



**NOAA  
FISHERIES**

# Planning to Implementation: Recognizing and Stepping through the Process

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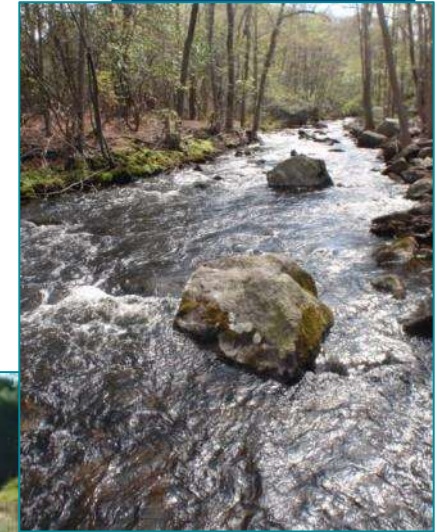
Dam Removal and Ecological Restoration 101 Training

Clark University, Worcester, MA

October 26, 2023

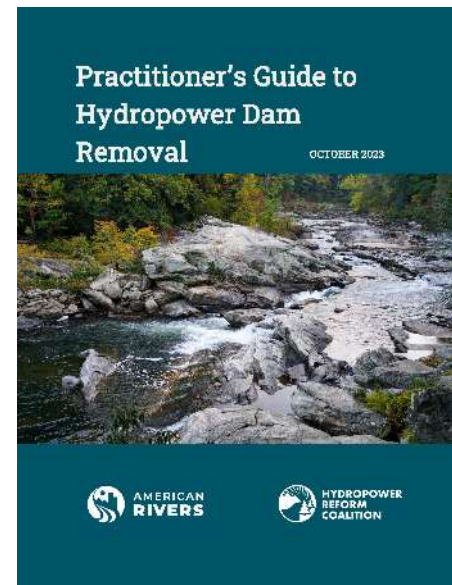
# Presentation Outline

- Build a project team with a purpose and goals in common
- Engage in collaborative a process to achieve common project goals
- Identify project conditions, constraints, and challenges
- Develop strategies to advance to project completion
- Project costs and planning your budget



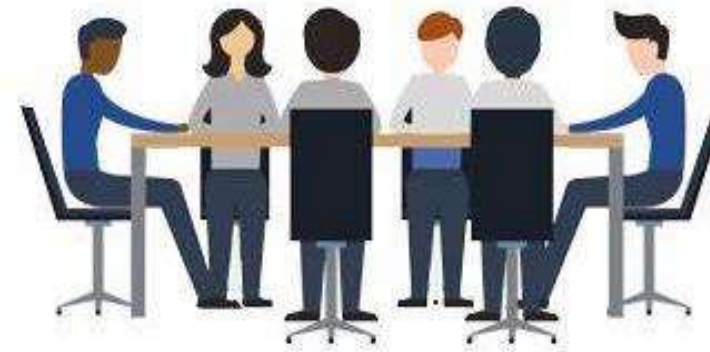
# Qualifier: Distinguishing Types of Dam Removal

- Focus on run-of-river, aging dams with no longer an intended purpose
- Many are old mill sites with dams that once produced power
- Dams also constructed for generating hydropower
- Some licensed by FERC, some are exempt from licensing
- FERC-licensed dam decommissioning now targeted in the Northeast
- See: <https://www.americanrivers.org/HydroDamRemovalGuide>
- Katie Schmidt, [kschmidt@americanrivers.org](mailto:kschmidt@americanrivers.org)



# Building a Dedicated Project Team

- **What is YOUR role?**
- Project manager: Leads project throughout
- Town manager: Minimize costs to town
- Town solicitor: Minimize town liability
- State resiliency agency: Reduce flood risk
- State natural resource agency: Restore fish and wildlife habitat
- NOAA, USFWS: Provide funds for fish passage
- Watershed NGO: Restore healthy river, public access for members
- Recreational NGO: Provide canoe and kayak opportunities
- Engineering consultant: Apply expertise supporting project proponent and partners
- Grant writer: Prepare materials to secure federal, state, private foundation funds



# Follow a Stepped, Phased Process

- Upfront assessment and feasibility analysis
- Public engagement and input
- Design – conceptual through final plans, specifications, and construction bid documents
- Public engagement and input
- Regulatory permitting – local, state and federal
- Construction bidding and contract award
- Public update
- Implementation and construction oversight
- Post-project adaptive management, performance monitoring



# Project Schedule and Realistic Timeframe

- Upfront assessment and feasibility analysis – **9-12 months**
- Public engagement and input – **1-3 months**
- Design – conceptual to final plans, specifications, and construction bid documents – **12-18 months**
- Public engagement and input – **1-3 months**
- Regulatory permitting – local, state and federal – **9-18 months**
- Construction bidding and contract award – **2-6 months**

# Project Schedule and Realistic Timeframe

- Public notification – before and throughout construction
- Implementation and construction oversight – **3-12 months**
- Post-project adaptive management, performance monitoring – **3-12+ months**
- **Total project timeframe: 3.5-7 years**, patience and persistence required, expect the unexpected



# Project Constraints and Challenges

- Property ownership
- Engineering considerations and constraints
- Environmental conditions
- Regulatory requirements and permit conditions
- Cultural considerations
- Societal needs, social interests
- Political landscape and climate





# Property Ownership

- One entity versus multiple owners
- Willing public or private owner(s)
- Incentivizing owner to dam removal
  - Resolve dam safety deficiencies, consent order
  - Secure grant funds to help cover costs
  - Provide technical and project management assistance
  - Establish that dam removal benefits the public to reduce flood risk and liability
  - Address public safety
  - Generate recreational opportunities
  - Provide greater community resilience to a changing climate



# Engineering Considerations

- State Office of Dam Safety dam condition designation
- Mill and other on-site structures and utilities
- Upstream and downstream infrastructure
- Water management strategies for dam removal
- Cost-effective and safe construction equipment access
- Impoundment sediment and site material transport and disposal



# Engineering Considerations

- Efficient and effective fish passage
- Channel bed adjustment, sediment transport
- Riverbank and outfall stability
- Effects of channel headcutting
- Site restoration and reuse
- Discovery of legacy dams
- Adaptive management practices



# Environmental Conditions

- Migratory fish passage and habitat restoration
- Sediment quantity, clean or contaminated
- Freshwater mussel populations
- Rare, threatened and endangered species
- Wetlands and floodplain
- Riverine versus tidal hydrology
- Invasive species colonization



# Regulatory Requirements, Permit Conditions

- Natural sediment release
- Sediment management
- Wetland permits, Water Quality Certification
- Time-of-Year in-water work period
- Freshwater mussel relocation
- Post-project monitoring and reporting
- Adaptive management requirements



# Cultural Considerations

- Designated National Historic District
- Historic features, resources, and context
- State Historic Preservation Office consultation
- Tribal interests and consultation
- Local historical societies, other interested parties
- Legacy dam discovery or other unanticipated outcomes



# Societal Needs, Social Interests

- Municipal and private water supplies
- Fire-suppression water
- Upstream water-dependent businesses
- Public safety hazard and flood risk
- Nearby park and other public open space
- Public access and recreational uses
- Flat-water boating
- Kayaking, canoeing, paddle-boarding
- Underserved community needs
- Personal sentimental values



# Political Landscape and Climate

- Local and state government play key roles in decisions
- Project opinion of and changes in mayor, town manager, and town council staff
- Special interest groups
- Ambushers
- Consensus-building is paramount.
- Decisions based on factual information





# Range of Potential Outcomes

- Full dam removal – all river eco-services restored
- Partial dam removal – reduced height or shortened structure length
- Dam removal with nature-like fishway
- Dam repair and technical fishway installation
- Dam repair and bypass channel



# Project Costs and Budget Planning

- Consider past experiences and cost databases
- Implementation costs prepared by project engineer using RS Means and/or other data sources
- Duda et al. 2023: Predictive cost model with six variables:  
<https://wrises.shinyapps.io/DamRemovalCostPredictiveModel/>
- 2018 NMFS project record analysis of 53 NER projects completed, 2007-2017, including 37 dam removals, mean dam height of 8.9ft.
- Cost for each project phase converted to 2018\$ using CPI.
- Cost developed as cost/foot-rise of overall set of dams



# Project Costs and Budget Planning

Project Type	Total Project Cost Range (2018\$)	Mean Cost/Foot Rise	Median Cost/Foot Rise
Dam Removal (N=37)	\$26,980 - \$5,367,587	\$115,130	\$83,264
Technical Fishway (N=12)	\$373,102 - \$4,874,388	\$128,544	\$112,058
Nature-like Fishway (N=4)	\$553,429 - \$6,538,680	\$255,270	\$244,709

- Project costs and time substantially increased with construction components including:
  - Removal and disposal of contaminated sediments, soils, and/or debris
  - Relocation of underground utilities
  - Historic archaeological features and documentation
  - Stabilization of upstream infrastructure
  - Restoration of riparian floodplain habitat with fill removal, grading and plantings
  - Effects on and repair or replacement of private shallow-water wells



# Thank you for listening and your efforts in river restoration!

