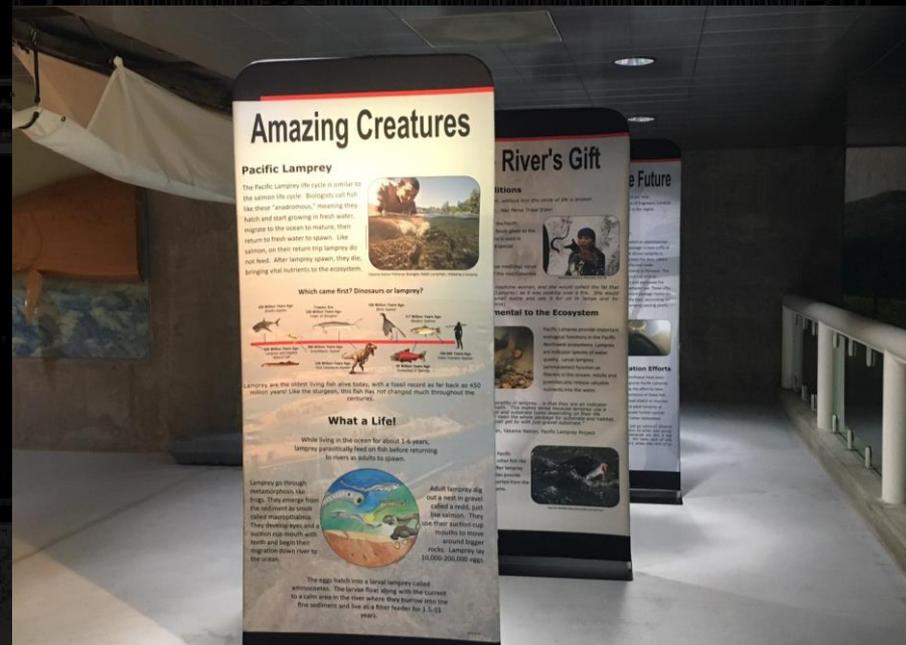


IMPROVING LAMPREY PASSAGE AT MAINSTEM HYDRO DAMS

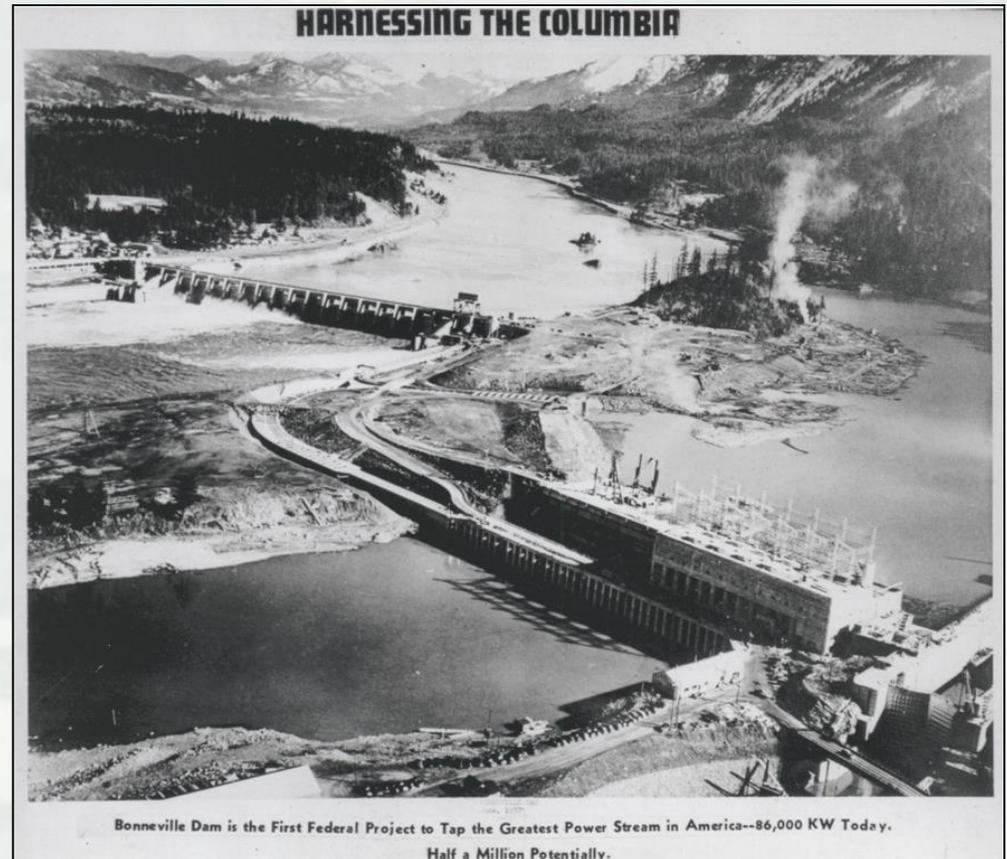
Nathan McClain & Jacob Macdonald
Portland District Fish Passage Team

2024 Columbia Gorge Fish Science Review



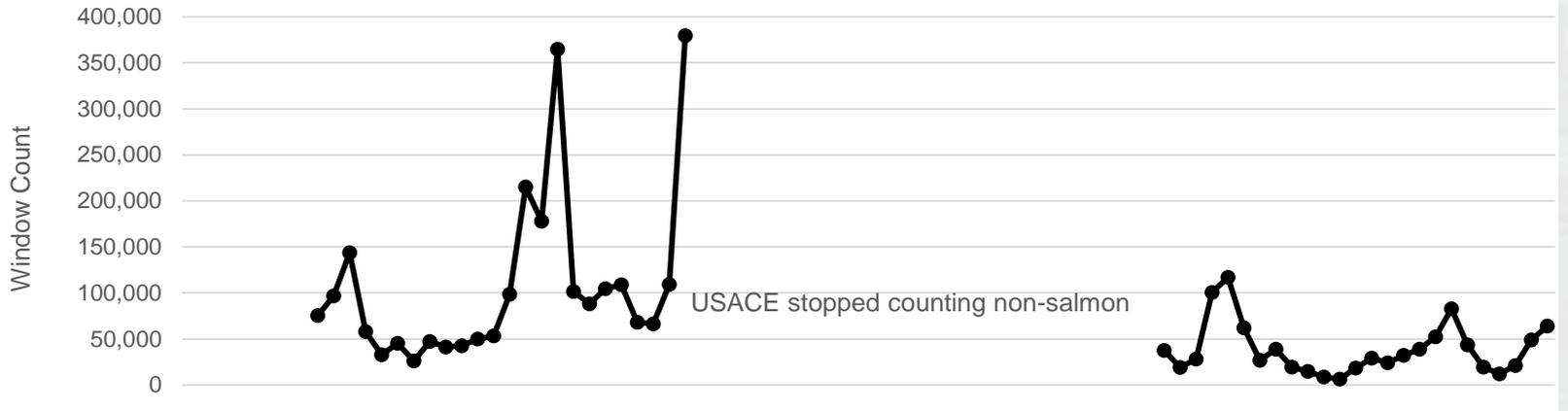
Introduction

- ▶ Fishways designed for salmonids
- ▶ Turns out lamprey are different

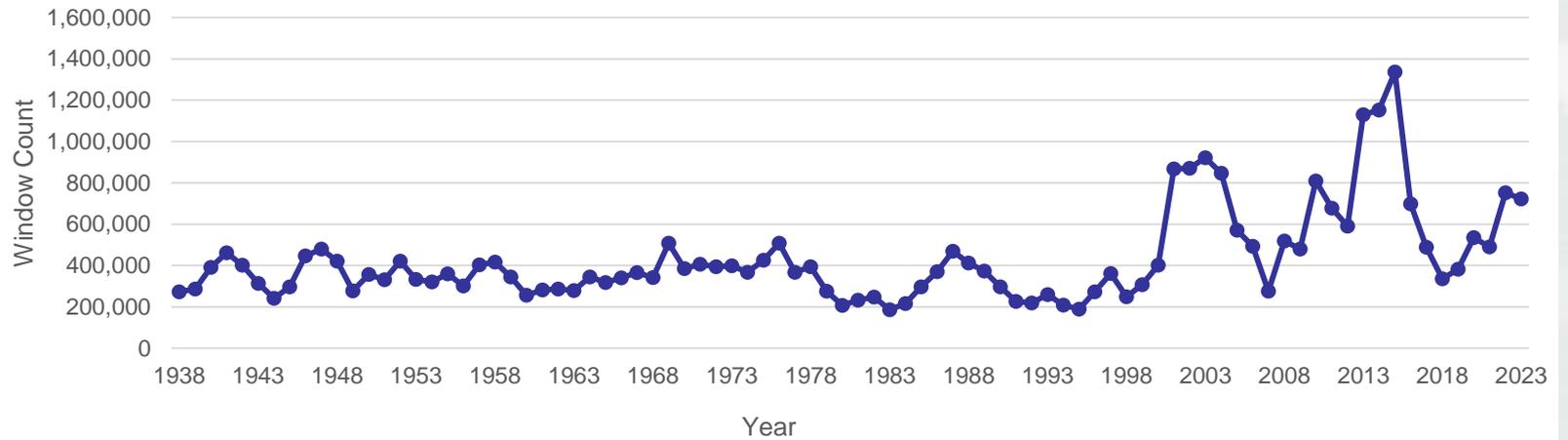


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Bonneville Dam: Lamprey

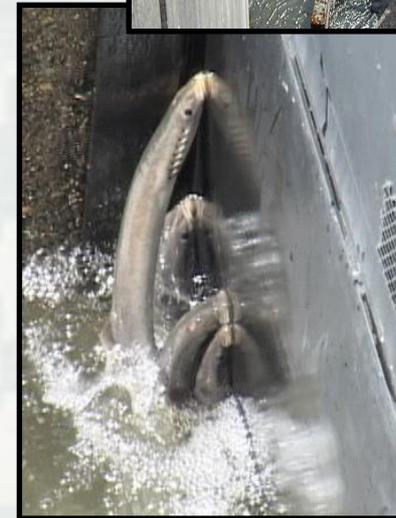
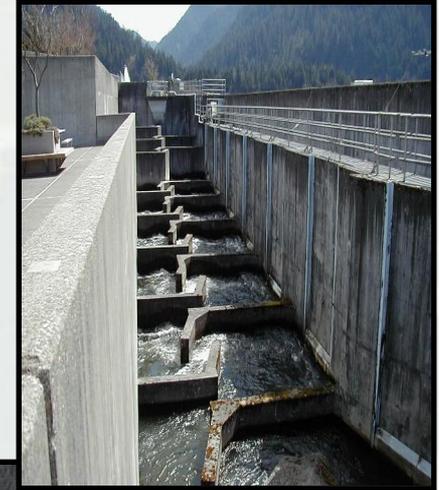


Bonneville Dam: Chinook (Spring + Summer + Fall)



Early Passage Studies

- 25-40% tagged lamprey pass ladders at Bonneville (salmonid 95-100%)
- Turn around areas:
 - ▶ Entrances
 - ▶ Collection Channels & Transition Pools
 - ▶ Count Stations
 - ▶ Upper Ladder Flow Control Sections
- High attrition upstream



Purpose:

Share Lamprey Improvements

▶ Previous

- Diffuser plating, LPSs, refuge boxes

▶ Upcoming

- Bonneville's A-branch LPS to trap
- The Dalles East ladder junction pool LPS to trap
- Bonneville's WA Shore flow control replacement!

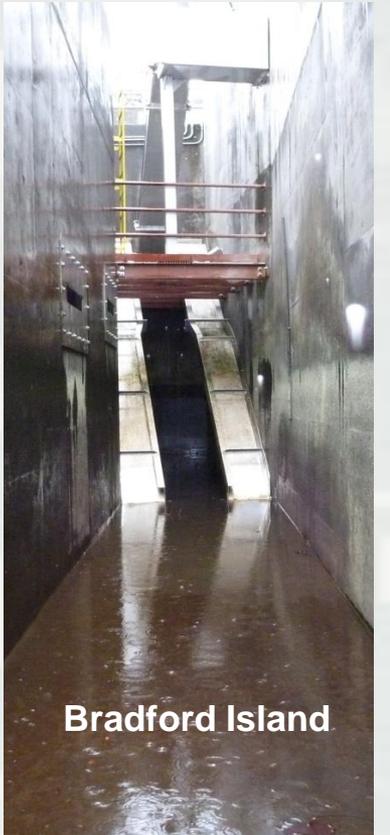


Lamprey Passage Structures (LPS)

- Designed to provide appropriate surfaces, slopes, flow and resting locations
- Takes advantage of oral disc attachment to climb to forebay or trap
- Implemented at:
 - ▶ Bonneville Dam (3 volitional + 3 traps)
 - ▶ The Dalles Dam (1 trap)
 - ▶ John Day Dam (1 trap)



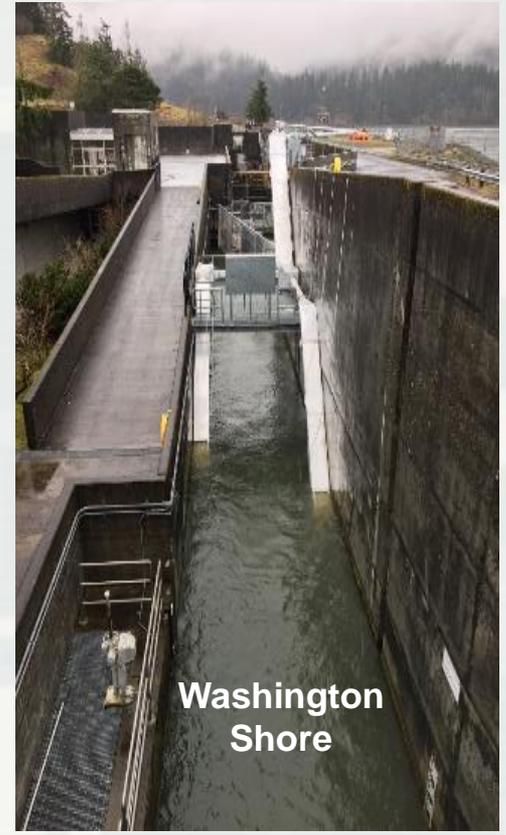
Bonneville's Lamprey Passage Structures (LPS)



Bradford Island



Cascades Island



Washington Shore



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The Dalles East Ladder Junction Pool trap box



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The Dalles East Ladder Junction Pool LPS



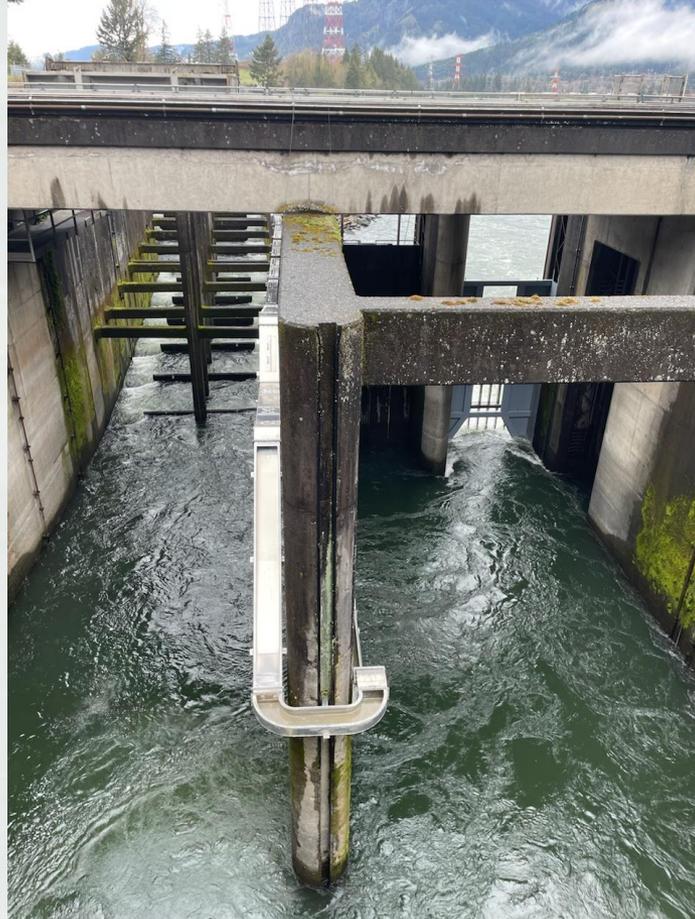
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Larger Entrance Mods:

- Keyhole entrance / variable width weir
 - ▶ Faster velocities in upper water column
 - ▶ Lower velocities deeper for lamprey
 - ▶ BON CI, JD North, and now BON B-Branch (2024)
- Floor bollards – flow refuge & attachment

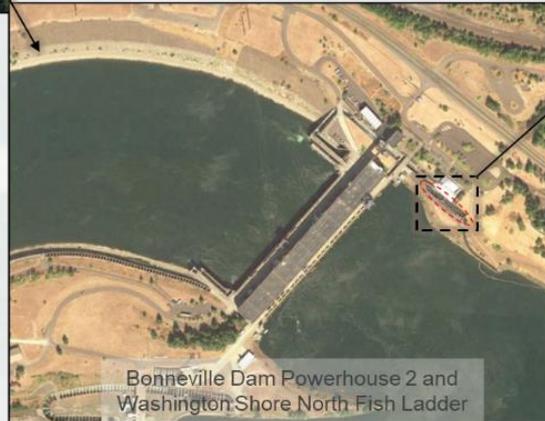
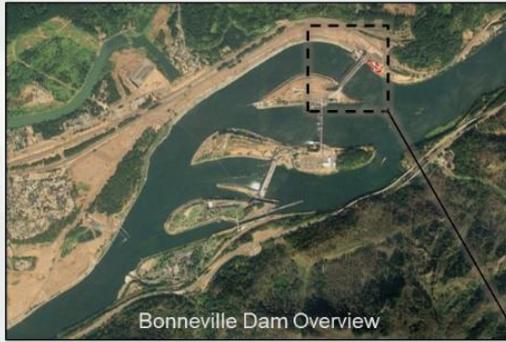


BON B-Branch ENT LPS



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BON WA Shore Flow Control Replacement (2025)



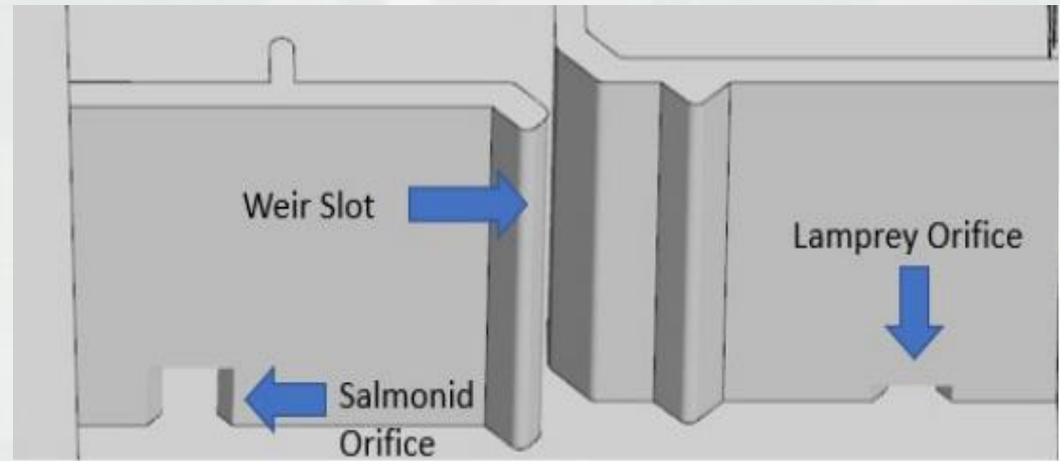
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Serpentine (flow control) to Vertical Slot & Orifices

Serpentine (flow control) Section

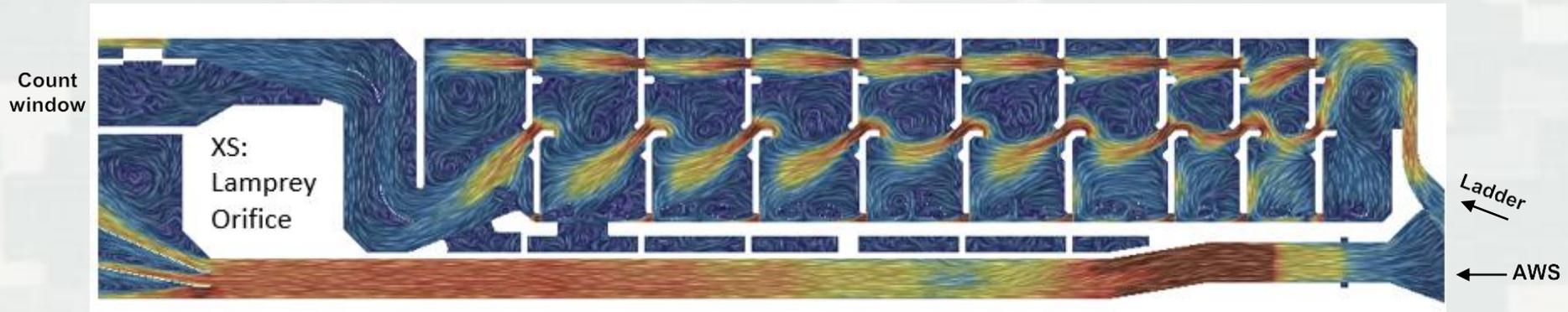
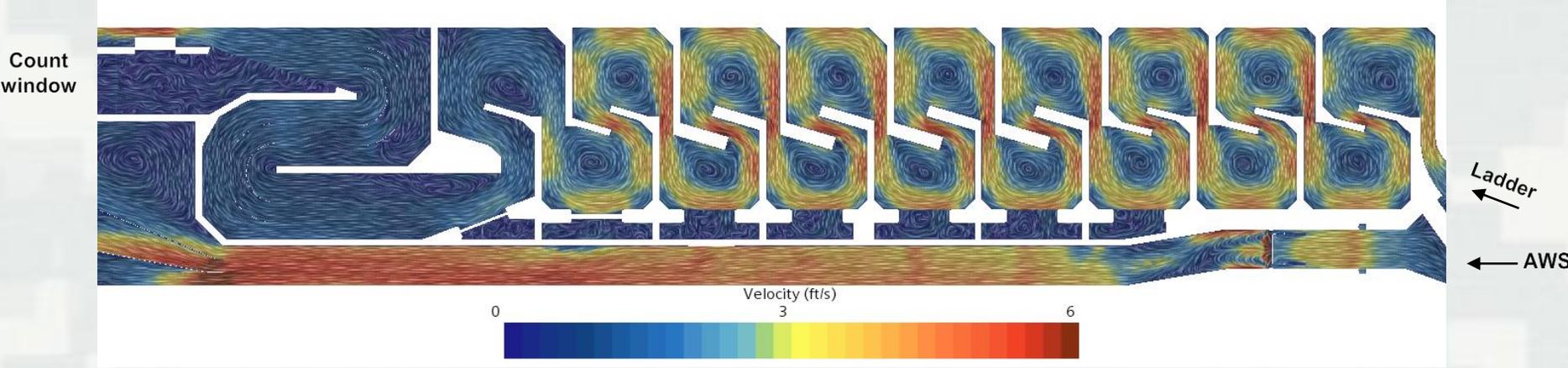


Vertical slot & orifice configuration



Existing & Planned

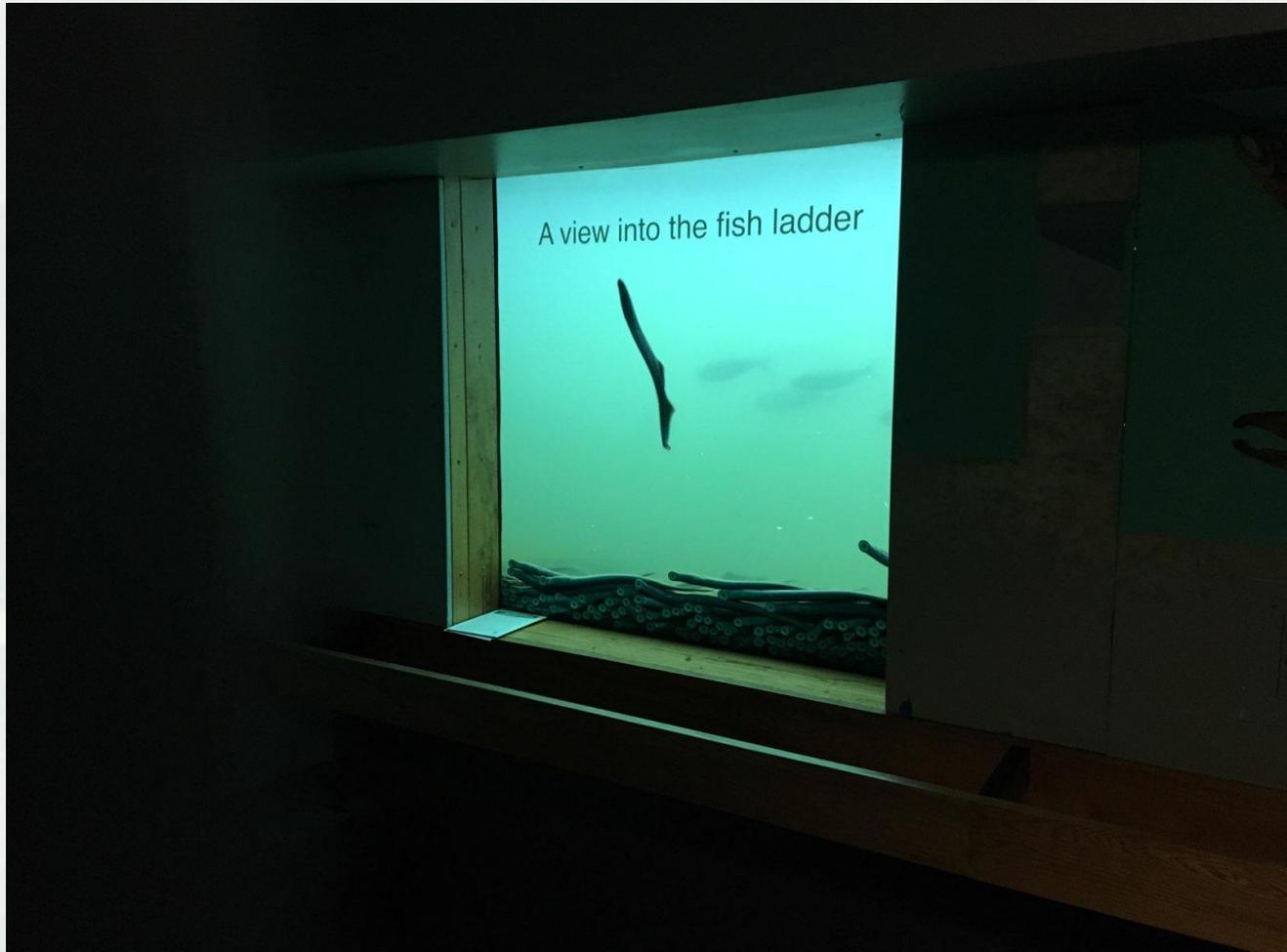
Top: Existing, Mid-Depth Velocity



Bottom: Planned, lamprey orifice plane



Questions?



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Future Actions

- Tribal Translocation – continue to provide access
- *Evaluate* - 3 Improvements (2025)
- *Build new* - WA Shore Entrance LPS & JD south mods
 - ▶ *Can we achieve passage = replacement with minor mods?*
- *Innovate* – Wetted wall, irrigation tubing, automate counting and on-line reporting.

