

Brook Trout Habitat in New Hampshire

Water in the Woods

October 17, 2013

**John Magee, NH Fish and Game Department
603-271-2744
John.a.magee@wildlife.nh.gov**

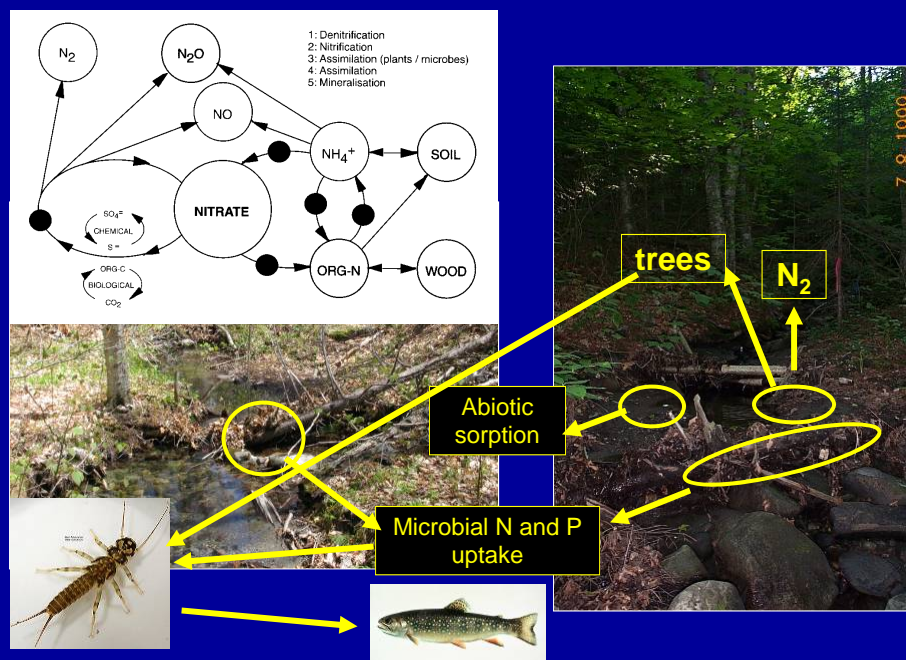
Today's Talk

- **Stream ecology and nutrients**
- **Habitat use by brook trout (Nash Stream)**
 - **PIT tags**
 - **Barrier (culvert) removal**
- **Water quality influence on brook trout**
 - **Water temperature**
- **How does this inform conservation efforts?**

Take Home Messages

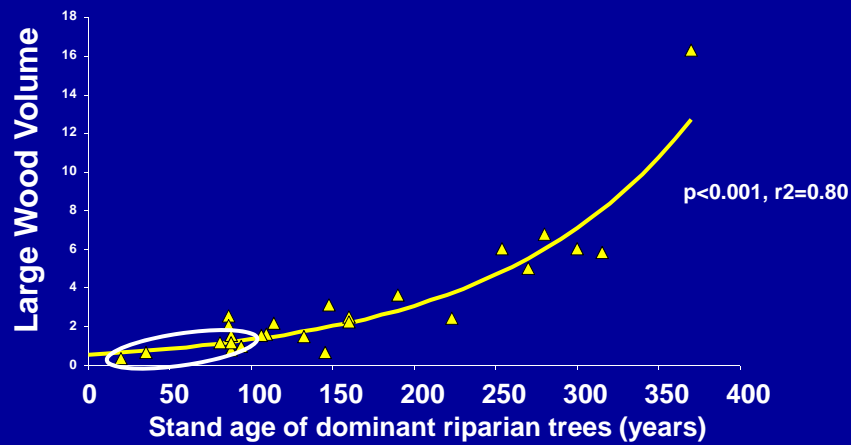
- **Instream Wood is GOOD**
- **Natural Stream Processes are GOOD**
- **Riparian areas are especially important**
- **What we do on the land affects the water**
- **It takes CENTURIES to restore instream wood**

The Riparian Forest: influence of wood on nutrients



Changes in the Riparian Forest: influence of wood on nutrients

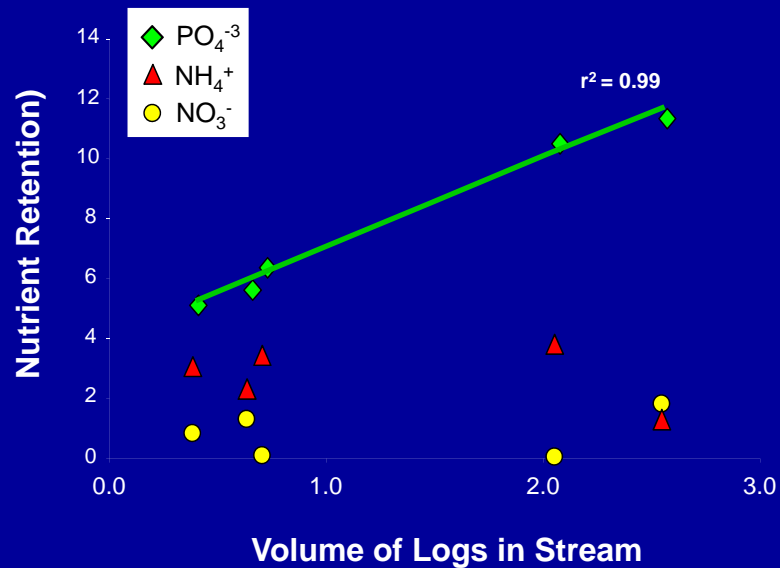
Riparian forest stand age and large wood volume
at HBEF, Woodstock and Ellsworth, NH



(Warren et al. 2007)

Changes in the Riparian Forest: influence of wood on nutrients

More instream wood = greater retention of nutrients in the stream



Warren et al. 2007

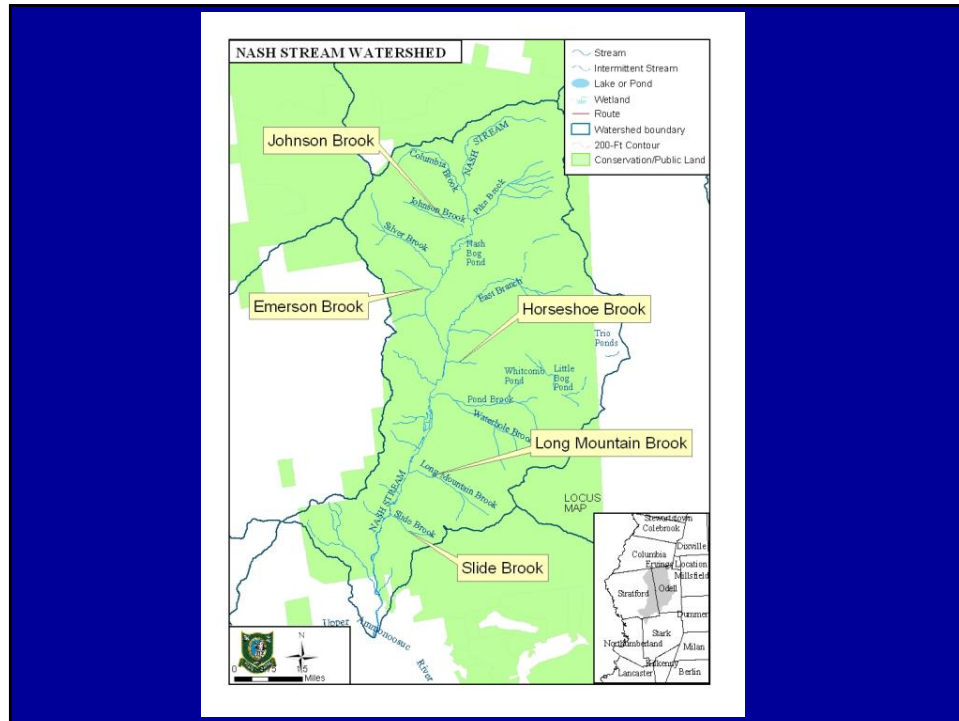
Some Trout Research Objectives

What habitat attributes influence brook trout biomass, density, growth, survival, etc?



Fish don't talk to us, so we have to go collect data...

By the way...we don't use duct tape on fish



Methods

1. Electrofished

2. Habitat survey

Related density and biomass of fish to habitat variables

3. PIT tag

4. Tracking surveys

Used tracking data to determine what habitat trout prefer

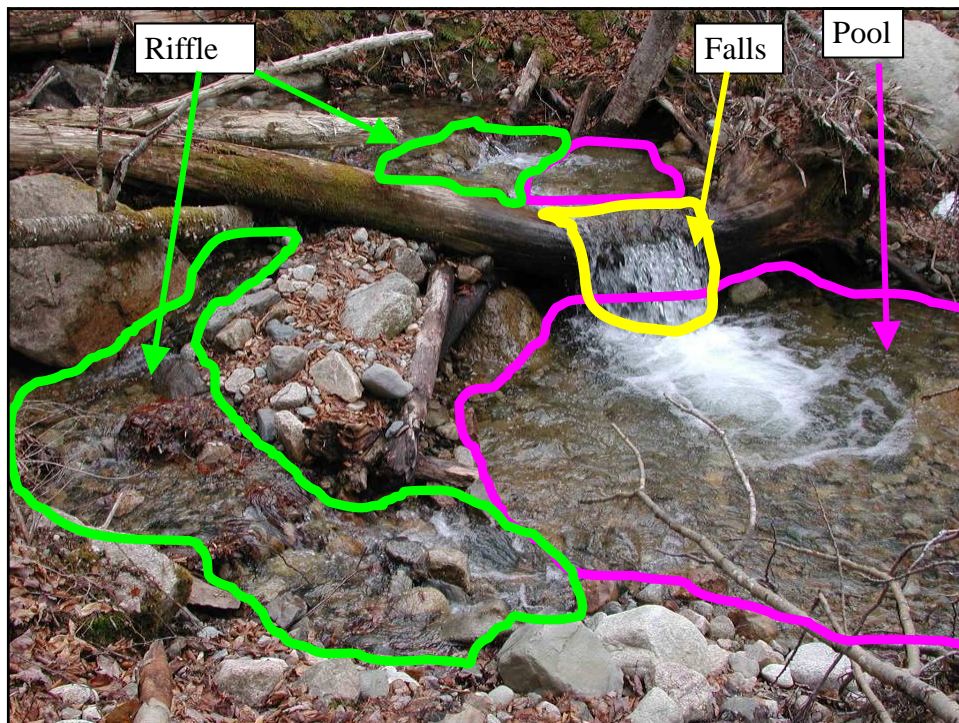
- **Electrofished**

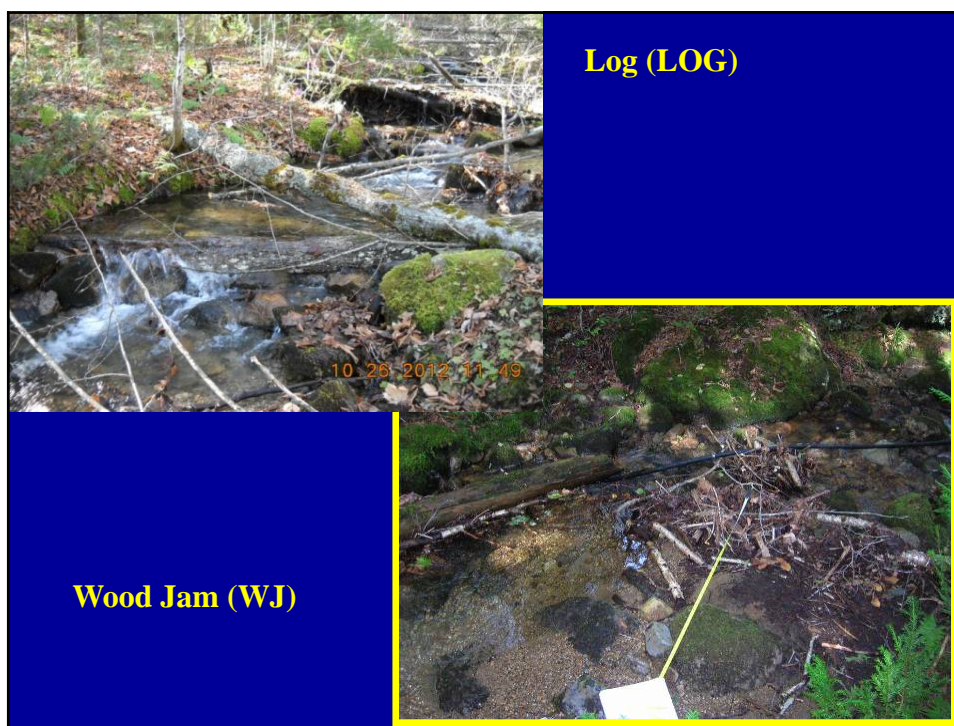
- (40) 10 meter sections, each with blocking nets
- 3 passes
- ID to species, length, weight
- Insert PIT tag (EBT>60mm, SS>80mm)
- Released into Section of capture





Habitat Survey – “we measured everything in the stream”

- ID habitat type (riffle, glide, pool, cascade/fall)
- Measure wetted length, width, depth, gradient
- Measure Bankfull width
- Document riparian conditions
- Estimate the amount of each cover type (substrate, turbulence, undercut banks, wood, etc)
- Detailed wood survey to quantify type, amount and location (to nearest stream meter)





Tracking survey



- Cover entire wetted width
- Document:
 - PIT tag #
 - Location
 - Alive, Dead or Unknown
 - Habitat detected in
 - Type, substrate, wood

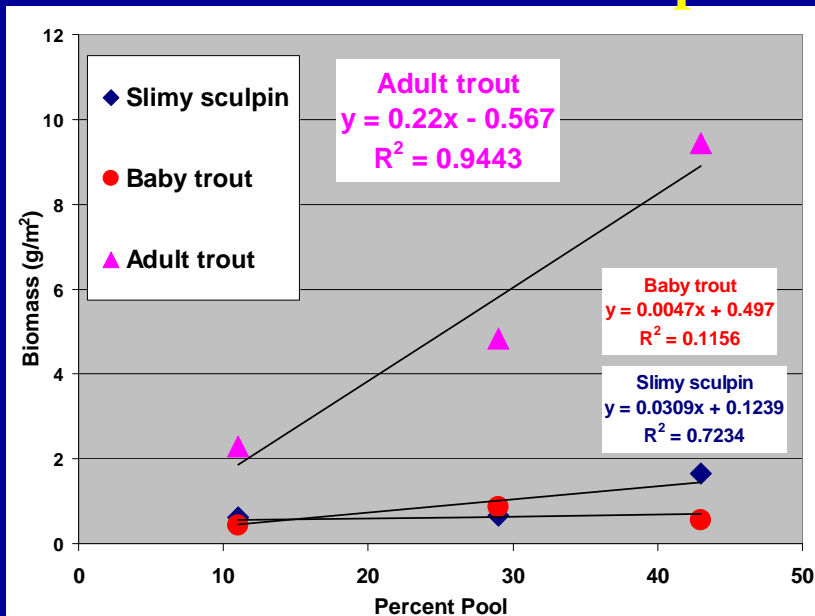
Results

Two sets of data:

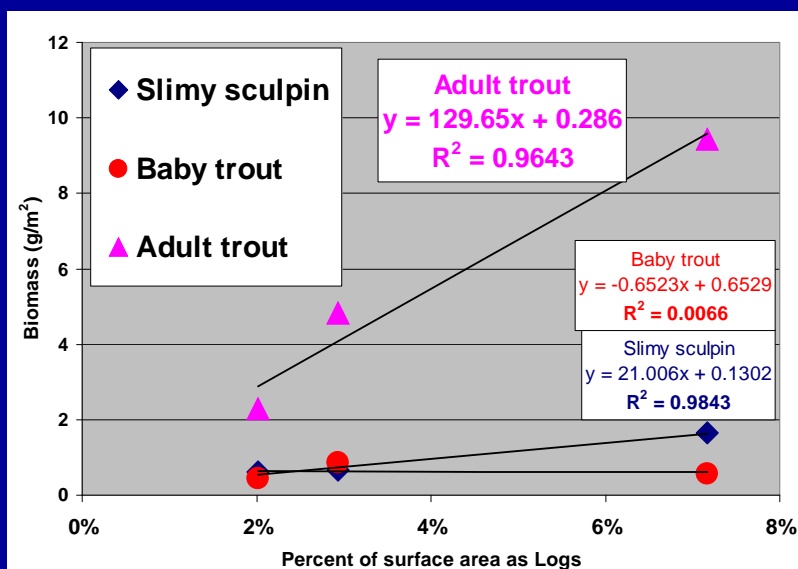
1. August 10, 2009 electrofishing and habitat

1. Wading survey on August 26, 2009

Results – adult trout like pools



Results – adult trout like LOGS



Conclusions from Electrofishing and Habitat

- **Adult trout like Pools and Logs**
- **Baby trout seem to not care about Pools and Logs**



Results – Tracking Surveys

- **Logs comprise 3.5% of the wetted surface area overall, but 19% of YAO and 29% of YOY were found directly associated with LOGS.**
- **All wood comprises 8.3% of the wetted surface area, but 28% of YAO and 50% of YOY were found associated with wood.**
- **Both YAO and YOY are more often found in pools.**

How does habitat influence brook trout populations?

- **More pools = more brook trout**
- **More wood = more brook trout**
- **Brook trout are clustered around instream wood**
- **Wood formed many pools, but not all pools**

Objectives

1. **Determine the effect of barriers on fish passage (and the genetic integrity) of wild brook trout;**

So, you removed the barrier....how did the trout POPULATION (#s of fish) respond?

1. Electrofished
2. Determined the density of brook trout pre- and post-barrier removal



Emerson Brook



- No (human-made) barrier – added wood in Oct 2009

Long Mountain Brook



- **Culvert was impassable to baby trout and all other species – removed September 2008**

Johnson Brook



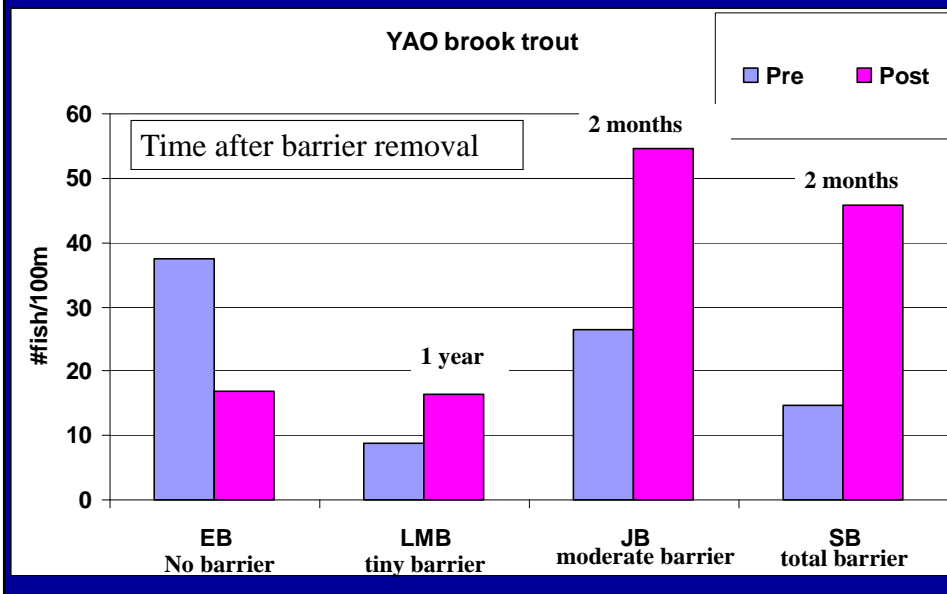
- **Moderate/Severe barrier – only some adult trout passed upstream through it – removed June 2009**

Slide Brook



- Complete barrier to everything! – removed May 2010

Results – Adult trout



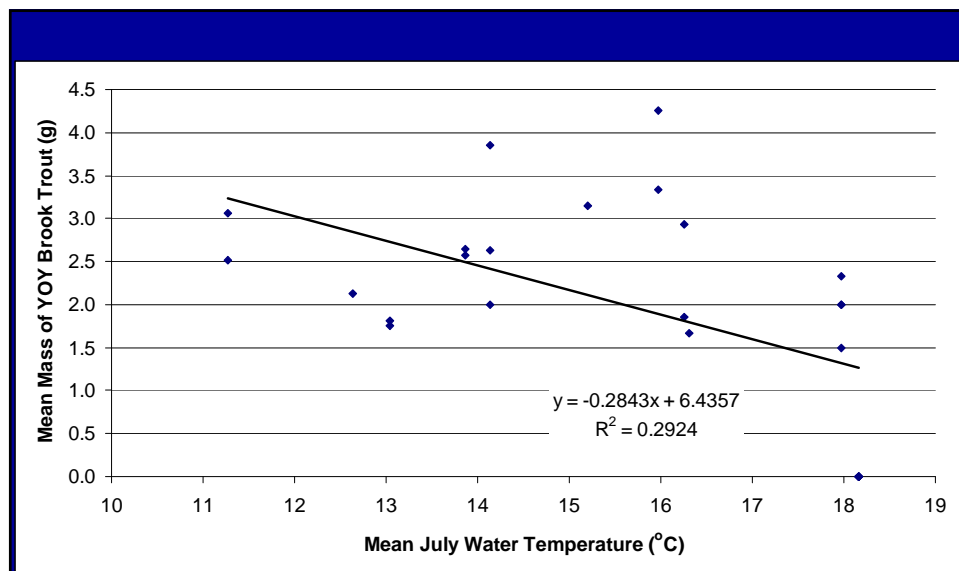
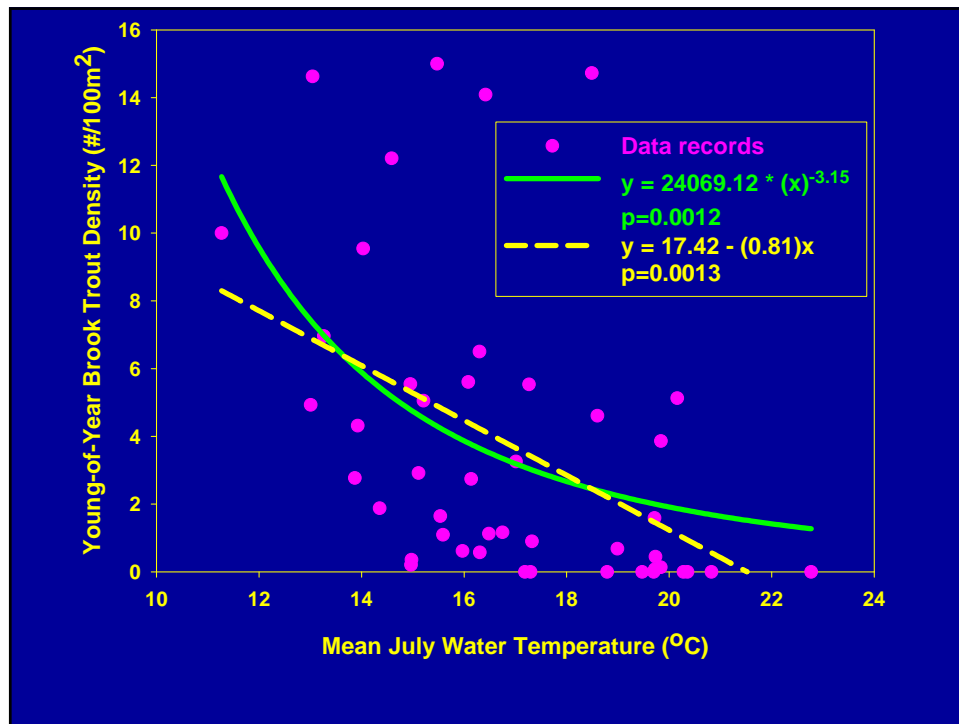
Conclusions

- The more severe the passage barrier, the greater the increase in the EBT density after removal of the barrier
- Not sure if this is due to more fish immigrating to the brook, or production of more fish within the brook

How does water quality effect brook trout?

- Water temperature





The warmer the water, the slower they grow

What does all of this mean?

- Anything done that results in a reduction in instream wood, pools or connectivity can lead to a reduction in the population of brook trout

What does all of this mean?

So, build in long-term resiliency!!!

- Geomorphic processes (not just stability)
- Healthy riparian areas



Take Home Messages

- **Instream Wood is GOOD**
- **Natural Stream Processes are GOOD**
- **Riparian areas are especially important**
- **What we do on the land affects the water**
- **It takes CENTURIES to restore instream wood**



John Magee
Fish Habitat Biologist
NH Fish and Game Department
603-271-2744
John.a.magee@wildlife.nh.gov