Concurrent Sessions C: Prioritization - Oregon Fish Passage Priority List - A Statewide Barrier Prioritization Effort

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HISTORY

• First fish passage laws were prior to statehood (1859)

• 1848: Oregon Territorial Constitution, Section 12:

"The rivers and streams of water in said territory of Oregon in which salmon are found or to which they resort shall not be obstructed by dam or otherwise, unless such dams or obstructions are so constructed as to allow salmon to pass freely up and down such rivers and streams."

• Former statutes required passage, did not allow waivers, and were not followed (leaving many outside law)
FISH PASSAGE MUST BE ADDRESSED

- at artificial obstructions (AO’s)
- where native migratory fish are currently or were historically present, and
- Prior to when a "trigger event" will occur

OR

- when the OFWC identifies an emergency location, condemns a passage site, or identifies a "priority" location
SCOPe OF PROBLEM IN OREGON

- road-stream crossings: 10,000s
- dams: 1,000s
- tide gates: 1,000s
- dikes, etc.: ?

Upstream and Downstream Fish Migration has been Bisected Throughout Oregon
Priority List- Background Information

• Last ODFW Priority List completed in 2007
  – Highly successful
• Recognition of the scope of the problem
• Need for more information!
  – Standardization and Inventory
GIS Inventory and Data Standardization

• ODFW GIS program gathered barrier data from dozens of sources
• Data standardized to meet requirements of OFPBDS
• Creation of the most comprehensive barrier data base for Oregon to date.
North Canal Dam – Deschutes River, Bend
Water Diversion Dam
Tide Gates
Tide Gates
Perched Culvert (Coos County)
Dams, Culverts, Tidegates....Oh my!

- Over 27,800 artificial obstructions

  17% Passable
  19% Partial Barriers
  21% Blocked
  43% Unknown
To date: 12,368 passage barriers

- Blocked: 6,432 (21%)
- Partial: 5,936 (19%)
- Passable: 5,363 (17%)
- Unknown: 13,049 (43%)

Figure from ODFW GIS Program’s Fish Habitat Distribution Project Summary
Fish Passage Prioritization- “The How”

• How do you prioritize fish passage barriers in a state with 28,000 artificial obstructions?
  – Hybrid Approach
    • Rely on Local Experts’ knowledge
      – District Biologists and staff
    • Data Driven
      – Known or derived quantities
      – Based Primarily on Biology
Methodology

- ODFW Biologists Provided Their “Top 25”
- Tools For ODFW District Biologists
- ODFW GIS provided habitat distribution data, other barrier data
  - Each species
  - Each barrier
  - Historical
  - Adjacent barriers
Priority Analysis

• At least 25 barriers from each of 18 fish district on the list
  • Habitat quantity
  • Habitat quality
  • Level of Passage
  • Species Present
  • Biological Status of species present
  • Barriers up and downstream
  • Historical habitat
  • Other Unique or Limiting Factors

• WHAT NOW???????
Prioritization Model

\[ p(R_p) = jkZ_0 \frac{e^{-jk\rho}}{4\pi\rho} \left\{ u_0 + \frac{p_0}{Z_0} \left( \frac{1+jk\rho}{jk\rho} \right) (\hat{a}_r \cdot \hat{n}) \right\} \]

\[ u(R_p) = \frac{e^{-jk\rho}}{4\pi jk\rho} \left\{ -u_0 \left( jk\rho - k^2 \rho^2 \right) \hat{a}_r \right. \]

\[ - \frac{p_0}{Z_0} \left[ 3 + 3jk\rho - k^2 \rho^2 \right] (\hat{a}_r \cdot \hat{n}) \hat{a}_r \]

\[ + \frac{p_0}{Z_0} \left[ 1 + jk\rho \right] \hat{n} \]
Model Development

- Several iterations
- Fish Passage Task Force Review and Comments
- Based on the needs of native fish and on the data available
The Model

\[
((Quantity \times Quality) \times \frac{Level of Passage}{5}) + 10(# \ Non\ Listed\ NMF) + 30(#\ listed\ NMF) + 15(#\ autoup) - 15(autodown)
\]

= \text{PRIORITY}
Assumptions and Limitations

• Based on best available data
  – Salmon Centric

• Data is variable
  – Subjective
  – Level of completeness

• Complicated Question
  – “defining priority” is dependant on viewpoint, geography, species needs
Results

- 534 Priority Barriers organized into 16 groups
- Additional 55 included as other significant barriers
- 289 (59%) are dams
- 207 (39%) are culverts
- 38 (7%) are tide gates, fords, other obstructions
<table>
<thead>
<tr>
<th>ODFW Fish District</th>
<th>Owner</th>
<th>Barrier Name</th>
<th>Barrier Type</th>
<th>Stream Name</th>
<th>Species In need of passage at barrier and biological status</th>
<th># T&amp;E</th>
<th>Avg Hab. Quant</th>
<th>Avg. Potential hab.</th>
<th>Habitat Quality</th>
<th># Comp. barriers up stream</th>
<th>Auto Up</th>
<th>Auto Down</th>
<th>Psg. Level</th>
<th>Group Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Grande</td>
<td>Idaho Power Company</td>
<td>Hells Canyon Dam</td>
<td>Dam</td>
<td>Snake River</td>
<td>Pacific lamprey, Summer Steelhead (FT), Redband trout, fall Chinook (FT), spring Chinook (FT), bull trout (FT), largescale sucker, northern pikeminnow, white sturgeon</td>
<td>4.0</td>
<td>75.0</td>
<td>100+</td>
<td>Med</td>
<td>10+</td>
<td>4.0</td>
<td>2.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Deschutes</td>
<td>Deschutes Valley Water District</td>
<td>Opal Springs Diversion Dam</td>
<td>Dam</td>
<td>Crooked River</td>
<td>Bulltrout (FT), Spring Chinook, Redband trout, Summer Steelhead (FT)</td>
<td>2.0</td>
<td>356.9</td>
<td>94.238</td>
<td>Med/High</td>
<td>7.0</td>
<td>3.0</td>
<td>2.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Upper Willamette District</td>
<td>U.S. Army Corps of Engineers</td>
<td>Lookout Point Dam</td>
<td>Dam</td>
<td>Middle Fork Willamette River</td>
<td>Bulltrout (FT historical), Spring Chinook (FT), Rainbow trout, CT, WF, PL, NPM, CSS</td>
<td>1.0</td>
<td>54.8</td>
<td>41.831</td>
<td>High</td>
<td>1.0</td>
<td>2.0</td>
<td>1.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Upper Rogue</td>
<td>Steven Keeton</td>
<td>Fielder Dam</td>
<td>Dam</td>
<td>Evans Creek</td>
<td>Fall Chinook, Coho (FT), Pacific lamprey, Summer and Winter Steelhead, suckers, cutthroat</td>
<td>1.0</td>
<td>54.8</td>
<td>5.93</td>
<td>High</td>
<td>4.0</td>
<td>3.0</td>
<td>1.0</td>
<td>4.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Upper Willamette District</td>
<td>U.S. Army Corps of Engineers</td>
<td>Cottage Grove</td>
<td>Dam</td>
<td>Coast Fork Willamette River</td>
<td>Spring Chinook (FT), Rainbow trout, CT, WF, PL, CSS</td>
<td>1.0</td>
<td>73.1</td>
<td>9.703</td>
<td>High</td>
<td>6.0</td>
<td>1.0</td>
<td>1.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Mid Willamette District</td>
<td>U.S. Army Corps of Engineers</td>
<td>Detroit Reservoir</td>
<td>Dam</td>
<td>North Santiam River</td>
<td>Bulltrout (FT historical), Spring Chinook (FT), Cutthroat trout, Winter Steelhead, Pacific Lamprey, Mountain Whitefish</td>
<td>1.0</td>
<td>33.7</td>
<td>0.000</td>
<td>High</td>
<td>0.0</td>
<td>4.0</td>
<td>2.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Mid-Columbia District</td>
<td>Middle Fork Irrigation District</td>
<td>Clear Branch Creek Dam</td>
<td>Dam</td>
<td>Pinnacle Creek, Clear Branch Creek</td>
<td>Bulltrout (FT), Spring Chinook (FT), Coastal cutthroat, Coho (FT/SE), Redband trout, Winter Steelhead (FT)</td>
<td>4.0</td>
<td>4.8</td>
<td>1.971</td>
<td>High</td>
<td>1.0</td>
<td>1.0</td>
<td>0.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Upper Rogue</td>
<td>Private</td>
<td>Wimer Dam</td>
<td>Dam</td>
<td>Evans Creek</td>
<td>Fall Chinook, Coho (FT), Pacific lamprey, Summer and Winter Steelhead, suckers, cutthroat</td>
<td>1.0</td>
<td>37.7</td>
<td>5.93</td>
<td>High</td>
<td>3.0</td>
<td>3.0</td>
<td>1.0</td>
<td>4.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Umatilla District</td>
<td>U.S. Bureau of Reclamation</td>
<td>McKay Reservoir (USBR)</td>
<td>Dam</td>
<td>McKay And Birch Creeks</td>
<td>Summer Steelhead (FT), Redband trout (historical)</td>
<td>1.0</td>
<td>84.1</td>
<td>11.450</td>
<td>High</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>Mid Willamette District</td>
<td>U.S. Army Corps of Engineers</td>
<td>Foster Reservoir</td>
<td>Dam</td>
<td>South Santiam River</td>
<td>Bulltrout (FT historical), Spring Chinook (FT), Winter Steelhead (FT), Pacific Lamprey, Mountain Whitefish, CT</td>
<td>2.0</td>
<td>31.4</td>
<td>29.865</td>
<td>Med/High</td>
<td>1.0</td>
<td>3.0</td>
<td>1.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
<tr>
<td>La Grande</td>
<td>U.S. Bureau of Reclamation</td>
<td>Unity Reservoir</td>
<td>Dam</td>
<td>Burnt River</td>
<td>Redband trout, largescale sucker, northern pikeminnow, bridgelpin sucker</td>
<td>0.0</td>
<td>88.4</td>
<td>54.065</td>
<td>High</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>5.0</td>
<td>Top Ten</td>
</tr>
</tbody>
</table>
Potential Uses

• Database of High Priority Projects
  – Help Get the Word Out
• Strategic Planning Tool for Restoration Efforts
• Assist Funding Agencies
• Potential Mitigation Locations
• Enforcement
Future Improvements

- Data quantity and quality improvements
- Interactive web tools (mapping)
- Use of Intrinsic Potential?
The Goal......