Session C8: River Mill Dam Downstream Migrant Integrated Collector and Bypass

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R2 Resource Consultants

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River Mill Dam Downstream Migrant Integrated Collector & Bypass

Peter Christensen, P.E. — R2 Resource Consultants

FISH PASSAGE 2015

International conference on river connectivity best practices and innovations
Clackamas River Hydroelectric Project and River Mill Development
Clackamas River and River Mill Dam

• Clackamas River Anadromous Fish Species
  – Chinook Salmon
  – Coho Salmon
  – Steelhead Trout
  – Pacific Lamprey

• River Mill Dam
  – Original Construction 1911-1912
  – Only Surviving Ambursen Dam West of Rocky Mountains
  – Five Units with Combined Capacity of 5,000 cfs (141 cms)
  – Approximately 85 Feet Head
Original Project Layout (2005)
Experimental Test Channel (2007)

Unit 5

150 cfs (4.25 cms)

1.25-Inch (31.75 mm) Clear Space Between Trashrack Bars (Fish Tend to Resist Passage through the Racks)

Experimental Fish Bypass Channel
Overall Collector & Bypass Plan
Forebay Fish Collector Plan
Forebay Fish Collector Entrance

Entrance Trashrack

Trashrack Cleaner Rake
Screen Channel Profiles
Fish Sampling Station Plan

- Fish flow is dewatered from 7 to 2 cfs. (0.2 to 0.06 cms)
- Smaller juvenile fish are separated from larger adult fish.
- Juvenile fish are held for sampling.
- Adult fish pass into adult pool and then directly into the downstream bypass pipe.
Fish Sampling Station on Downstream Side of Dam
Plan View of Bypass Pipe on Powerhouse Roof
Bypass Pipe across Powerhouse Roof
Bypass Pipe Junction and Hinged Discharge
Biological Monitoring Results

Based on PIT Tag Studies in 2013 and 2014

Collector Fish Guidance Efficiency

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Efficiency</th>
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</thead>
<tbody>
<tr>
<td>Chinook Salmon</td>
<td>98%</td>
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<td>Coho Salmon</td>
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Lake Survival

<table>
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<th>Survival</th>
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Injury Rates were consistently below 2%
Summary Points

- Hydro Project Forebays are Hydraulically Unique
- Need to Understand Fish Behavior at Your Project
- Success is Enhanced by Utilizing Natural Behavior
- Physical Constraints can Result in Non-conventional yet Potentially Advantageous Designs