Horseshoe Falls Dam Fish Passage Project

Public Informational Meeting
Richmond/Charlestown, RI

September 21, 2010

Wood-Pawcatuck Watershed Association
Agenda
Horseshoe Falls Dam Fish Passage

• Introduction
• Project Background
• Project Description
  – Site Description
  – Previous Dam Assessments and Current Condition
  – Feasibility Study Alternatives Evaluations
  – Fish Passage Target Species
  – Fish Passage Design Alternatives
  – Final Design and Construction Sequence
• Questions and Discussion
Site Description
Horseshoe Falls Dam Fish Passage

USGS Site Location Map
Site Description

Horseshoe Falls Dam Fish Passage

Wood Pawcatuck Watershed Association Fish Passage Projects

- Lower Shannock Falls Dam Removal and Fish Passage – Completed 2010
- Horseshoe Falls Dam Fish Passage – Permitting Completed, Design 70% Complete
- Kenyon Mills Fish Passage – Design 20% Complete, Permitting Underway
Site Description

Horseshoe Falls Dam Fish Passage

Richmond

• 1759 - Saw & Grist Mills (Jeffrey Wilcox)
• 1771 - Bought by Clarke Family, Added a Woolen Mill
• 1848 - Added additional Stone Cotton Mill, Five Mill Houses and Store (Clarke Family)
• 1925 - Horseshoe Dam Spillway Raised, Original Waterwheel Replaced with Hydroelectric Turbine
• 1964 - Mill Closed, 1972 Clark Family Sold Mill Holdings
Charlestown

- 1845 – Linen and Wool Goods Factory (Knowles Family)
- 1848 Bought by Samuel A. Hoxie, Converted to Cotton Mill
- Mill Burned in 1856
Site Description
Horseshoe Falls Dam Fish Passage

Figure 5-12. Ca. 1942 aerial photograph of Upper Shannock Falls village (source: www.driftways.com).
Site Description

Horseshoe Falls Dam Fish Passage

Aerial Site Location Map
Agenda
Horseshoe Falls Dam Fish Passage

Previous Dam Assessments and Current Condition
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

- 1984 Dam Inspection Report (RIDEM)
  - Concrete Crest of Spillway in Fair Condition
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

• **1993 Raceway Mechanism Failed**
  – 1993 - State Ordered Repairs to Raceway
  – 1997 - Plans were submitted and approved, repairs were never made
  – 1998 & 2000 - Stop logs placed in headgate
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

- **Current Dam Inspection**

Horseshoe Dam Structural Inspection – February, 2010
• **Current Dam Condition**
  - **Spillway Remains in FAIR Condition**
    - **Cracks/Leakage in Concrete Apron Behind Spillway**
    - **Voids on Stone Masonry Spillway Face**
  - **Embankment Walls in Fair Condition**
    - **Left Wall to be removed during construction**
  - **Damage/Deficiencies Noted on Raceway Walls**
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

Current Site Photographs

Horseshoe Dam – June, 2010
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

Current Site Photographs

Raceway – June, 2010
Previous Dam Assessments and Current Condition
Horseshoe Falls Dam Fish Passage

Current Site Photographs

Left Embankment Wall – February 2010
Agenda
Horseshoe Falls Dam Fish Passage

2007 Feasibility Study
Alternatives Evaluation
Feasibility Study Alternatives

TABLE 5-1
Summary of Alternatives Considered

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
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<tbody>
<tr>
<td>H-1</td>
<td>No Action</td>
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<tr>
<td>H-2a</td>
<td>High Gradient Riffles at Right Raceway</td>
</tr>
<tr>
<td>H-2b</td>
<td>Fish Ladders at Raceway</td>
</tr>
<tr>
<td>H-3</td>
<td>Fish Ladder at Left Abutment</td>
</tr>
</tbody>
</table>
Fish Ladder Through Right Raceway

A: FISH LADDERS / BYPASS CHANNEL

- Install Demil Fish Ladder at Risk
- Install Demil Fish Ladder and Gate Structure Entry
- Dam to Remain
- Install Boulder Diversion Wier

Figure 7-2: Alt. H-3 - Horseshoe Dam Fish Ladders Through Right Raceway

Source: August 2007
Malone and MacBroom Feasibility Study
2007 Feasibility Study Alternatives Evaluation
Horseshoe Falls Dam Fish Passage

Fish Ladder At Left Abutment

Flow Through Raceway to Remain

Repair Timber Stop-Log Structure

Dam to Remain = Repair as Necessary

Fortify and Replace Sections of Existing Abutment

Construct Demol Fish Ladder at Left Abutment

Figure 7-3
Alternate H-3 - Horseshoe Dam Fish Ladder at Left Abutment

Source: August 2007
Malone and MacBroom Feasibility Study
2007 Feasibility Study Alternatives Evaluation
Horseshoe Falls Dam Fish Passage

Alternatives Evaluation Summary Table

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Achieves Fish Passage?</th>
<th>Improves Habitat Conditions?</th>
<th>Minimizes Long Term Dam Maintenance?</th>
<th>Potential for Impact to Historic Resources?</th>
<th>Prudent and Feasible Alternative?</th>
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<tbody>
<tr>
<td>H-1</td>
<td>No Action</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>H-2</td>
<td>Ladder/Bypass Channel</td>
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<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>H-3</td>
<td>Ladder - Left Abutment</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: August 2007
Malone and MacBroom Feasibility Study
2007 Feasibility Study Alternatives Evaluation
Horseshoe Falls Dam Fish Passage

Denil Fish Ladder
Fish Passage Target Species
Fish Passage Target Species
Horseshoe Falls Dam Fish Passage

- Historic Passage
  - *Atlantic Salmon (possible)*
  - *Salter Brook Trout*
  - *American Shad*
- Alewife
- Blueback Herring
- Rainbow Smelt
- Brown Trout
- Brook Trout
- American Eel
Fish Passage Alternatives
Fish Passage Alternatives
Horseshoe Falls Dam Fish Passage

Final Design Considerations
Fish Passage Alternatives
Horseshoe Falls Dam and Fish Passage

- Alternate: Install Sluice Gates, Repair Channel Walls & Floor
- Alternate: Repair Leakage in wall below Carpenter Shop Floor

Proposed Fish Ladder
- 12 inch wide main fish passage with substrates and solid cover
- 3 foot wide channel to function as exit for downstream migration channel (ENV. EL. = 78.30)
- Stop Log for downstream migration
- Level Turn Pool
- Fish Ladder Slope at B.H.V.
- Fish Passage Exit with Solar Pump to Supply Constant Flow Down the Pool during fish migration
- 6 foot wide geocellular reinforcement pad

Storage Building
Raceway Bypass Channel
Horseshoe Falls Dam
PAWCATUCK RIVER
SHANNOCK VILLAGE RD
Final Design and Construction Sequence
Horseshoe Falls Dam Fish Passage

Fish Ladder
Final Design Alternative – Fish Ladder at Left Abutment
Agenda
Horseshoe Falls Dam Fish Passage

Final Design and Construction Sequence
Final Design and Construction Sequence  
Horseshoe Falls Dam Fish Passage

Proposed Temporary Site Modifications

- Construction Entrances
- Perimeter Erosion and Sedimentation Controls
- Temporary Cofferdam Next to Existing Dam
- Open Raceway
- In-Channel Access and Work Areas
  - Heavy Equipment in River
- Expected 120 Day Construction Period
  - Potential Lane Closures, Sidewalk Remains Open
Proposed Permanent Site Modifications

- **Bedrock Removal**
  - *Area Between Bridge and Left Embankment*
  - *Heavy Equipment/Potential Blasting*

- **Fish Ladder**
  - *Area Between Bridge and Left Embankment*
  - *Limited Riverbed Grading Under Bridge*
Final Design and Construction Sequence
Horseshoe Falls Dam Fish Passage

Construction Activities and Sequence
Final Design and Construction Sequence

Horseshoe Falls Dam Fish Passage

Proposed View

Existing View

Conceptual View Across Channel
Final Design and Construction Sequence
Horseshoe Falls Dam Fish Passage

Proposed View

Existing View

Conceptual View at Center of Spillway
WPWA Horseshoe Falls Dam Fish Ladder
Final Design and Construction Sequence
Horseshoe Falls Dam Fish Passage
Agenda

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Questions and Discussion