodies.

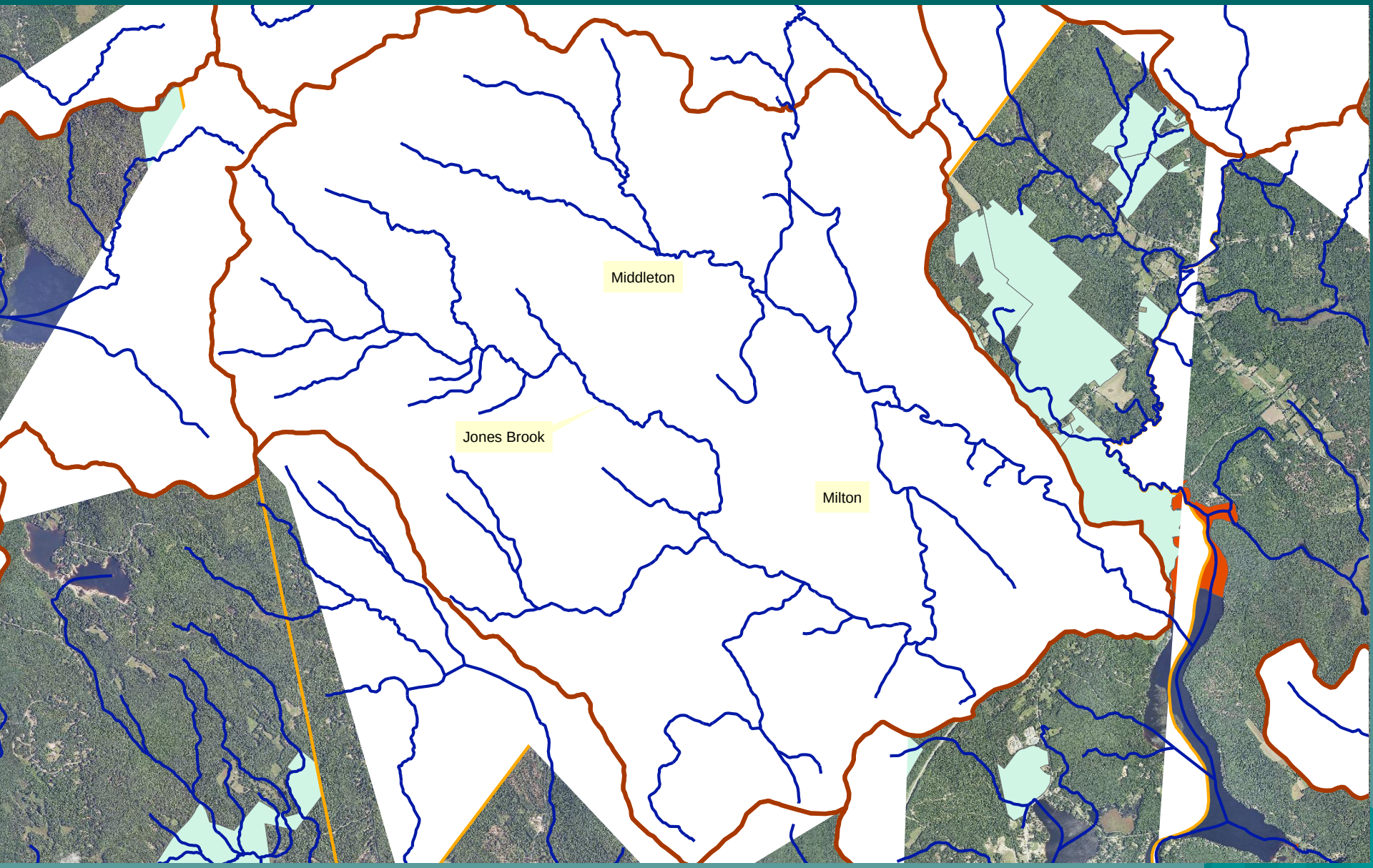
Impacts associated with shoreline development, lake level manipulation, efforts to remove aquatic vegetation, water quality impairments.

NHFG biologists have confirmed bridle shiner presence at 59 sites since 2005.



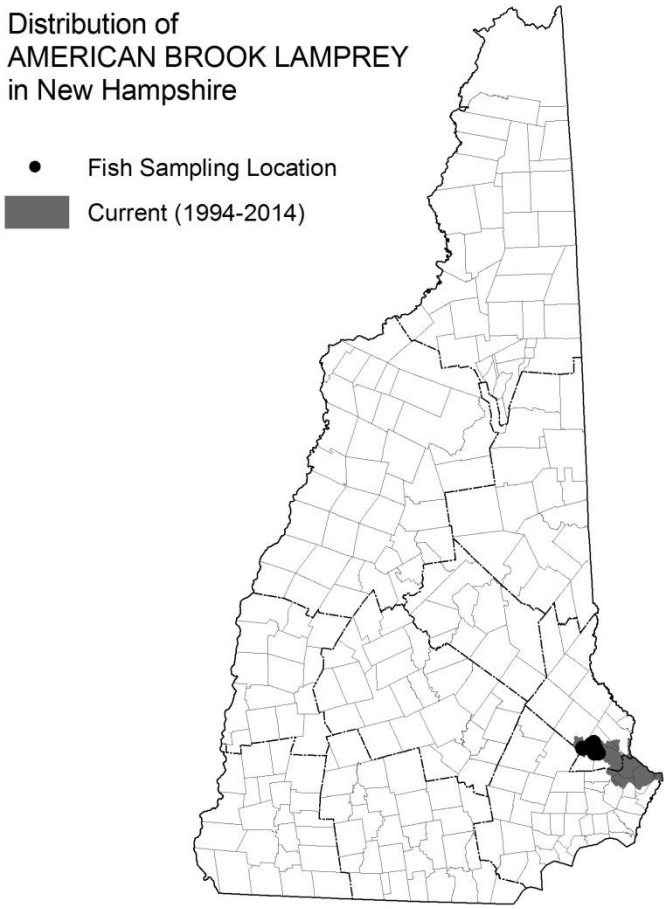


Bridle shiner distribution in the Jones Brook Watershed



Bridle shiner distribution (red) and conservation land (green) in the Jones Brook Watershed

American brook lamprey
(State Endangered)



American Brook Lamprey Life Cycle

Adult Stage

Spawning location

Ammocoetes (larval stage)

adults die after spawning

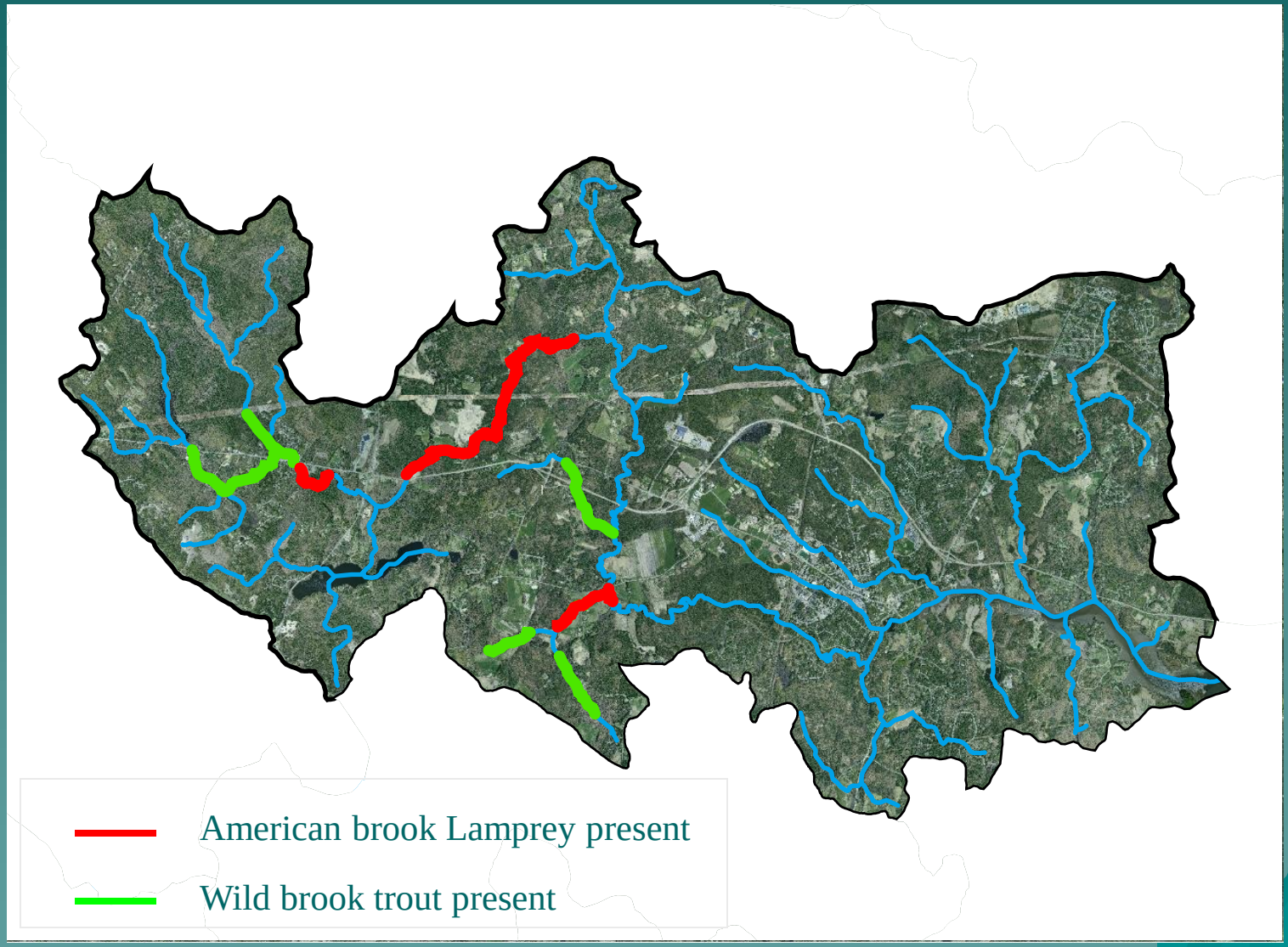
Spawning:

- Timing: Early spring (water temp 55F)
- Location: Head of riffles in water <1.5feet
- Substrate: Sand and small gravel

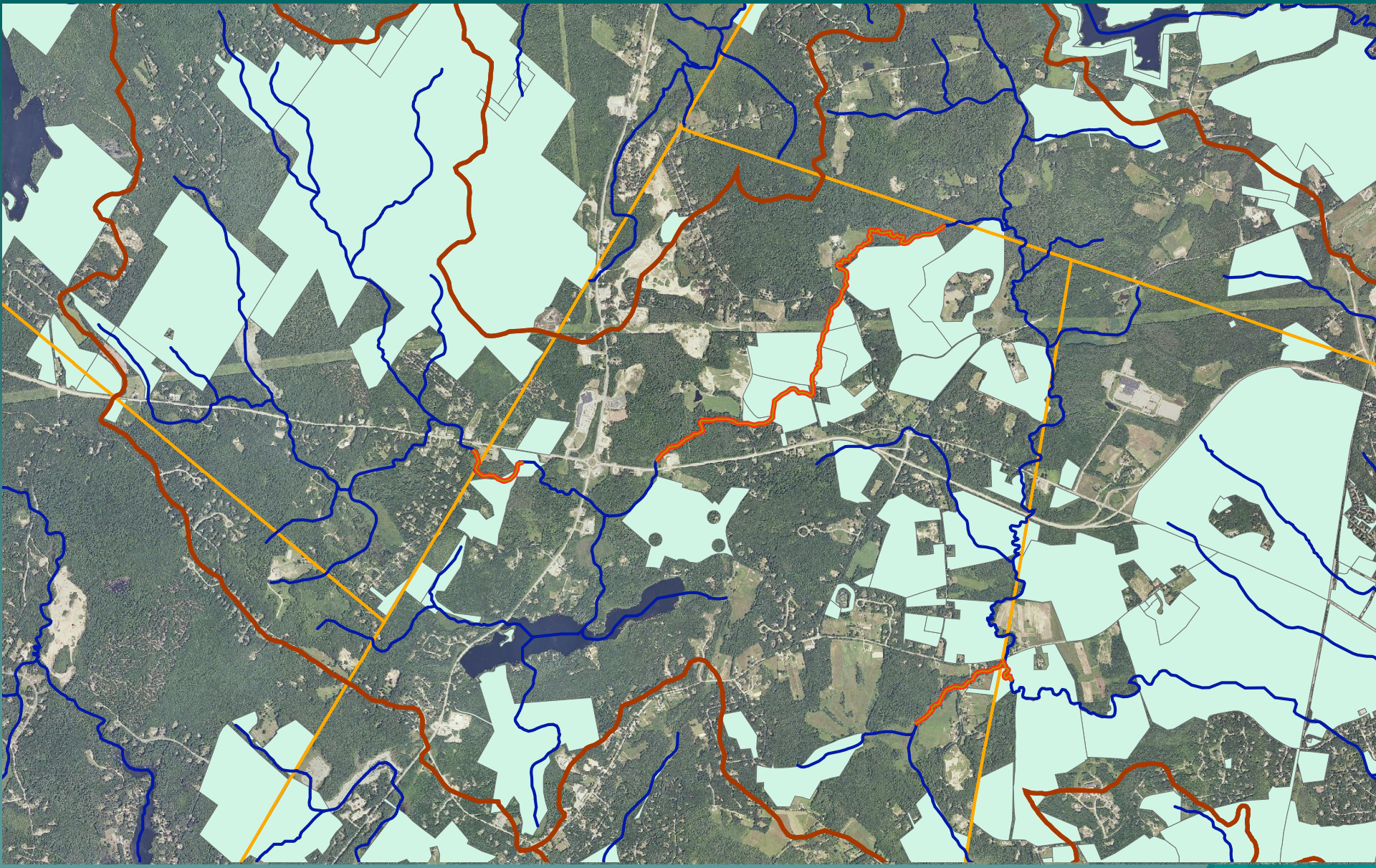
Ammocoete Development

- After eggs hatch, ammocoetes drift downstream and burrow into softer substrates with woody debris
- Filter feed in this stage for 4-5 years
- Maturation to adult stage occurs in the fall prior to spawning. Adults emerge and remain in the stream until spring spawning

American Brook Lamprey Locations within the Oyster River Watershed



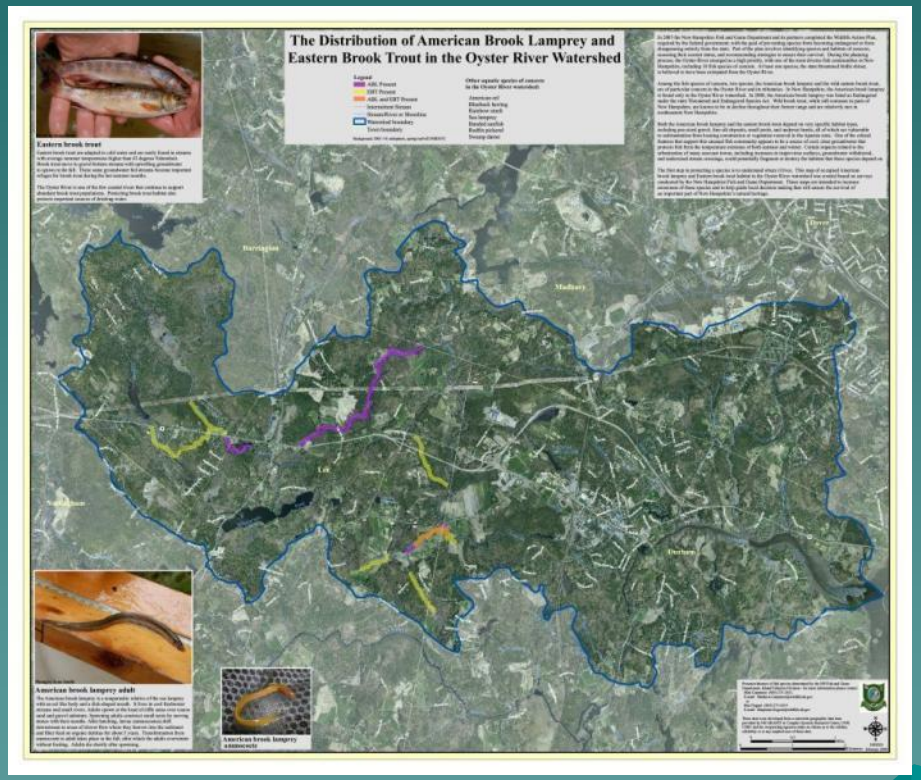
State endangered fish species



American brook lamprey distribution (orange) and conservation land (green) in the Oyster River watershed

Outreach: How do we provide information that is useful and easily accessible?

Online outreach (ESRI Story Maps)



NHFG Website
Fisheries
Fish Fact Sheets
Fisheries Management
Fish Conservation
Wildlife Action Plan

Traditional Outreach (Posters, presentations, brochures, site walks, etc.)

The End

- For more information: http://www.wildlife.state.nh.us/
- Contact: matthew.carpenter@wildlife.nh.gov
- (603)-271-2612