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Session C2- Thanks for putting in that fish ladder: Can you remove the dam now?

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American Rivers

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Who is American Rivers?

- Founded in 1973
- National, non-profit, river conservation organization
- American Rivers protects and restores America's rivers and the clean water that sustains people, wildlife, and nature.
- River Restoration Program works on both dam removal and floodplain management projects and issues

American Rivers
Thriving By Nature

Fish Passage as Primary Driver?

- In fact, there is a distinct divide between projects that are strongly driven by fish passage objectives and projects driven by other factors.
- Essentially, fishways are virtually always driven by fish passage. Dam removals are rarely driven solely by fish passage.
- Removal costs vs. fishways:
  - Fishway rule of thumb: $50,000 per vertical foot
  - 2-5 feet $11,460 median cost per vertical foot
  - 6-10 feet $9120 median cost
  - 11-15 feet $10,780 median cost
  - 16-25 feet $16,450 median cost
  - 26 + feet $23,870 median cost
- In general, this makes dam removal 3-5.5 times cheaper than fishways and does not include costs for dam repairs that may precede fishway construction

Multiple Objective Solutions

- In many states, full dam removal projects are more common than fish ladders. Dam removals are motivated by a suite of factors, fish passage being only one. Yet dam removals are most effective and guaranteed fish passage and we should capitalize on aging dam infrastructure, changing community needs and aesthetics and cost-differentials to get to more removals.
- Society/communities are placing higher values on river functions beyond fish passage. Some of the strongest factors lie in the ability of dam removals to help address erosion, safety, water quality, sediment transport or flooding issues.

Older ladders aren't working

- This is inherently not a self-sustaining solution
  - Dam removals are driven by multiple factors, but in 5 of the 21 cases of removals of dams with ladders that we found, suboptimal function of the ladder was a key factor of interest to state or federal parties.
  - We compiled info from 13 states, none of which had distinct performance standards for fishways

Maintenance Problems

- Monitoring passage or evaluating the safety and function of fishways is rarely conducted. Dam Safety inspections may report debris in fishway, but these inspections are infrequent.
- Of the cases of subsequent removals we identified, 76% had ladders that were not being maintained
- The need for ongoing maintenance (minor-clearing debris, major-structural repairs) can be a factor that may open up a conversation about fish passage into one about full removal, as is now occurring on the Brandywine in Delaware
- Some maintenance requires expense or technical expertise. FERC facilities may be equipped with trained staff, but municipalities, state parks, private owners, etc are less likely to be able to visually assess a problem. This could be particularly problematic if a dam owner is motivated to protect their dam at the cost of a fish passage facility's short or long-term operations.

Multiple species popularity

- Multiple species approaches are gaining popularity
  - In line with the changing community thoughts about dams and their impacts, communities are increasingly looking for projects that offer a long-term solution to multiple problems
  - Addressing passage for instream and riparian species through dam removal can offer opportunities to improve overall corridor connectivity, an issue which has been heavily communicated to citizens & communities by conservation groups and recreation/tourism entities

Regional Context

- West Coast salmon passage projects have a very different context given the significant public support for salmon restoration and the continued existence
- Midwest passage has long been overlooked due to lack of anadromous species, now hamstrung by invasive species issues
- East Coast passage projects suffer with species that have not been present in a cultural context for decades, people have complacency and disbelief about restoration potential and less understanding of the value of restoration

Statistics

- In querying 13 states, we found 21 projects (some completed, some in planning stages) where the dam had previously had a fish ladder installed
- Of those cases, 4 have already been removed, another 7 are in planning/design phases
- Primary driver of the project was improved fish passage: 5
- Remaining projects were motivated by standard dam removal drivers

Interesting Cases

- Brandywine Creek in Delaware in ~1970s had series of ladders installed which have been assessed and declared by DNREC to be “ineffective and poorly maintained”
- A new shad restoration-focused fish passage effort has led to new discussions about dam removal which will likely result in multiple removals in both Delaware and Pennsylvania

- Simkins Dam on the Patapsco River in MD, funded through ARRA and part of a larger restoration effort that includes 2 other dam removals
- Billington Dam on Town Brook in MA, removed in 2000 after earlier ladder failed and it wasn't a good investment to put a new ladder on an unmaintained dam
- Michigan has a removal candidate dam that has a fish ladder that has been negatively affecting its scores for restoration funding

- Recently completed removal on Dunkard Creek in PA for a dam on a warmwater system that had an original 1914 ladder
- Another project is currently underway in PA with a bypass channel built in the 1980s for walleye passage, current monitoring indicates walleye are not using passage
- One of the grandfather projects of dam removal: Embrey Dam, Rappahannock River, VA, had pool & weir fishway that never passed alosines, removed in 2004/05

- Dam in VA had a Denil installed in 2003, but then had a significant breach in 2009 that has allowed for passage through dam, Denil has been dewatered by breach

Technical v. Social Issues

- Most technical issues at dam removals are addressed through critical issues assessment
- Many social issues are not appropriate or relevant to a critical issues analysis and should instead be broken out as Real or Perceived and Informational or Value

Sequential Alternatives Analysis for Fish Passage

Need for fish passage is identified

OR

Dam costs or liability initiate consideration of dam removal

Feasibility Assessment for Preferred Dam Removal Alternative

Initiate Field Investigation for Removal

Identify Critical Issues

Assess Critical Issues

Sediment Quantity & Quality
Infrastructure Stability-bridges, road embankments
Fish Passage
Utilities-gas lines, sewer & water lines
Access
Underlying Bedrock Configuration
Comparative Costs
Endangered, Threatened & Special Concern Species
Historic Concerns
Dam Owner Concerns-liability, future obligations

One of the critical issues makes dam removal infeasible

Investigate Other Alternatives For Fish Passage-prioritizing options with maximum species and highest efficiency

- Partial Removal Of Dam
- Denil Fishway
- Alternate Fishways & Configurations

Selection of Preferred Alternative

All of the critical issues can be resolved and are able to meet the project goals with feasible funding levels

Dam Removal is Feasible

Prepare Preliminary Design and Cost Estimate

Modified from Wildman

Thank you!

- Questions?

Abstract

- **Thanks for putting in that fish ladder: Can you remove the dam now?**
- Meeting fish passage objectives is one primary driver for modifying conditions at dams and other barriers. American Rivers has been involved with a number of dam removal projects for dams that had ladders or fishways. We propose a few reasons why this phenomenon is occurring: 1) Society/communities putting a higher value on the river functions that fish ladders cannot provide; 2) Older fish ladders are failing to meet their objectives; 3) Maintenance problems exist; and 4) Multiple species approaches are gaining popularity. American Rivers will describe the extent of these types of projects, present a few example cases and provide a decision-tree that is a combination of "best fit" for the projects we have seen thus far and a thought process to provide additional perspective to project managers who are evaluating fish passage.