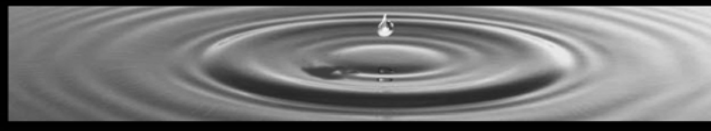


A photograph of a man standing on a concrete dam structure. The dam is partially broken, with water flowing over the remaining sections. The background shows a river and trees with autumn foliage. The man is wearing a blue jacket and light-colored pants.

Dam Removal and Restoration: A Volunteer Monitoring Approach

**Musconetcong Watershed Association
Beth Styler Barry and Nancy Roberts-Lawler**

MUSCONETCONG



**WATERSHED
ASSOCIATION**

**Dedicated to
protecting and
improving the
quality of the
Musconetcong
River Watershed**

The MWA and Our Mission

The Musconetcong Watershed Association is an independent, non-profit organization dedicated to protecting and improving the quality of the Musconetcong River Watershed, including its natural and cultural resources, through:

- Public education and awareness programs
- River monitoring
- Promotion of sustainable land management practices
- Community involvement

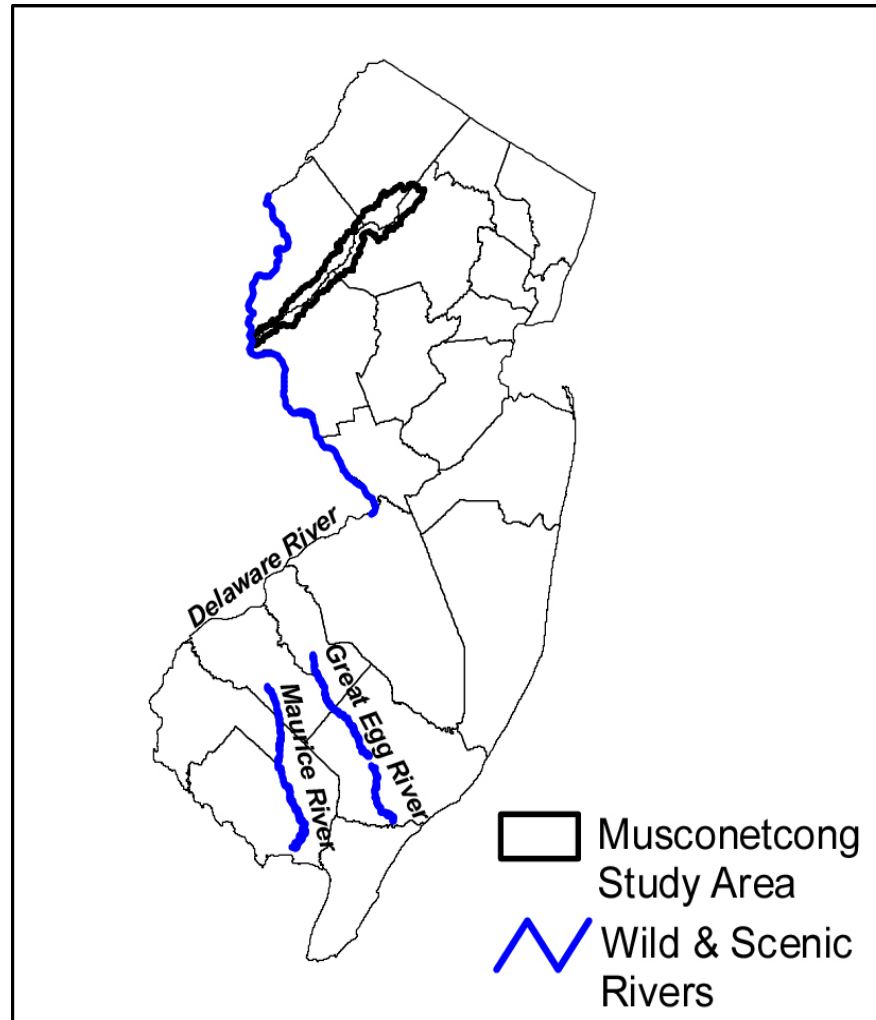
The Musconetcong River

158 square
miles

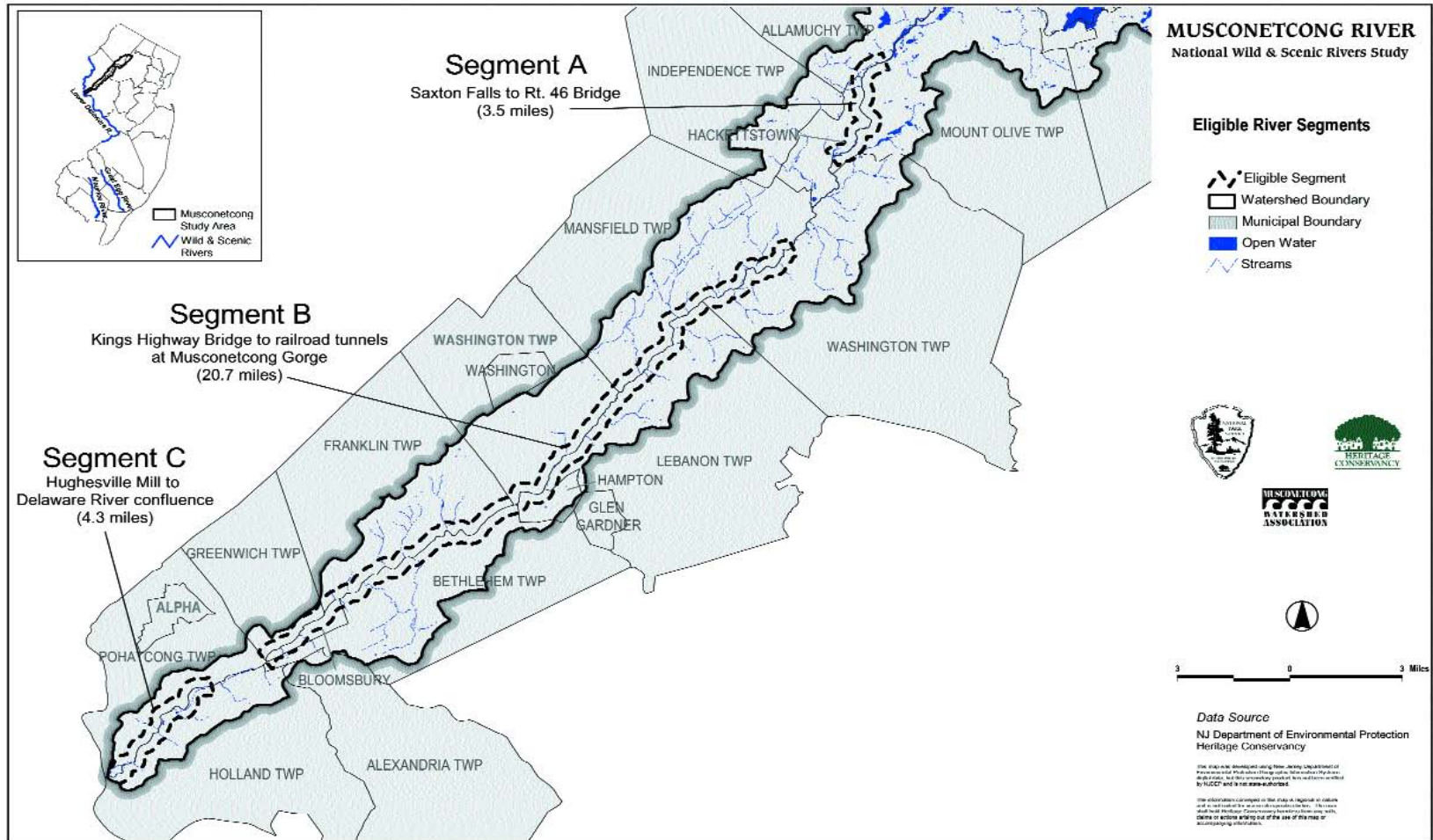
4 counties

25 townships

42 miles



24 miles of Musconetcong River Designated Wild & Scenic



River Restoration

The Musconetcong River is generally in good condition, but there are some serious water quality problems in certain areas of the main stem....

- Thermal pollution
- Nutrient enrichment
- Severe river bank erosion
- Native trees eliminated
- Invasive non-native vegetation flourishing

These factors stress the ability of these critical ecosystems to function properly.

Riparian Restoration

The MWA has teamed up with North Jersey RC&D, NRCS, TU, USF&W and NJ F&W to restore riparian buffers along the main stem and tributaries throughout the watershed



River Preservation & Restoration through Partnerships

The MWA is part of a long-term effort to restore the river's natural flow, improve water quality and enhance fish migration.

- Stream bank stabilization
- Enhance riparian buffers by adding trees and natural grasses
- Enabling fish passage
- stocking the river with fish or other living organisms.
- the removal of dams and other man-made structures, and adding meanders

Why Remove Dams?

Dams alter the natural flow and with it virtually every aspect of a river ecosystem, including

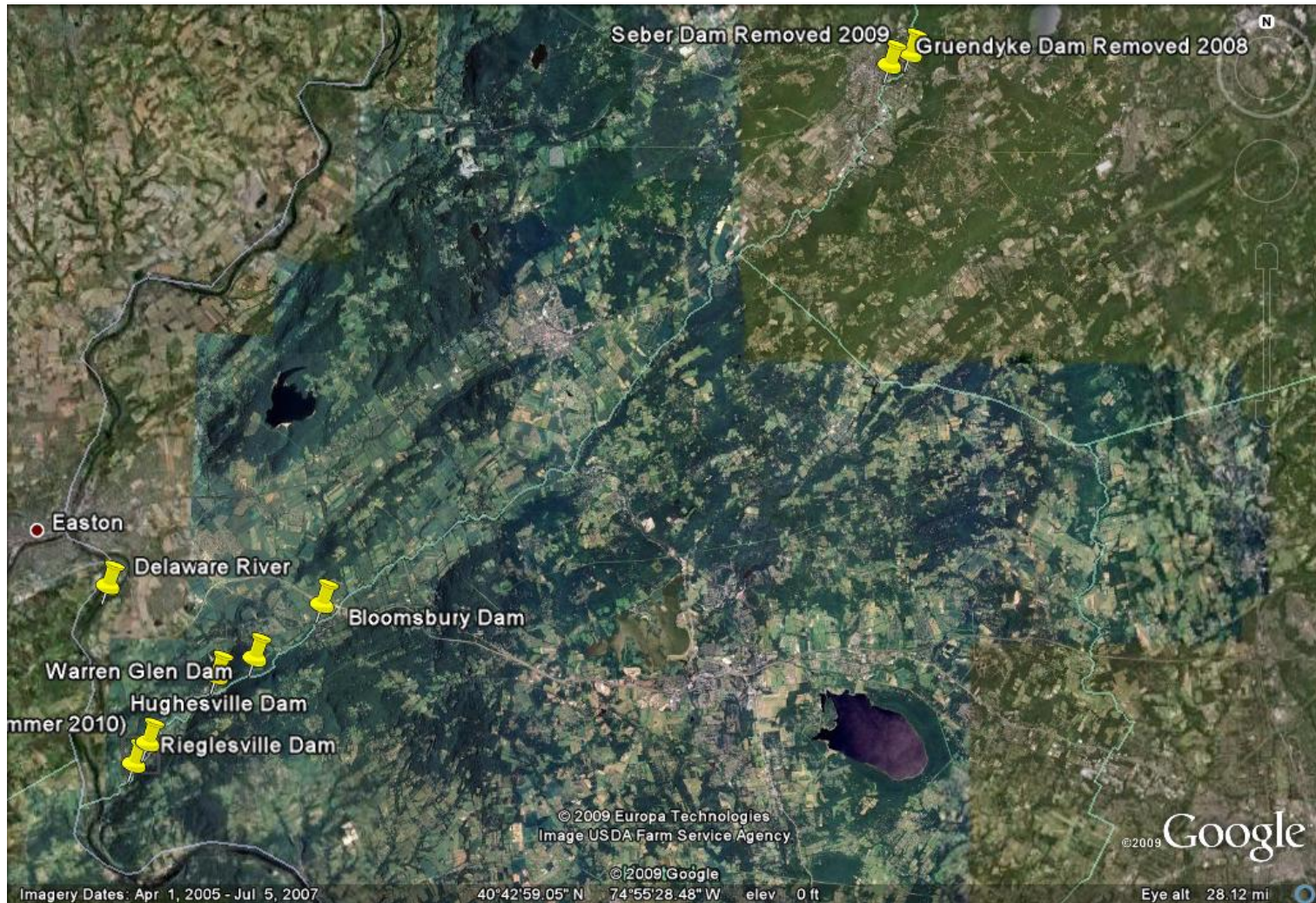
- water quality
- sediment transport and deposition
- fish migrations and reproduction,
- riparian and floodplain habitat and the organisms that rely on this habitat.

Taken from the American Rivers website www.americanrivers.org

Dams require \$\$\$

- Dams require ongoing maintenance
 - On some streams, silt accumulates behind the dam, lowering the reservoir's capacity to store water
- As dams age, maintenance costs and safety hazards often increase, resulting in an increasing financial burden and liability on the dam owner

Musconetcong Watershed Association What We Are Working On



Gruendyke Dam: Before



Gruendyke Mill Dam Removed

March 13, 2008



Gruendyke Dam: After



Riparian Restoration Begins

Trees

- Sycamore
- Silver Maple
- Red Maple
- River Birch
- Green Ash
- White Ash

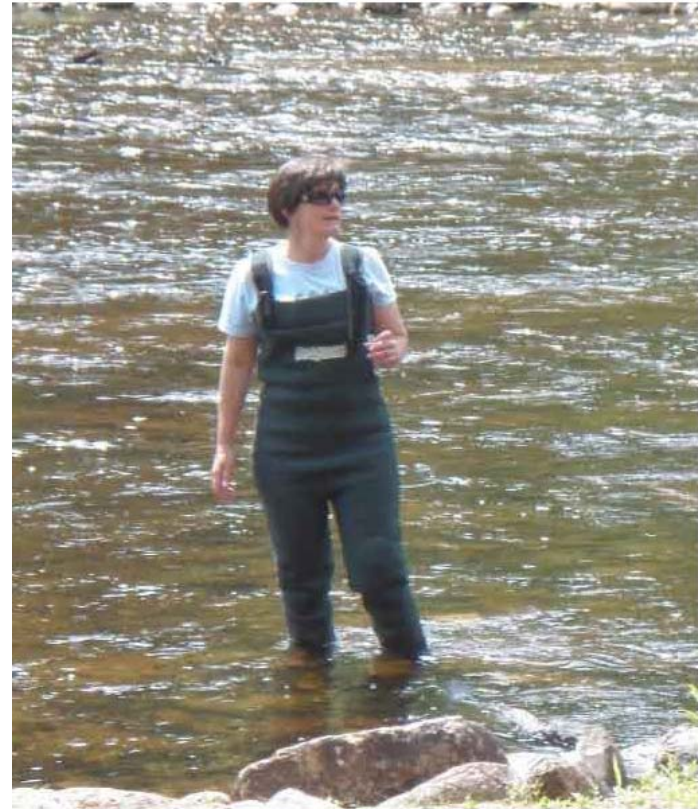
Shrubs

- Elderberry
- Preference
- Red Olsen Dogwood
- Silky Dogwood
- Grey Dogwood
- Buttonbush (obligate wetland)
- Alder
- Viburnum



HOW DO WE KNOW IF THE DAM REMOVAL
IMPROVES WATER QUALITY?

MONITOR!



Benefits of Monitoring

- Can evaluate the performance of individual restoration projects
- Can assess the long-term ecological response of restorations
- Help us improve our understanding of restoration ecology and improve restoration techniques
- Help us better anticipate the effects of future dam removal projects
- Help us communicate our project results to stakeholders and the public.

From Stream Barrier Removal Guide, Gulf of Maine Council on the Marine Environment

Musconetcong Watershed Association Seber Dam



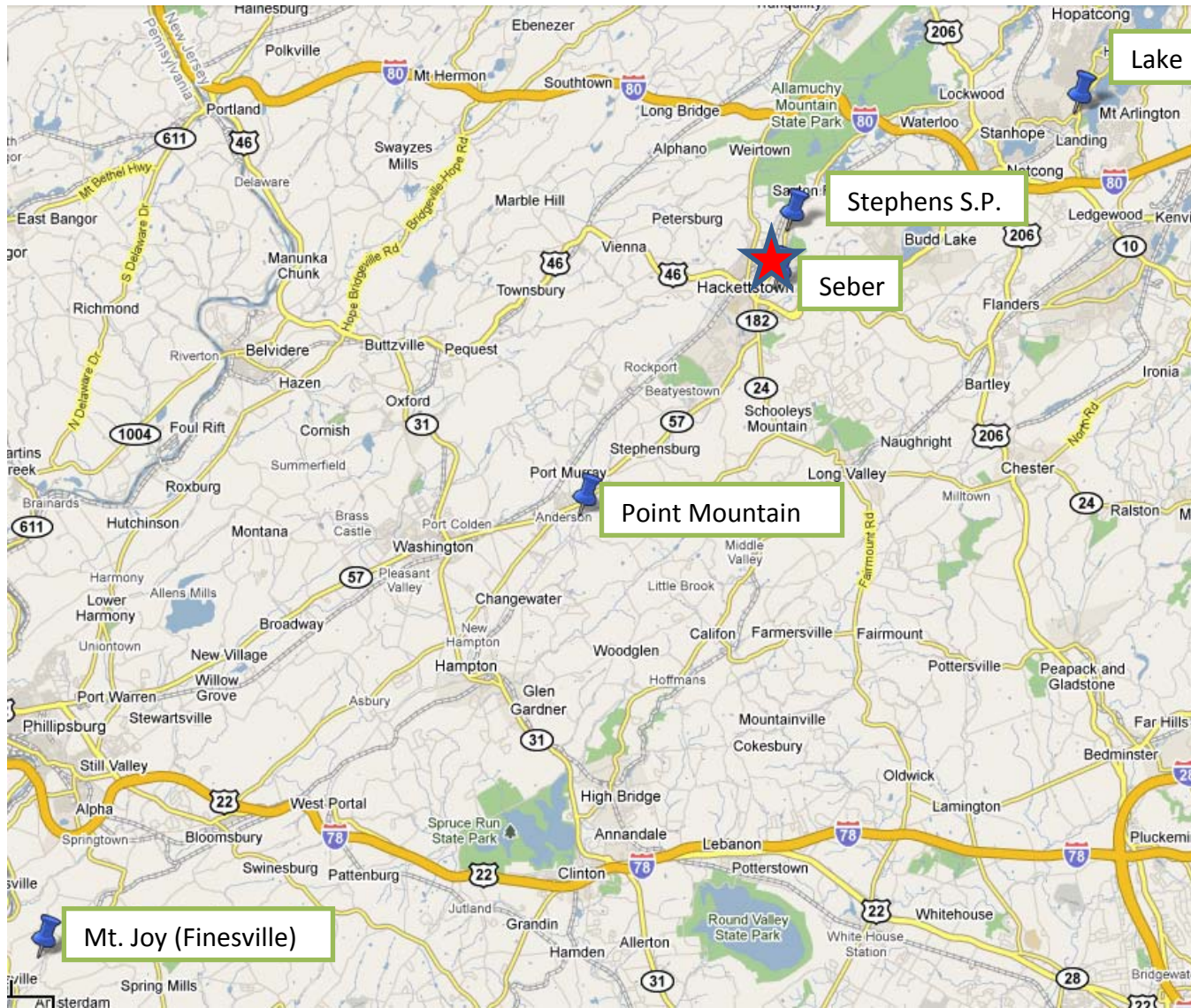
Musconetcong Watershed Association Seber Dam



MWA River Watcher Program

- Started in 2007 to establish baseline
- Philosophy-start slow and build on success
- 4 sites
 - Lake Hopatcong outfall
 - Stephens State Park
 - Point Mountain
 - Finesville
- Bio, Chem, Visual/Habitat, Photos

MWA River Watcher Baseline Sites



Lake Hopatcong

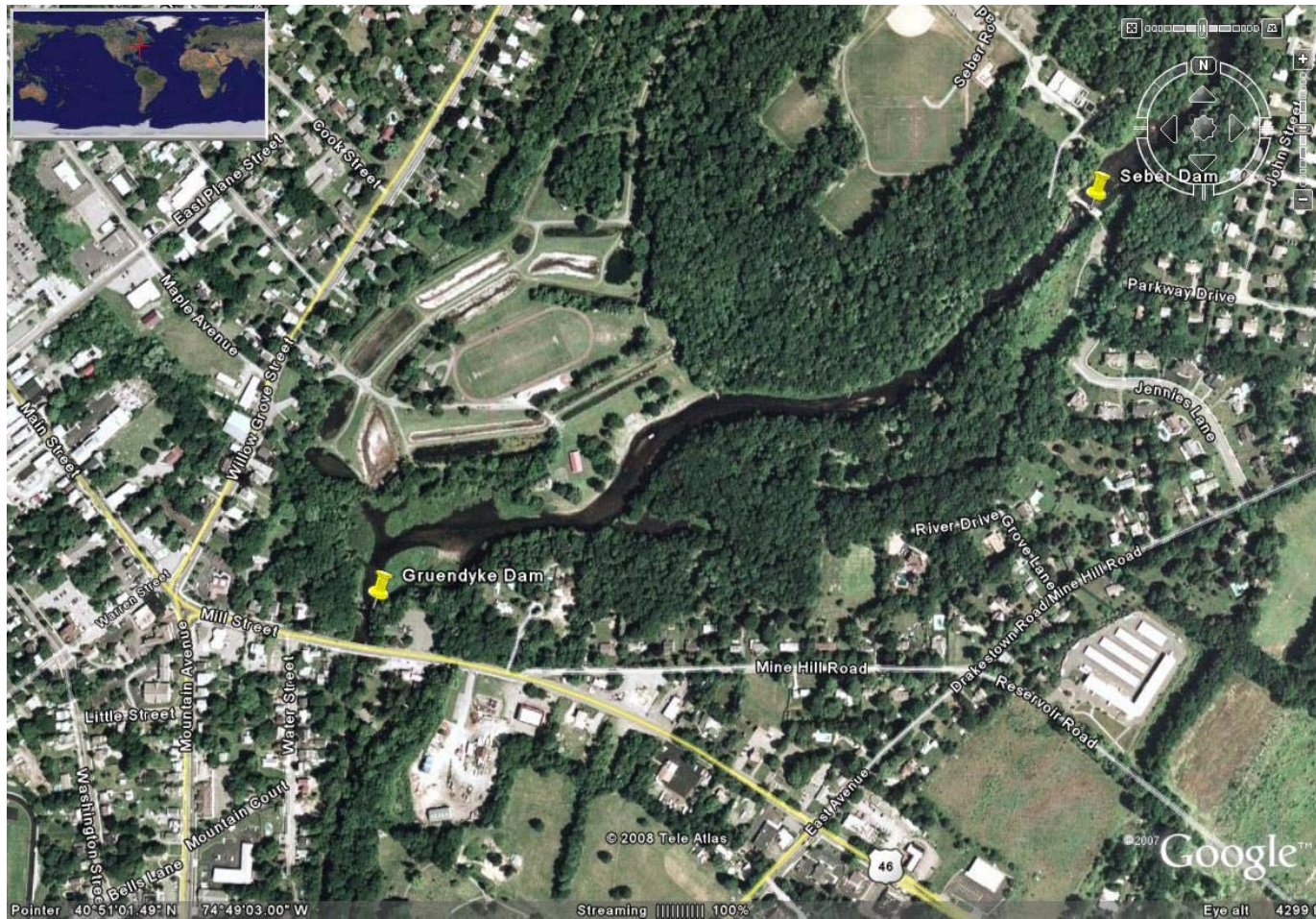
Stephens S.P.

Seber

Point Mountain

Mt. Joy (Finesville)

Musconetcong Watershed Association Seber Dam



Musconetcong Watershed Association Seber Dam – Upstream View



Musconetcong Watershed Association Seber Dam - Downstream View



Musconetcong Watershed Association Seber Dam Breach February 2009



Adjust Methods to Fit Data Use

River Watcher

- Bio
 - Modified SOS
 - 1 sq meter kick
 - Seine type net
 - ID and count by VM to order/family
- Chemistry
 - LaMotte kits (DO, N, pH)
- Visual/Habitat
 - NJDEP VM Assessment
- Physical
 - Temperature*
 - Flow (average W x D x Reach length/Float time)
- Photos

Seber Dam Monitoring

- Bio
 - SOS
 - Five minute kick
 - D-frame net 800u
 - Sept sample ID + count by Normandeau to genus/species
- Chemistry
 - LaMotte (DO, N, pH)
- Visual/Habitat
 - NJDEP VM Assessment
 - In September used RBP
- Physical
 - Temperature*
- Flow
- Turbidity (Tube)
- Photos from specific locations

Physical Changes to Seber Site

- Before

- Width at bank full=160ft
- Depth at bank full=7 ft

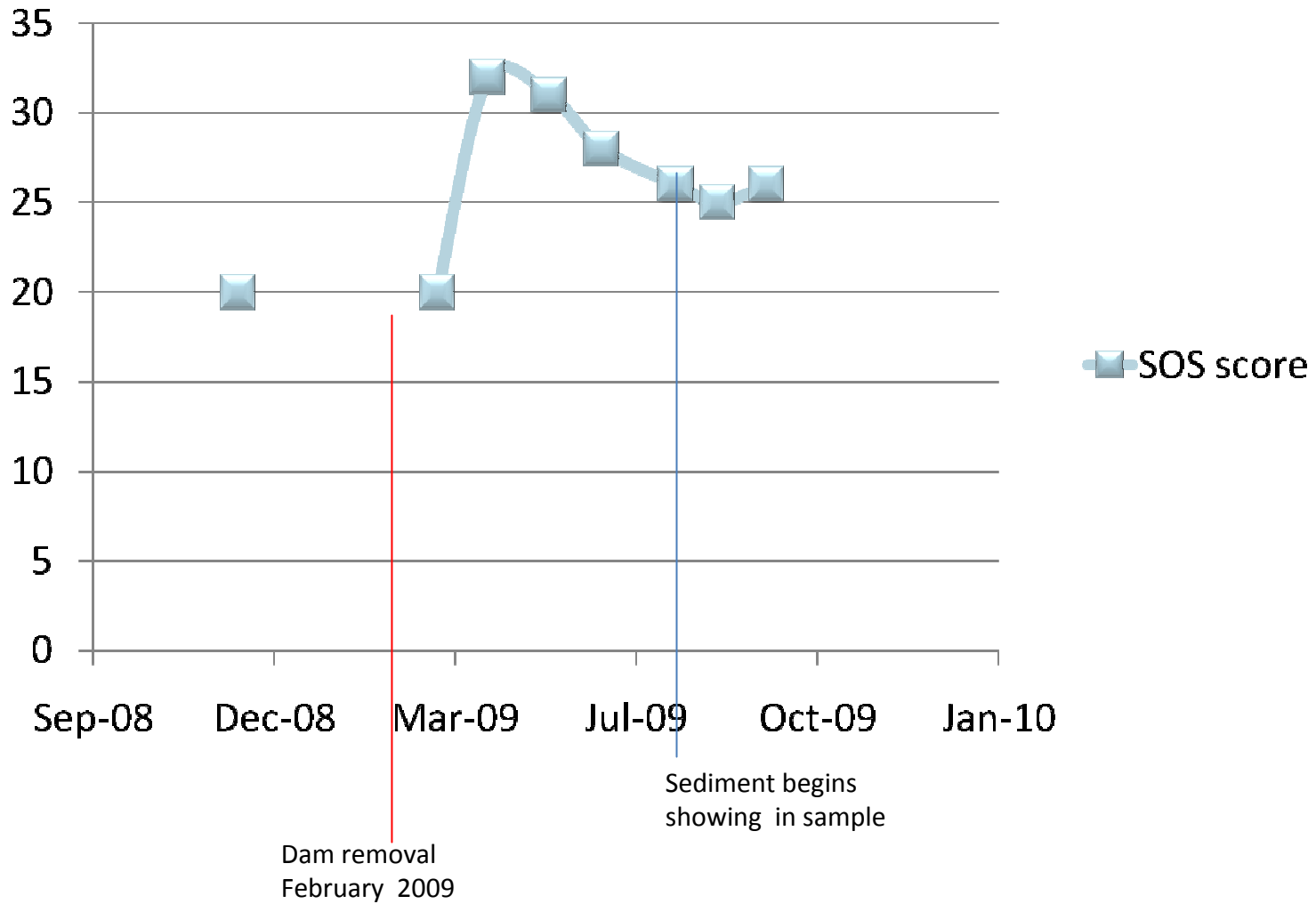


- After

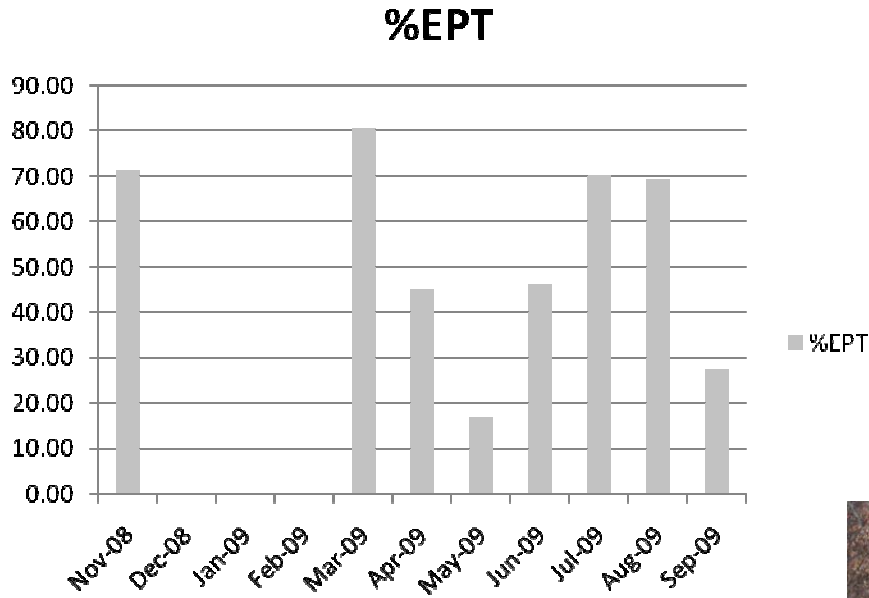
- Width =80-102 ft
- Depth =14-22”



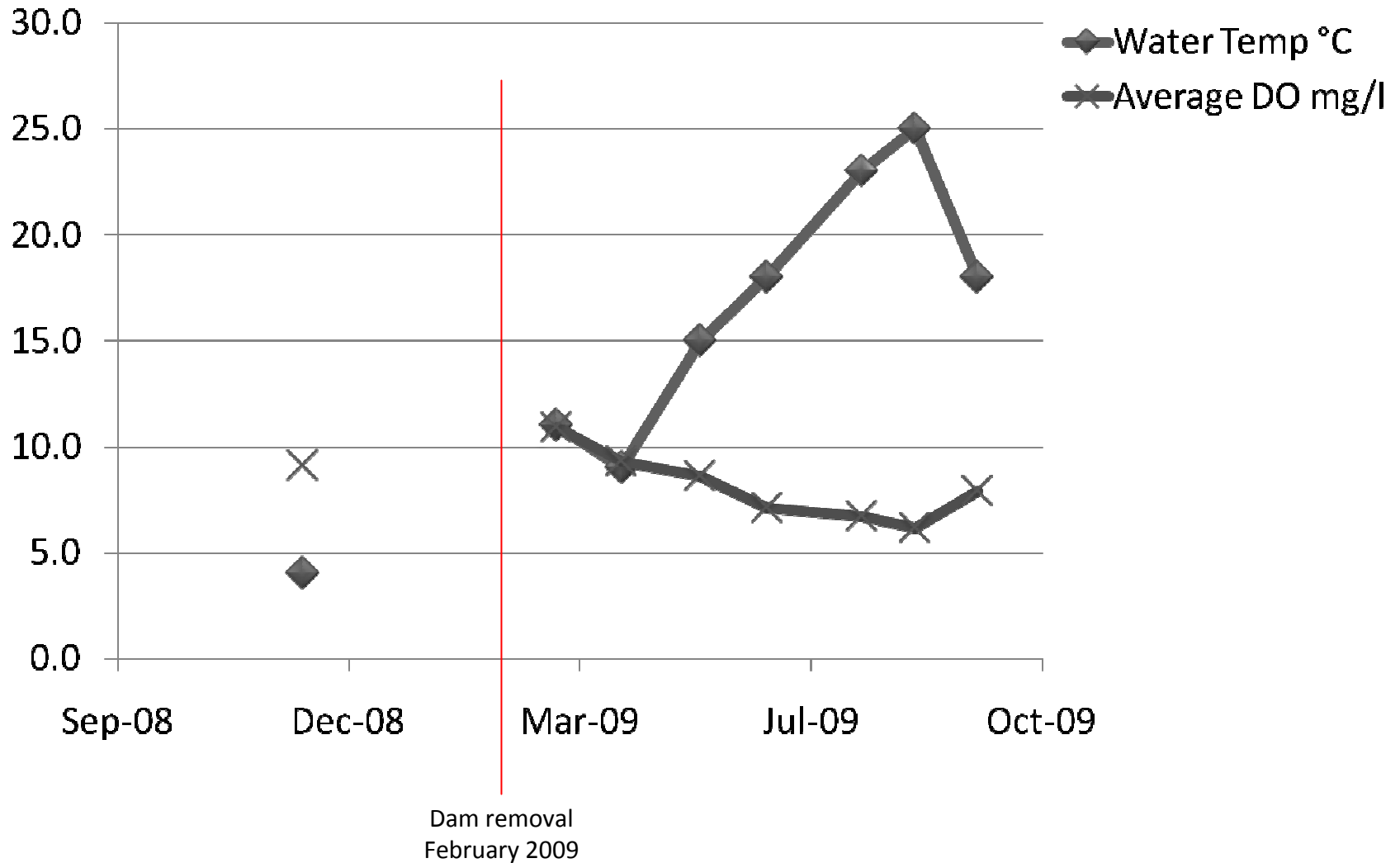
Biological Assessment Scores at Seber (SOS)



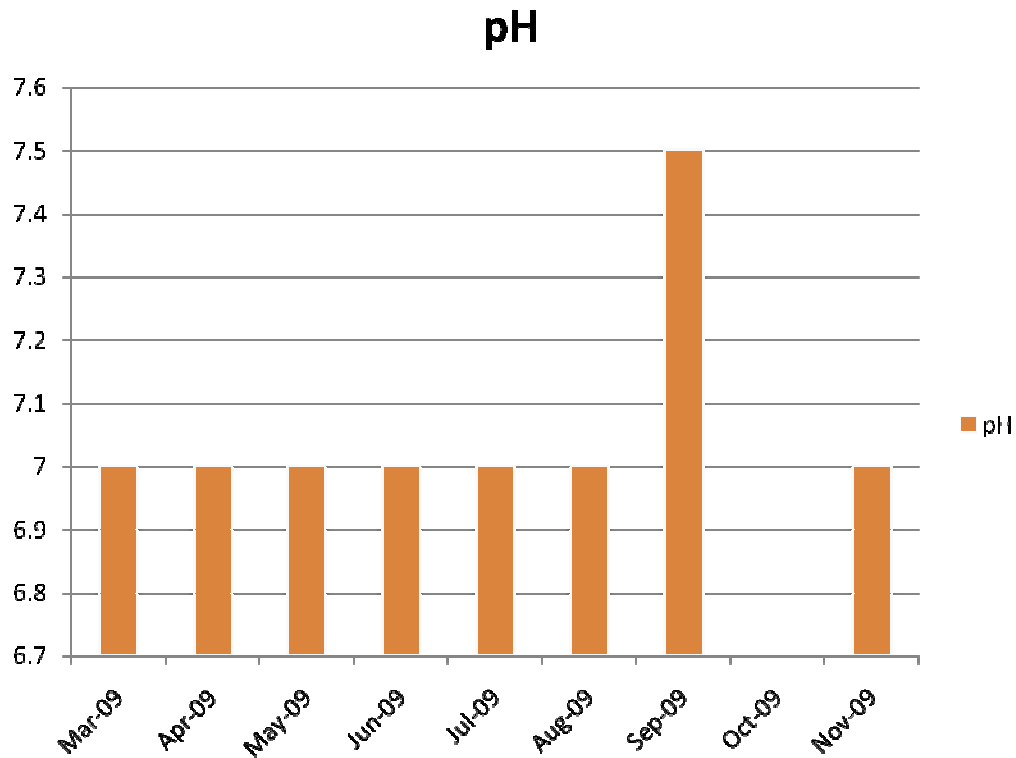
EPT at Seber



Water Temperature vs Dissolved Oxygen at Seber Dam site

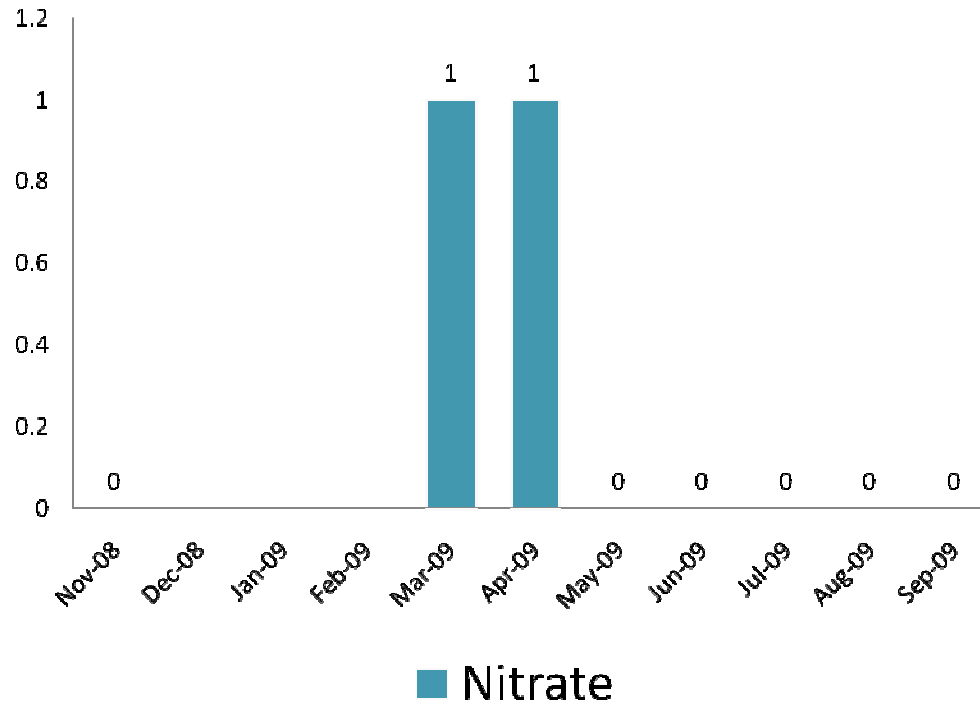


pH at Seber Dam site



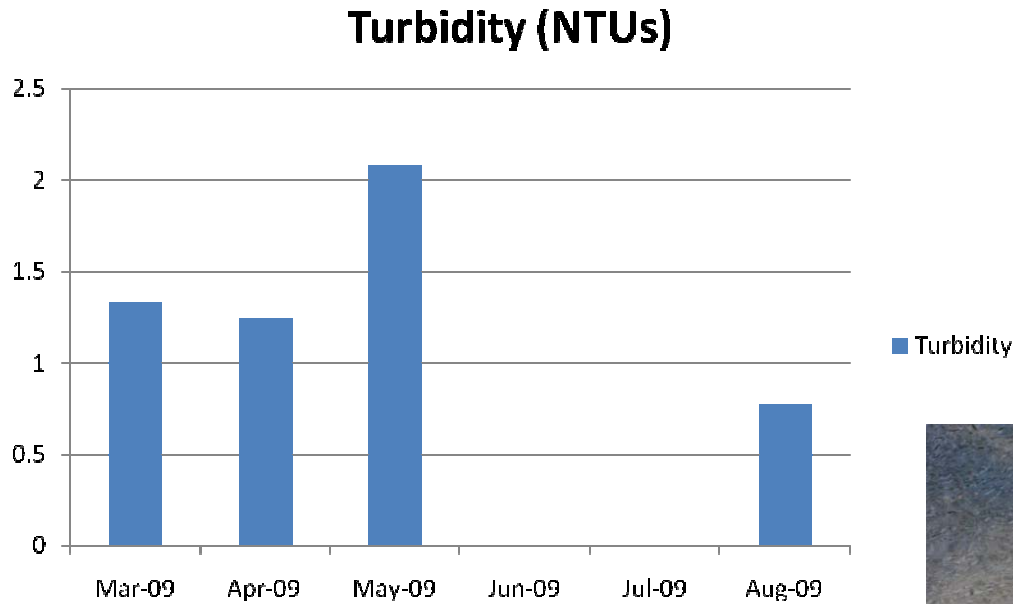
Almost no change is pH at dam site

Nitrates at Seber



Nitrates do not appear to be a significant factor at the dam site

Turbidity at Seber-NJDEP VM Program



Turbidity appears in the normal range during study time



Abundance of sediment above site in May 2009

Lessons Learned

- Start monitoring as soon as you can
- Monitor upstream of the dam as well as downstream at a minimum
- Include a reference reach in your study for comparability

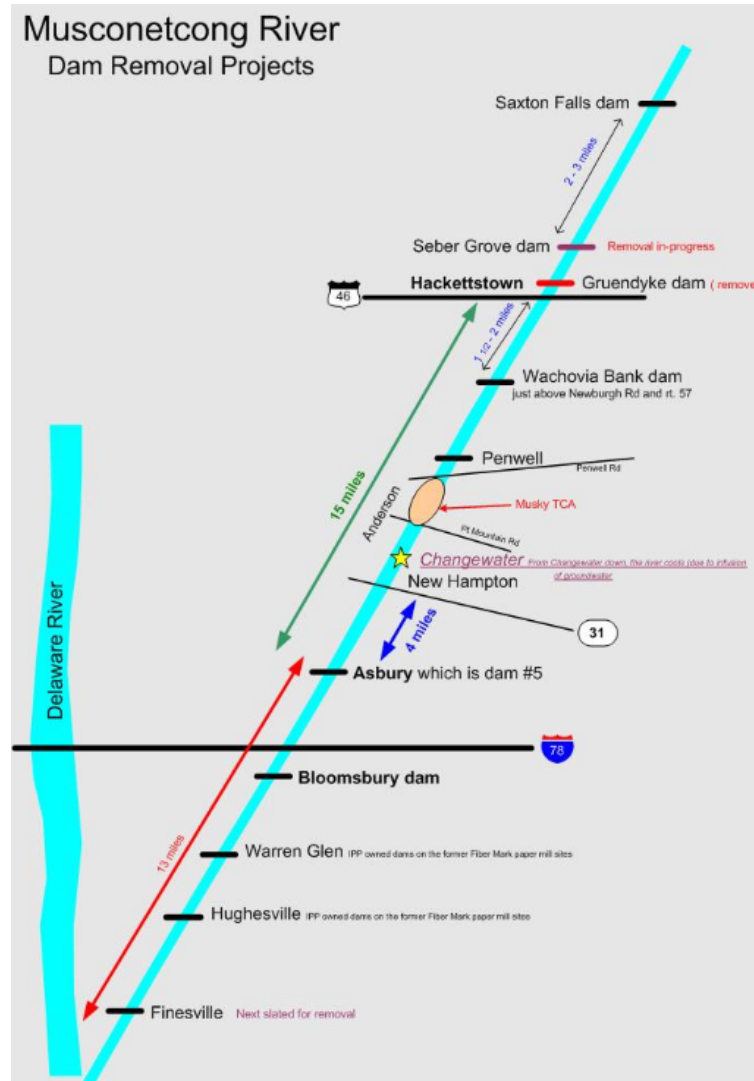


Things to consider



- Dam Removal timelines affect your study layout
- Where should you monitor and how many samples should you take?
- How will the data you generate compare to other data you may be collecting elsewhere on the river?
- Are your volunteers available at all of the times you need them?

Upcoming Projects



From Greg Sabol, TU

Musconetcong Watershed Association Warren Glen and Hughesville Dams

Application is in for
Feasibility Study!



Finesville Dam: final public meeting Dec. 1, 2009



Thanks to our volunteers at Seber!

Chuck Gullage

Andy Peterson

Don Proefrock

Erik Henriksen

Bob Hamilton



...and Luke Diglio of Montclair State University

Musconetcong River Partner List

Natural Resources Conservation Service – Natural Resources Conservation Service – technical assistance and financial assistance on riparian buffer restoration

US Fish and Wildlife Service – technical assistance and financial assistance from the Partners for Fish & Wildlife Program

The National Oceanographic and Atmospheric Administration – technical and possible financial assistance through the American Rivers-NOAA Community-Based Restoration Program.

American Rivers – technical, outreach, and regulatory assistance, and possible financial assistance through the American Rivers-NOAA Community-Based Restoration Partnership and other grant funding.

North Jersey RC&D Council – technical assistance and financial assistance on riparian buffer restoration.

Musconetcong Watershed Association –local landowner outreach, education, technical assistance.

NJ Division of Fish and Wildlife – technical assistance on local fisheries issues.

Trout Unlimited – in-kind volunteer assistance from membership and possible limited financial assistance from local TU funds.

National Park Service

Corporate Wetland Restoration Partnership - financial assistance