Session B8- Evaluating Diadromous Fish Passage at Lower Shannock Falls Dam Removal and Nature-like Weir Installation, Pawcatuck River, Rhode Island

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Presenter Information
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Evaluating Diadromous Fish Passage at Lower Shannock Falls Dam Removal and Nature-like Weirs Pawcatuck River, Rhode Island

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National Conference on Engineering and Ecohydrology for Fish Passage, UMass, Amherst, MA June 27-29, 2011
Lower Shannock Falls Dam Removal, along with Horseshoe Falls Fishway and Kenyon Industries Dam Removal
ARRA Award, June 2009
Wood-Pawcatuck Watershed

Pawcatuck River Watershed
300 mi²

Project Site
87-mi² watershed

Rhode Island

Map Source: WPWA
Fish Passage Goal: Unimpeded Passage by Target Species and Design Criteria

**Target Species:**
- Alewife (*Alosa pseudoharengus*)
- Blueback herring (*A. aestivalis*)
- American shad (*A. sapidissima*)
- Atlantic salmon (*Salmo salar*)
- American eel (*Anguilla rostrata*)
- Resident fish species (e.g., Brook trout)

**Alosid Run Period Design Flows:**
- 10% Non-Exceedance = 85 cfs
- 50% Non-Exceedance = 175 cfs
- 90% Non-Exceedance = 356 cfs

**Herring Design:** Minimum 9-inch Depth, <7 ft/s v (?)

**Shad Design:** Minimum 12-inch Depth, <6 ft/s v (?)

Fish Flow and Hydraulic Analyses: KCI Technologies
Lower Shannock Falls Dam Pre-Removal

Low Flow

High Flow

Low head, Run-of-the-river dam
7-ft height (4-ft high structure on bedrock), 105-ft length

500-Year Event (March 2010)
Site Conditions

Knowles Mill Remains (Removed)

Historic Smoke Stack (Preserved)

Impoundment (13+ ft deep)

Mills Remains in Downstream Riverbed
Water Diversion, Dewatering

June-August 2010

Dam Removal
Dam Removed
Former Dam and Modified Bedrock Ledge
In-Field Techniques

Bedrock Removal

Stone Anchoring/Pinning

Stone Placement
Test Flow Measurements
August 26, 2010

Photos: Fuss & O’Neill
Backwatering weirs at 90 cfs flow (11 November 2010)
Weir Hydraulics

Q=90 cfs

Q=225 cfs

Q=450 cfs

2.26 ft drop

High Turbulence

Boating Hazard

Weir 2 Drowned Out
Proposed Modifications

Implementation
Late Summer 2011
Natural Grade Drops Exposed with Impoundment Drawdown
Cost Summary
Lower Shannock Falls Hybrid Dam Removal
(Dam Removal with Nature-like Fishway Components)

Feasibility Assessment = ~$42,300 (2006$)

Design and Permitting = $187,260 (2009$)
(Included SHPO coordination, public workshops, easements)

Construction and Oversight = $588,910 (2010$)
(Included removal/disposal of 105 cy contaminated sediments, one private well replacement)

Post-Construction Monitoring = ~$25,000

Total Project Costs = $843,470

Cost/Foot-Rise for Construction = $82,000
Lessons Learned

- Organize an interdisciplinary fish passage project team that is well experienced in fishery biology, hydrology/hydraulics, sediment transport, and water management.

- Bedrock modification should be considered a practice in combination with dam removal and nature-like fish passage projects if needed to meet fish passage effectiveness and efficiency objectives.

- Recognize that performance of fish passage through telemetry studies or other techniques may require 3-5+ years to conclude whether goals are met.

- Recognize that nature-like fishways should be constructed in “dry” conditions to attain proper elevations and other design features requisite for fish passage; test flows during the latter construction period if possible to evaluate site hydraulics that will support effective fish passage.

- In the absence of telemetric studies, complete surveys of fish passage season WSEs and water depths (and velocities if equipment and time available) for comparison to predicted/designed/construction conditions.