Northwest Power and Conservation Council

February 23, 2011

MEMORANDUM

TO: Council Members

FROM: Jim Ruff – Manager, Mainstem Passage and River Operations

SUBJECT: Corps Briefing on Lamprey Passage and Sturgeon at Mainstem Federal Dams

Background

At the March 9th Council meeting, Mike Langeslay from the Portland District of the Corps of Engineers (Corps) will describe the Corps' current actions concerning sturgeon at Lower Columbia River federal hydropower dams including handling protocols, research, emerging issues, and future actions to address this species. Mr. Langeslay is the Manager of the Corps' Columbia River Fish Mitigation Program.

He will then present adult lamprey passage improvements and research that the Corps is conducting under the Columbia River Fish Accords. He will present a summary of the Corps' 10-year lamprey plan, progress to date on implementing lamprey passage improvements and research in this plan, and the future direction for this work.

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851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

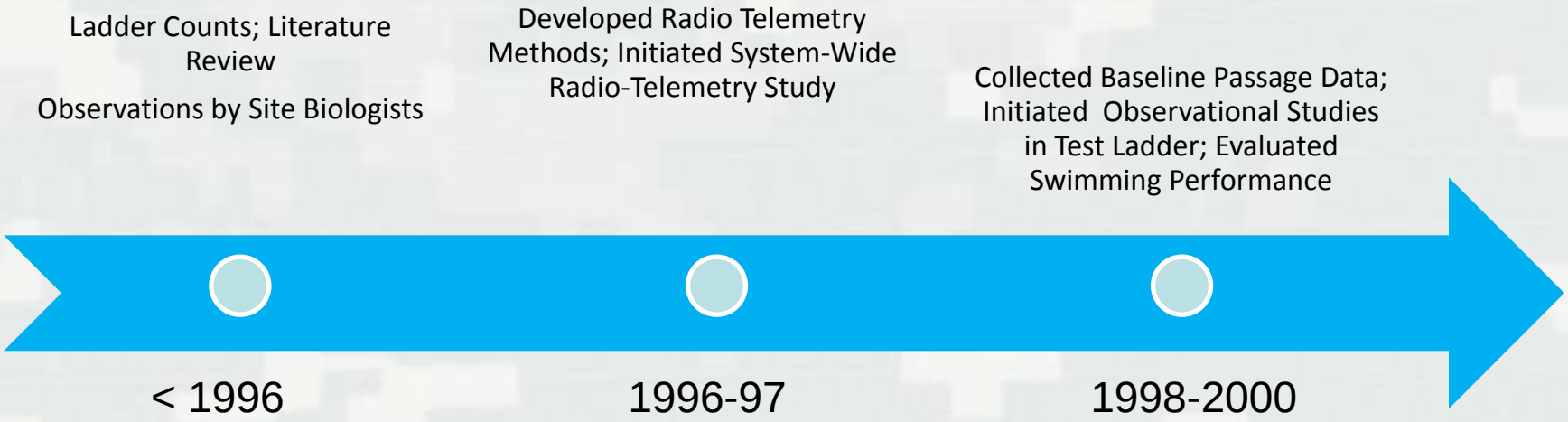
503-222-5161
800-452-5161
Fax: 503-820-2370

White Sturgeon and Pacific Lamprey at FCRPS Dams

NPCC Briefing

March 9, 2011

Adult Lamprey Passage Research Background



Juvenile Lamprey Passage Research Background

SMP Data, Incidental Catch from Juvenile Bypass Evaluations

Lab Studies: Effects of Shear, Rapid Decompression, and Screening; Development of Tagging Methods

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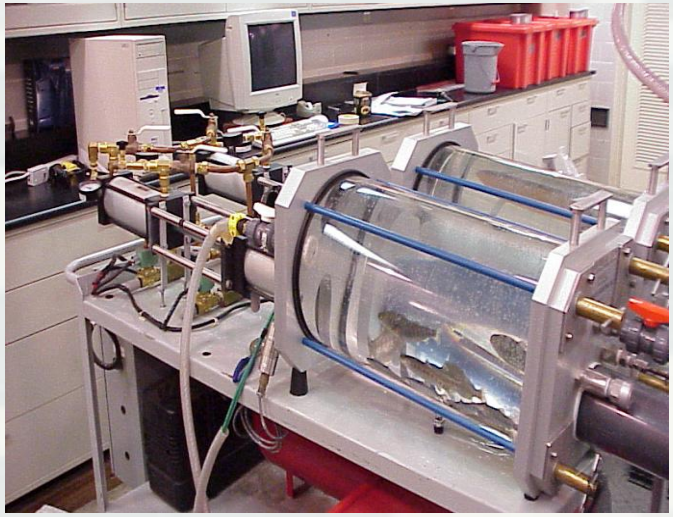


Adult Lamprey Passage Results from Early Studies

- Low Passage Success Rates at Bonneville
  - 30-40% tagged fish successfully ascended the ladders at Bonneville Dam
  - High Attrition Rates as Fish Move Upstream
  - Problem Areas:
    - Entrances
    - Transition Pools
    - Count Stations
    - Upper Ladder Flow Control Sections

Juvenile Lamprey Results
Early Studies

- Shear and Pressure Changes – less sensitive to shear and rapid pressure changes than juvenile salmonids
- Screens
  - 3.18 mm Clearance Bar Screens – lamprey become impinged/stuck
  - 1.75 mm (fry criteria) Bar Screens –0 impinged/stuck lamprey
  - Plastic Mesh Screens had much lower impingement than 3.18 mm bar screen
- PIT tag could be implanted in ≥ 120 mm lamprey with minimal mortality
  - Many fish smaller than 120 mm
  - Would need large source of fish to conduct a passage study
- Early Fyke Net Studies Indicated Most Juvenile Lamprey Pass Below Turbine Intake Screens

2008 Columbia River Fish Accords

- Focus on lamprey passage at Corps dams
- Calls for Corps to develop a 10-year plan with Tribes and FWS
- Commitment for Corps to fund lamprey work at approximately $5 million per year over the 10 years
- Commitment to work closely with Tribes to adaptively manage actions

Columbia Basin Fish Accords 2008-2018

10-Year Lamprey Plan
Adults

- Evaluate Passage Through FCRPS using Radio Telemetry and HD PIT-Tags
- Conduct Fishway Inspections and Inventory Potential Fixes
- Construct Alternative Passage Systems
- Evaluate Effects of Nighttime Ladder Entrance Flow Reduction and Implement Where Effective
- Develop New Entrance Designs
- Replace Diffuser Gratings
- Round Sharp Corners
- Improve Ladder Counts

10-Year Lamprey Plan
Juveniles

- Turbine Intake Screens
  - Replace old bar screens with narrower clearance screens where practicable
  - Remove screens during juvenile passage periods when feasible
- Develop Separators at Transportation Projects
- Work toward developing smaller active tags
  - Develop biological criteria for juvenile lamprey tags
  - Determine passage behavior and survival when small tags become available

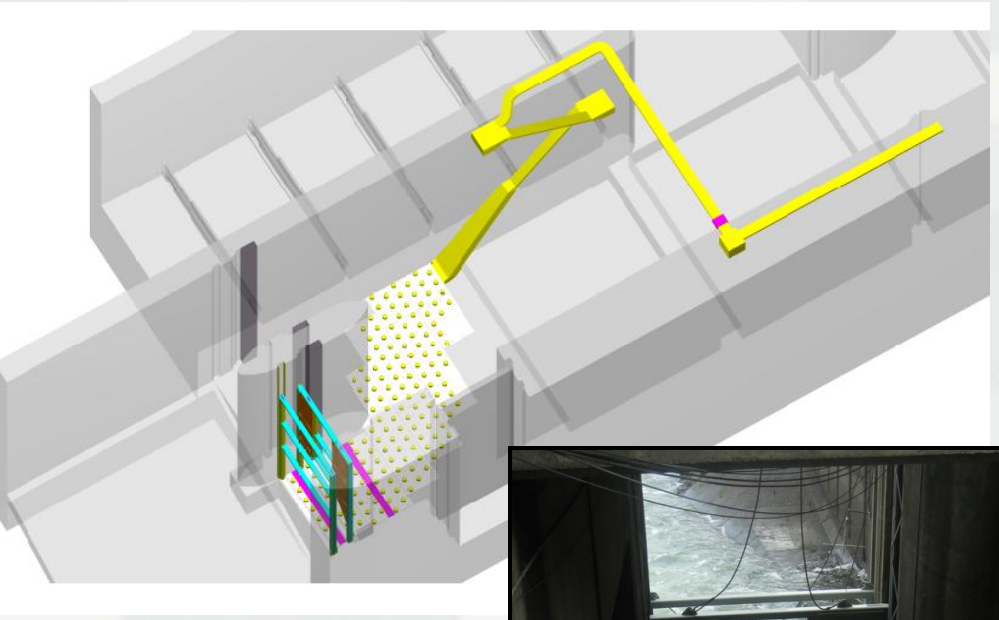
Nighttime Flow Reductions

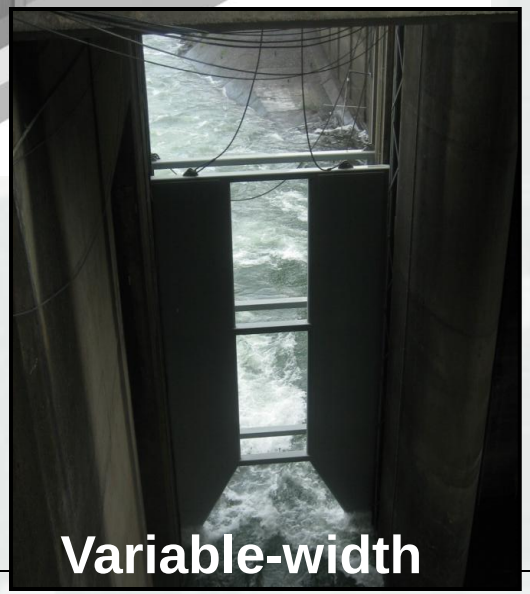
- Tested at Bonneville Spillway and Powerhouse 2
- Implemented as Standard Operation at Powerhouse 2 in 2010
- Testing at McNary Dam

Lamprey Alternative Passage Systems at Bonneville Dam

- Systems operating at OR and WA shore ladders
- Pass about the same number of fish as through the count windows
- Lamprey readily migrate through these
- Most effective if installed in ‘dead ends’ in fishways

Cascades Island Ladder Entrance, Bonneville Dam



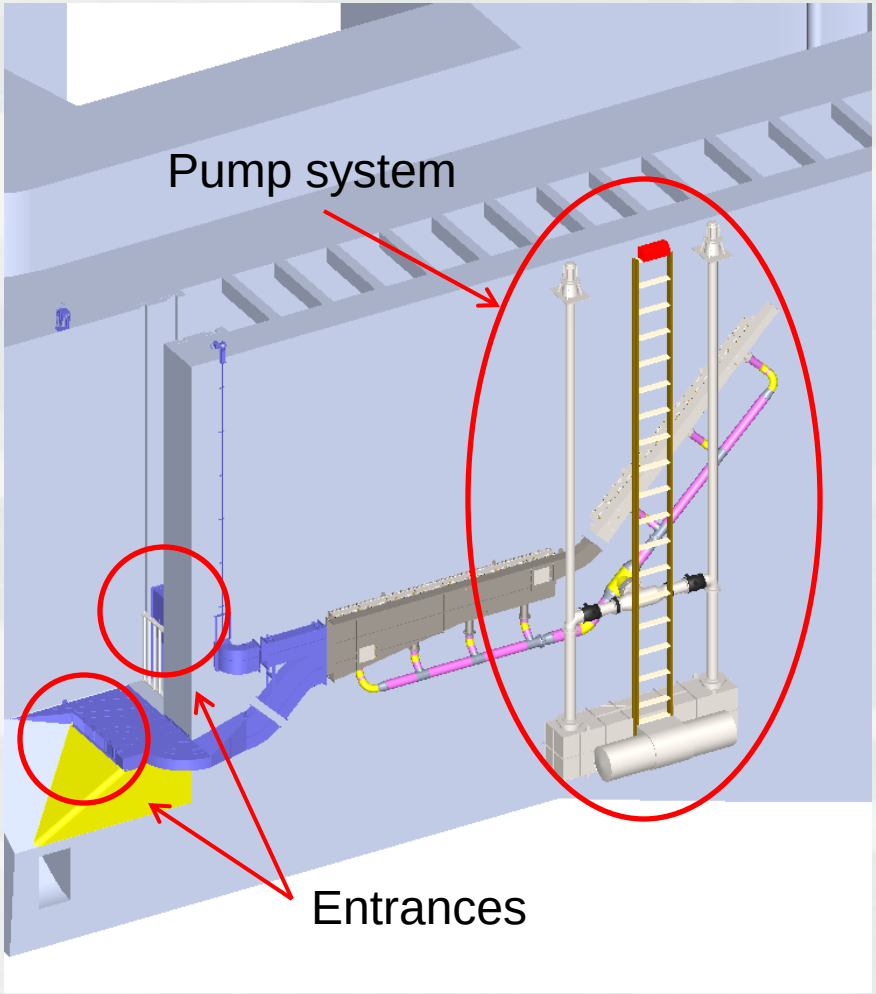


Variable-width weir

Bollards

LPS

Washington Shore Ladder Entrance Design, Bonneville



- Lamprey will encounter 2 alternative passage system entrances
- Once in the flume system, lamprey are guided up to a traditional LPS
- Design completed; working on gravity-flow water supply (rather than pumps shown here)
- Plan to build & test in Winter 2012-13

John Day North Ladder Improvements

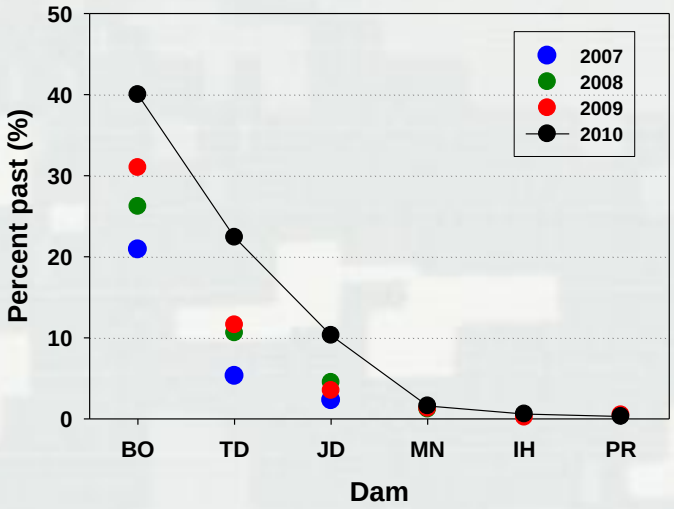
- Ladder redesign to meet salmon criteria
- Lamprey criteria incorporated into count station and upper ladder modifications (2010)
- Lamprey features planned for entrance modifications (2012)

Accomplishments – Ladder Inventory, Minor Modifications

- Conducted inventory of potential problem areas at all FCRPS ladders
- Implementing recommended modifications during maintenance periods
- Improving ladder counts

Adult Lamprey – Escapement of Radio-Tagged Fish

From release past dams

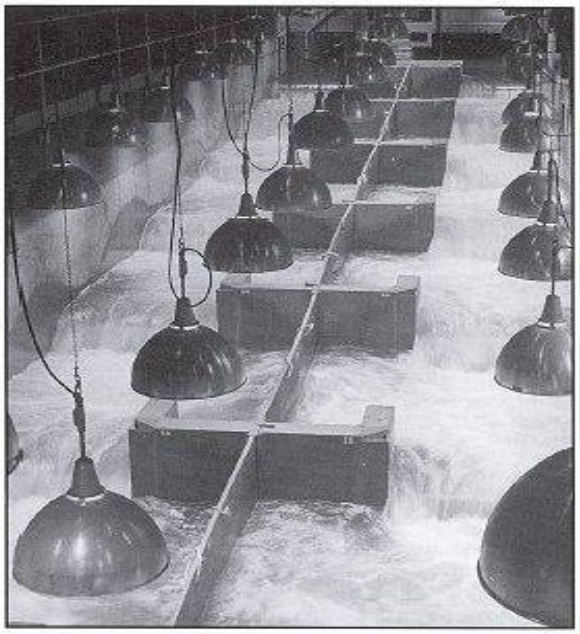


Ladder top – ladder top

	BO-TD	TD-JD
2007	25%	43%
2008	40%	43%
2009	34%	32%
2010	55%	46%

Adult Lamprey Path Forward

- Continue planning and design work to modify fishway entrances and other known problem areas (transition pools, count stations, serpentine weirs, etc)
- Identify and prioritize minor fishway modifications for all eight dams
- Continue passage studies and expand use of non-invasive technologies to evaluate fine-scale passage behavior and to improve counts



Juvenile Lamprey Path Forward

- Active (acoustic) tag needed to evaluate passage and relative survival through different passage routes
  - Tag size criteria work completed in 2010
  - Tagging and handling protocol development continues
  - Tag downsize efforts – 3 year prospect of lamprey-sized tag
- Identify and document known sources of juvenile lamprey mortality at dams
- Integrate lamprey-friendly features into fish screen designs and operations where possible

Sturgeon

- Steller sea lion predation/timing – heavy predation on sturgeon in winter
- Sturgeon numbers in BON ladders have increased over the past three years – pinnipeds/migration?
- Concurrently, apparent increase in turbine blade strikes
- Research needs (no funding- OM)

Date	Number of Sturgeon	Location
1/25-28/11	1600-1700	PH2 North monolith and PH2CC from U12 north
12/9/2010	900-1000	PH2 South monolith and PH2CC from U12 south
12/3/2010	0	CI ladder
12/3/2010	1	WA shore ladder
1/12/2010	180	B-branch
1/11/2010	65	B-branch
12/7/2009	11	BI ladder
12/7/2009	40	BI junction pool
2/25/2009	48	PH2CC diffuser C-5
2/18/2009	4	PH2 AWS conduit - North section
2/17-18/2009	2	North monolith
2/4/2009	8	PH2CC AWS conduit
2/3/2009	30	South monolith
1/23-24/09	400-500	CI entrance
1/22/2009	0	CI ladder (Diff 6-5 through 6-10)
1/20/2009	0	CI ladder
1/12/2009	0	WA shore ladder
1/5/2009	1	AFF
12/3/2008	12	BI junction pool
12/3/2008	0	BI ladder
12/31/2007	1	AFF
12/18-19/07	163	B-branch
12/18/2007	4	A-branch
12/17/2007	0	BI junction pool
12/17/2007	3	BI ladder
12/13/2006	0	CI
12/11/2006	0	WA shore ladder
12/9/2006	0	AFF
3/22/2006	0	CI exit section
1/20/2006	0	B-branch
1/9/2006	0	AFF
12/5/2005	0	BI ladder
12/14/2004	0	South monolith
11/29/2004	0	WA shore ladder and AFF
2/9/2004	0	PH1CC South
1/21/2004	0	B-branch Diff pools
1/21/2004	0	A-branch Diff pools
1/20/2004	0	BI junction pool
1/20-21/04	0	BI ladder

Sturgeon in collection channel

Path Forward

- Review dewatering plans and communication plan for all projects including adding observer from NWP during all future dewaterings
- Established a Fish Passage Operations and Maintenance Coordination Team (FPOM) Sturgeon Task Group to discuss alternatives/options/path forward and provide recommendations to FPOM (shift dewatering schedule, flush sturgeon, increase ROV inspections, research-DIDSON-tags-behavior etc),
- Research on sturgeon
  - Continue to identify needs through AFEP
  - Operations biologists evaluations
  - Look for collaborative opportunities – WDFW tags 2011