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Session C9: Cle Elum Dam Fish Passage: Novel, Research Driven Designs to allow Downstream Passage for Juvenile Salmonids

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Managing Water in the West

Cle Elum Dam Fish Passage: Novel, Research Driven Designs to allow Downstream Passage for Juvenile Salmonids

Presented by:

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and Innovations, June 22-25, 2015, Groningen, The Netherlands**



**U.S. Department of the Interior
Bureau of Reclamation**

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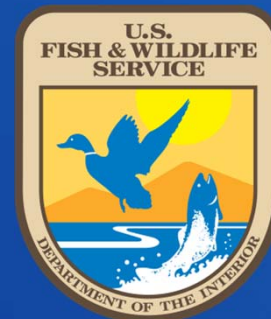
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Acknowledgements: Design Team

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Presentation Outline

- Project Goals
- Computational models
- Physical models
- Helix theory
- Conclusion

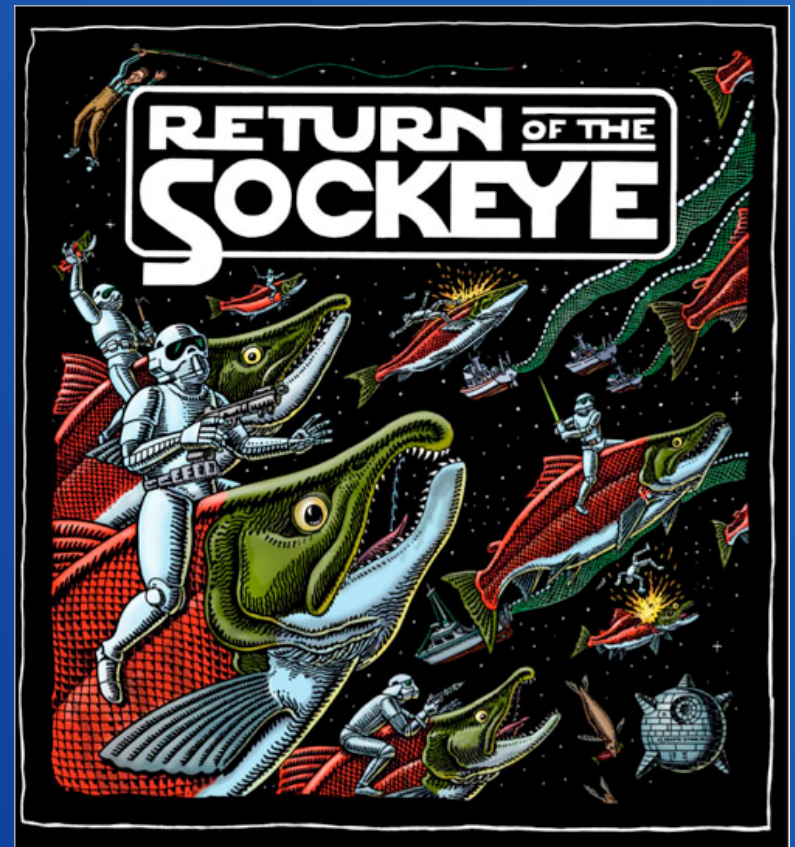


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PROJECT GOAL:

Restore river connectivity above Cle Elum Dam by:

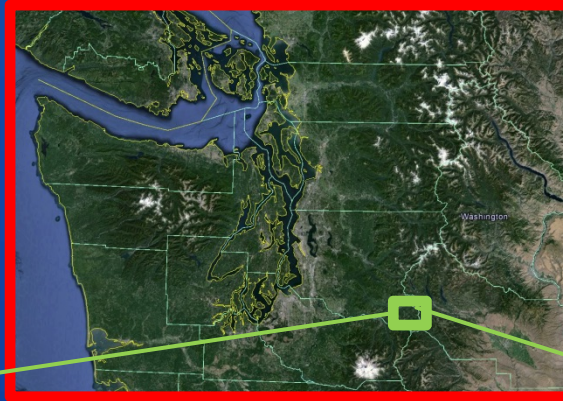
1. Constructing downstream fish passage for outmigrating salmonids that can operate at varying reservoir levels
2. Creating upstream adult fish passage



(Ray Troll)

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Cle Elum Dam



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Aerial view



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Site Video



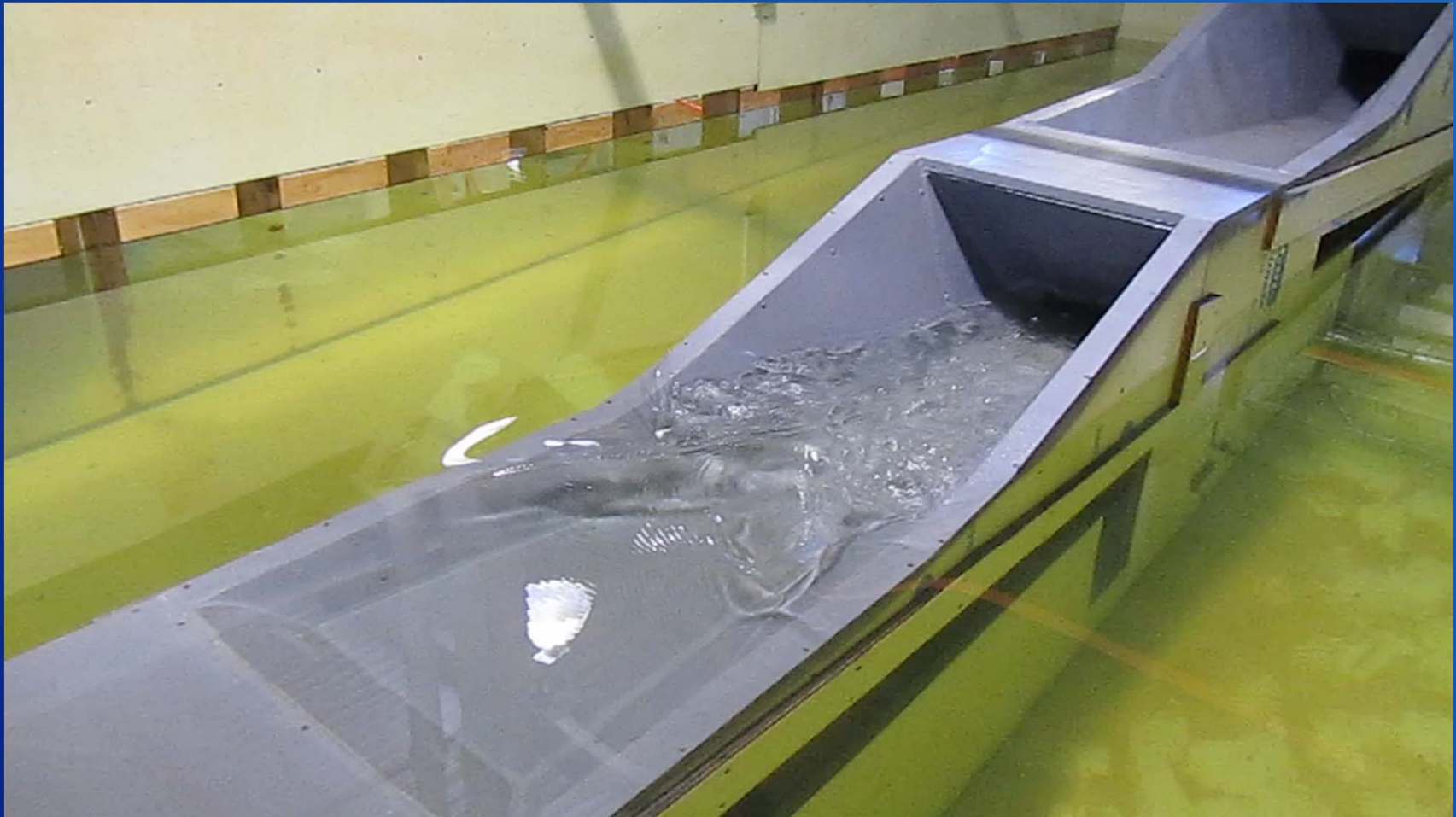
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Intakes - Computational



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Intakes – Physical; 1:9.5 scale



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Helix - computational



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Helix Physical; 1:9.5 scale



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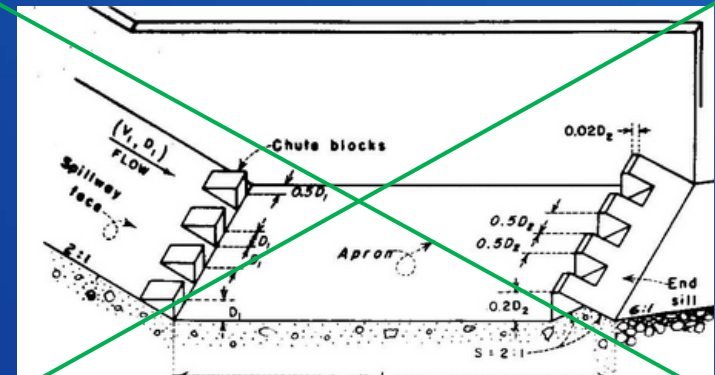
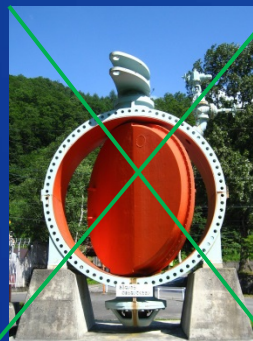
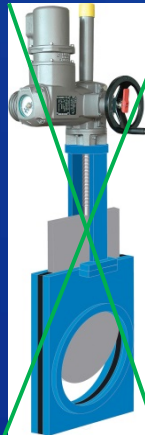
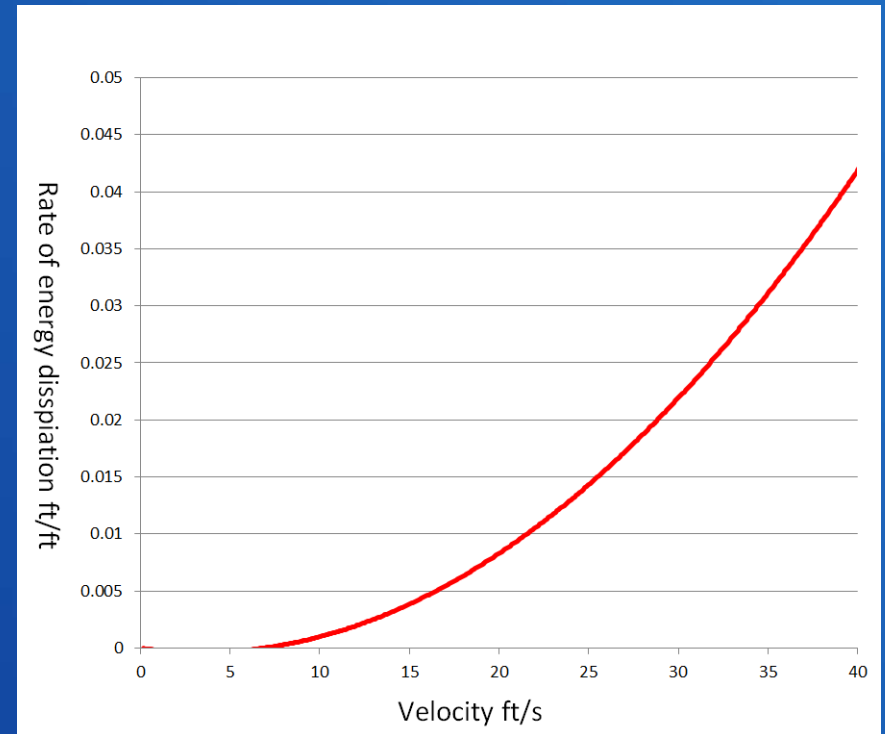
Helix Theory

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Helix Theory 1

Efficient energy dissipation
through high velocity stable
flow

No valves or obstructions

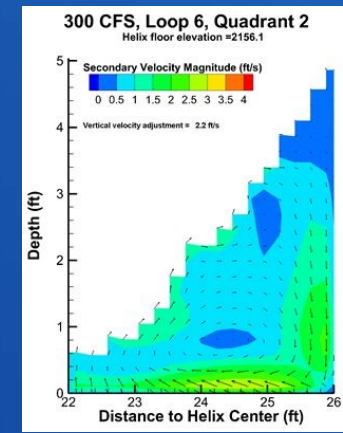
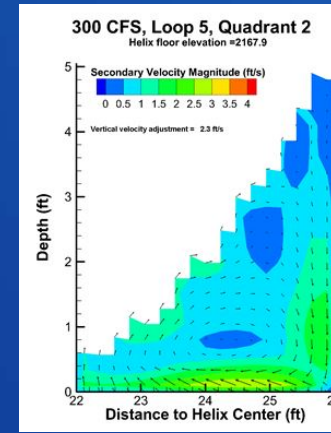
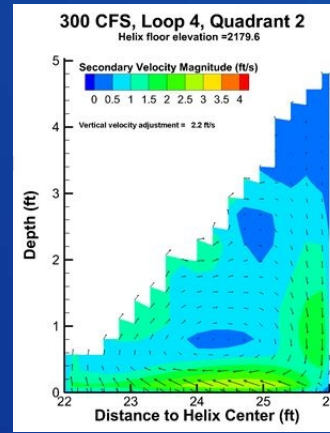
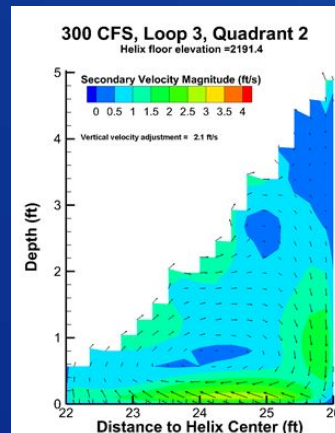
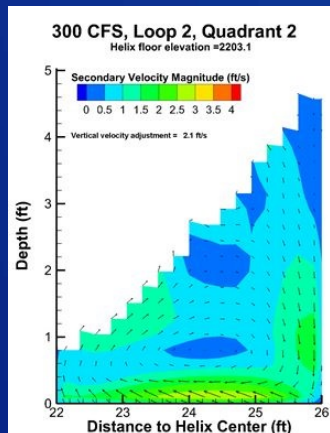
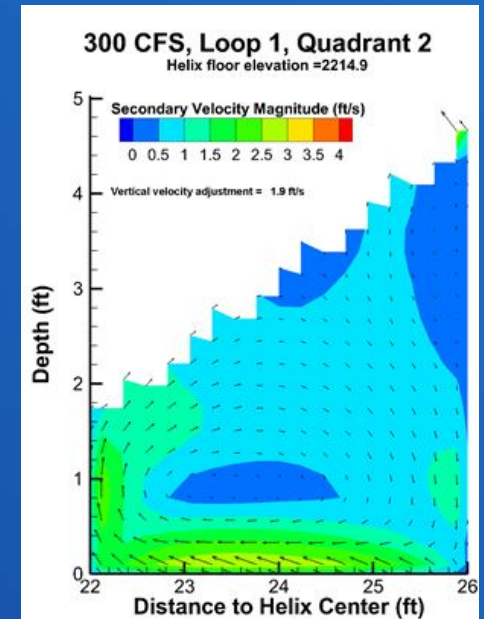
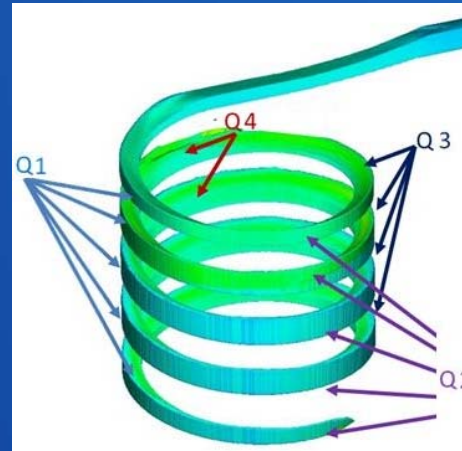


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Helix Theory 2

Create stable hydraulic conditions through:

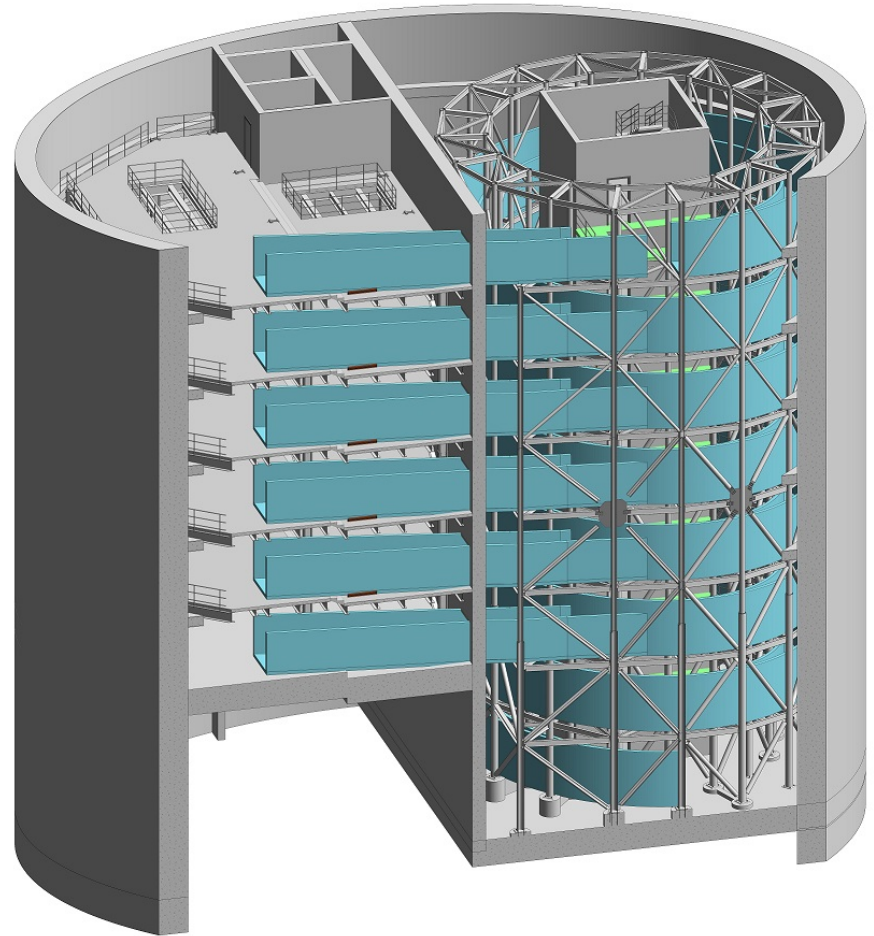
- Constant Radial acceleration
- Constant Slope



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Helix Theory 3

Confine this high velocity chute into a small area (helix structure), and allow for varying reservoir elevations by inlets at each rotation, all while maintaining stable flow conditions



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Additional considerations

- 1. Transitions into helix**
- 2. Transition from end of helix into discharge tunnel**
- 3. Outfall conditions**

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Questions?



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