

# Dam Removal Overview

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American Rivers

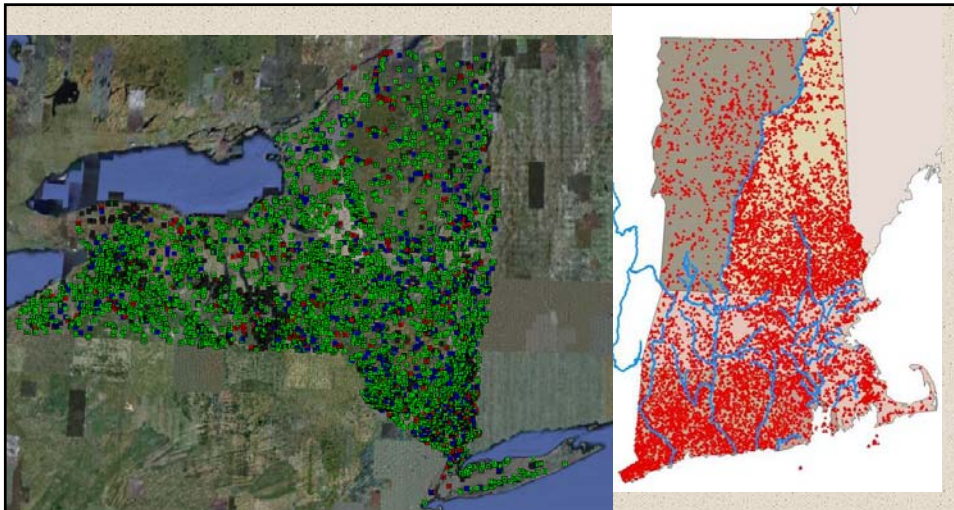


Rhode Island  
Land & Water Summit  
March 27, 2010





Nearly 800 dams have been removed around the country



More than 26,200 dams in state databases from Pennsylvania to Maine (6,701+ in NY)





# Goals:

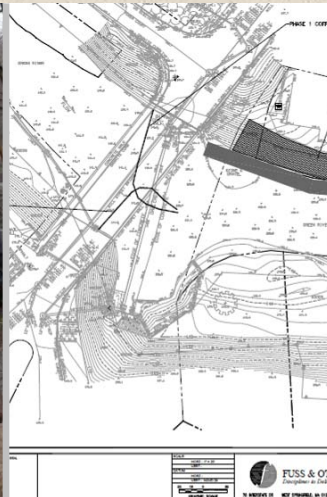
- 1) Understand the overall dam removal process
- 2) Show that much more is considered than just how to remove the structure



Expect that projects will take 3 years to complete



Year 1: Recon. and Prelim. Design



Year 2: Design and Permitting



Year 3: Implementation

Overall Process: General Steps



## Determine the challenges specific to your project



- Sediment quantity
- Sediment quality
- Dam size
- Dam condition
- Impoundment size
- Impoundment shape
- Surrounding infrastructure
- Surrounding environment

The depth of analysis should reflect the scale of the project:  
make easy projects easy and complex projects complex

## Dam removal projects have several steps

1. Initial Reconnaissance
2. Fundraising
3. Preliminary/Concept Design
4. Community/Stakeholder Involvement
5. Permitting (and pre-permitting)
6. Engineering and Restoration Design
7. Construction
8. Monitoring

Overall Process: General Steps

## The basic steps cover 4 major topics

**Fundraising**

**Social Issues**

**Permitting**

**Design/Construction**

Overall Process: General Steps

## Many funding sources exist

- US Fish and Wildlife Service
- National Oceanic and Atmospheric Administration
- Natural Resources Conservation Service
- State funds
- Corporate Wetlands Restoration Partnership
- Private foundations

Overall Process: Fundraising

## Funding hooks



Diadromous Fish



Brook Trout



Listed Species

Overall Process: Fundraising

## Social Issues/Community Involvement



- Some concerns are based on lack of information
- Some concerns are value-based
- Frequent concerns:
  - Flood control
  - Mudflats
  - Wetland loss
  - Historic
  - Recreation changes
  - Property values

Overall Process: Social Issues



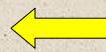


Digital rendering by L. Wildman



## Public Visioning

- Change can be a "loss"; provide a sense of "gain"



This is not real – it is a digital drawing!!!

## Some *short-term* impacts occur during construction



Sediment movement



Construction access



Habitat change


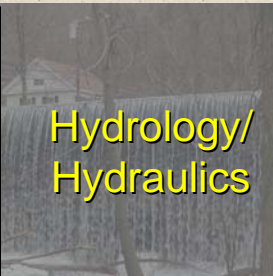




Overall Process: Long-Term Benefits/Short-Term Impacts



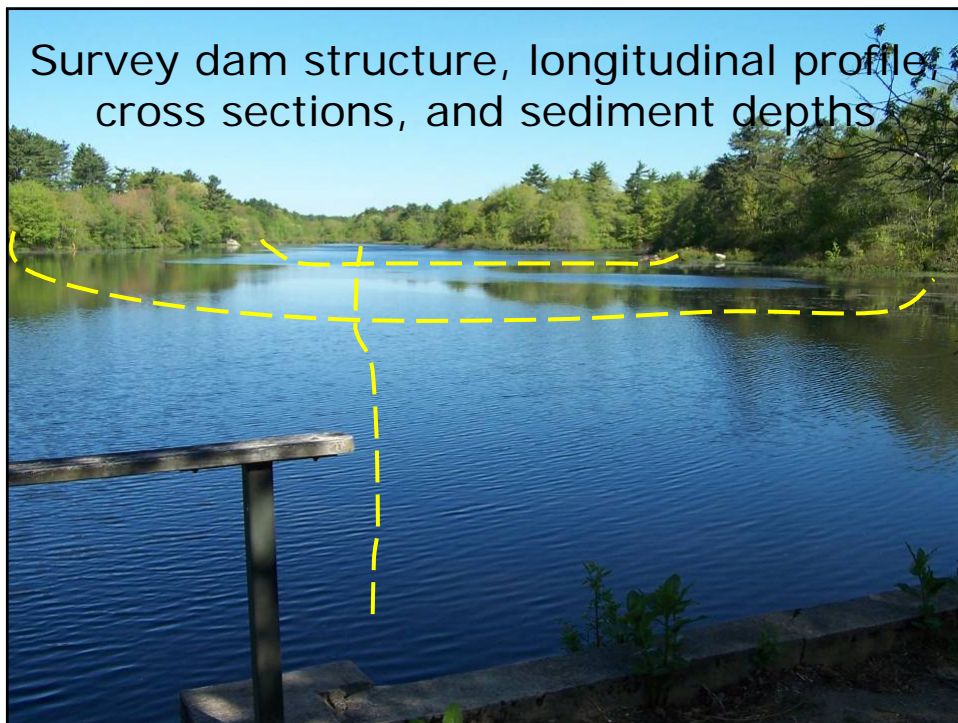
There are 3 potential long-term impacts if not managed well

		
Contaminants	T & E species	Infrastructure
Overall Process: Long-Term Benefits/Short-Term Impacts		

Understand the components of designing a dam removal

 <p>Data Collection/ Surveying</p>	 <p>Hydrology/ Hydraulics</p>	 <p>Sediment Management</p>
 <p>Protecting Infrastructure</p>	 <p>Species Protection</p>	 <p>Site-Specific Issues</p>

## Data Collection and Surveying

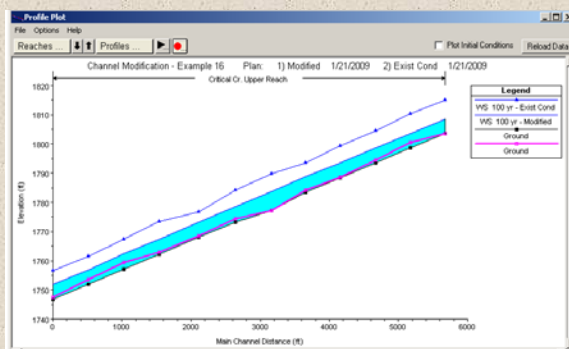




# Hydrology/Hydraulics




What's a HEC-RAS and when do you need one?



- Infrastructure protection
- To prove fish passage
- Post-project water levels for stakeholders
- Advanced sediment transport modeling
- To prove no flood control?

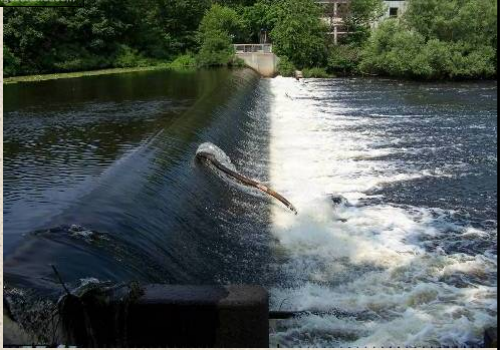
Design Components: Hydrology/Hydraulics



Does your dam provide flood control?  
Probably not


No Flood Storage Potential:  
has full impoundment and constant flow over spillway

Flood Storage Potential:  
has storage volume and flow through a controlled outlet



Design Components: Hydrology/Hydraulics

## Sediment Management



Sediment Management



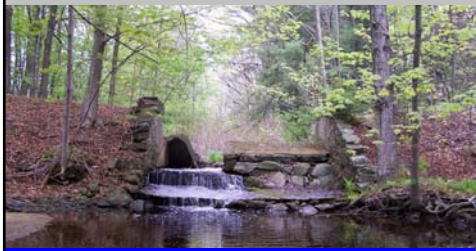
## Some general sediment thoughts



Consider background yield



Sediment can be beneficial or harmful



Not all dams have a lot of sediment



Not all sediment moves

Design Components: Sediment Management

## Assess the quantity, particle sizes, quality, and potential mobility of impounded sediment



Quantity



Particle sizes



Quality



Potential mobility

Design Components: Sediment Management

There are several approaches to managing clean sediment (depending on quantity and particle sizes)

- Natural erosion
- Sediment removal (dredging)
- Stabilize in place
  - Open dam gates
  - Remove dam slowly
  - Remove dam in stages
- Combined approaches

Design Components: Sediment Management

There are fewer approaches to managing contaminated sediment



- Management options
  - Remove and dispose
  - Isolate and cap
- If contaminant management is necessary, can greatly add to cost of project
- Conundrum: dams are not good hazardous waste containment facilities

Design Components: Sediment Management



# Protecting Infrastructure



Consider whether any infrastructure is at risk



Management approaches: always consider if infrastructure can be moved first; next consider direct stabilization



Bridges



Utilities



Retaining walls

Design Components: Protecting Infrastructure

## Species Protection



Species Protection



## Manage for Aquatic Species



Design Components: Species Protection

## Site-Specific Issues



Dam uses can often be replaced

Design Components: Site-Specific Issues

Data Collection/ Surveying	Hydrology/ Hydraulics	Sediment Management
Protecting Infrastructure	Species Protection	Site-Specific Issues



Understand the components of  
(de)construction



First, slowly drain the impoundment



We almost never use explosives in the northeast



Construction Approaches

Most commonly a backhoe with a hydraulic hammer will breach one side and then move across



Construction Approaches



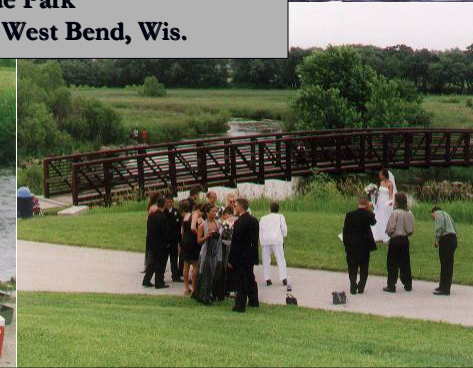


Woolen Mills Dam,  
Milwaukee River,  
West Bend, Wisconsin

One week after  
removal, Winter 1988



**Riverside Park  
Milwaukee River, West Bend, Wis.**



Billington Street Dam  
Town Brook, Plymouth, MA



Before



During (fall 2002)

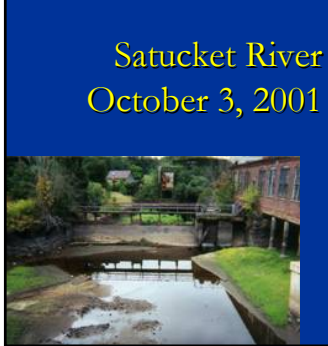


After (fall 2004)





Cotton Mill Dam  
Satucket River August  
11, 2001

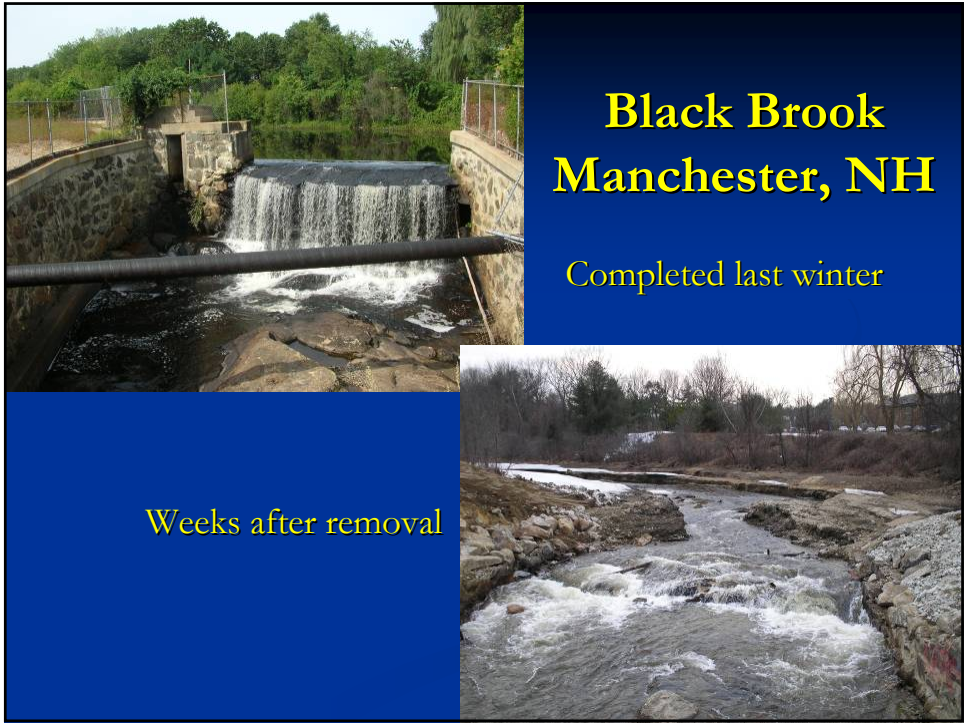


Satucket River  
October 3, 2001



Merrimack Village Dam  
Souhegan River  
Merrimack, NH





**Black Brook  
Manchester, NH**

Completed last winter

Weeks after removal



Dam Removal Clearinghouse:  
<http://www.lib.berkeley.edu/WRCA/damremoval/index.html>

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**American Rivers**  
*Thriving By Nature*