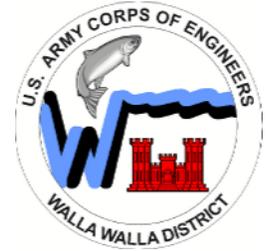


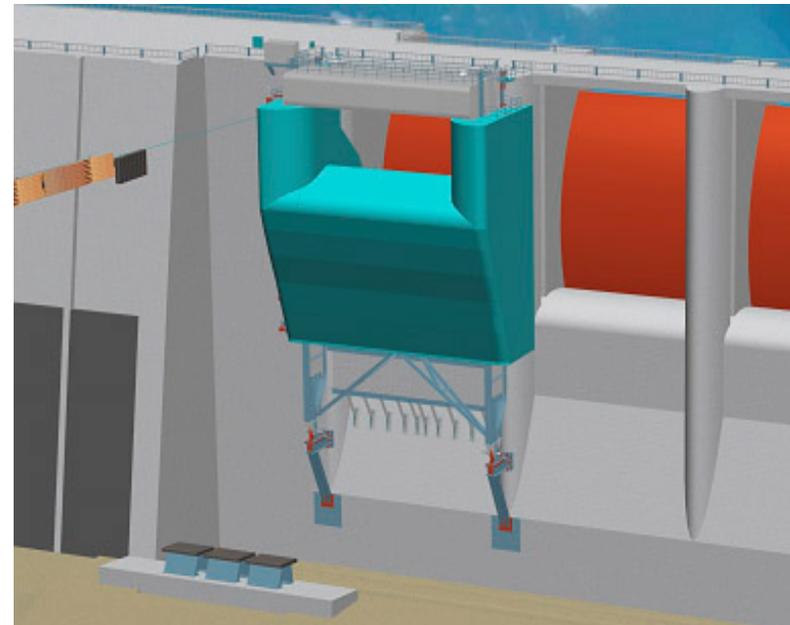
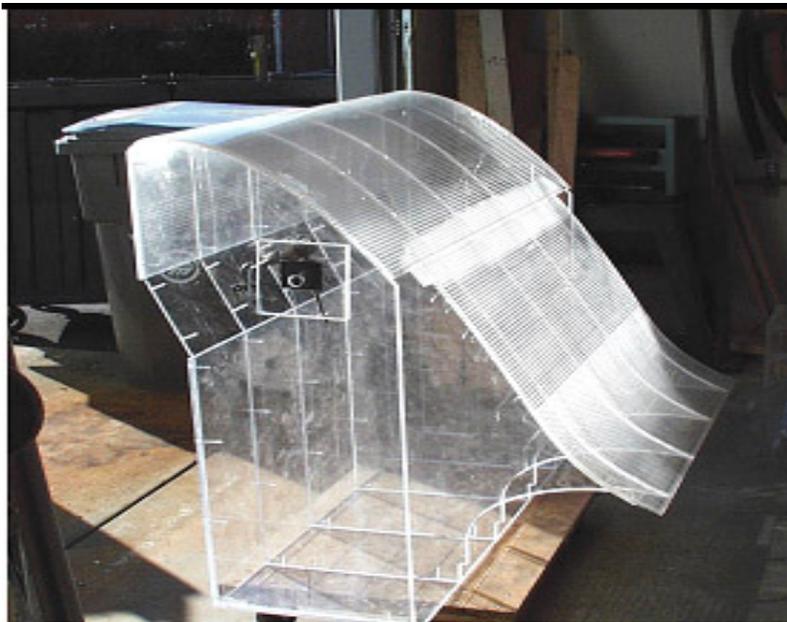


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WALLA WALLA DISTRICT

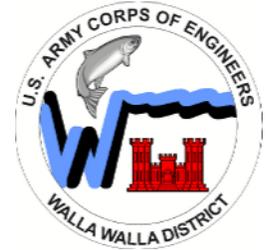


SURFACE BYPASS & REMOVABLE SPILLWAY WEIRS





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INTRODUCTION



Pacific Northwest

- Walla Walla District
Snake and
Columbia River
Projects



United States



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BACKGROUND



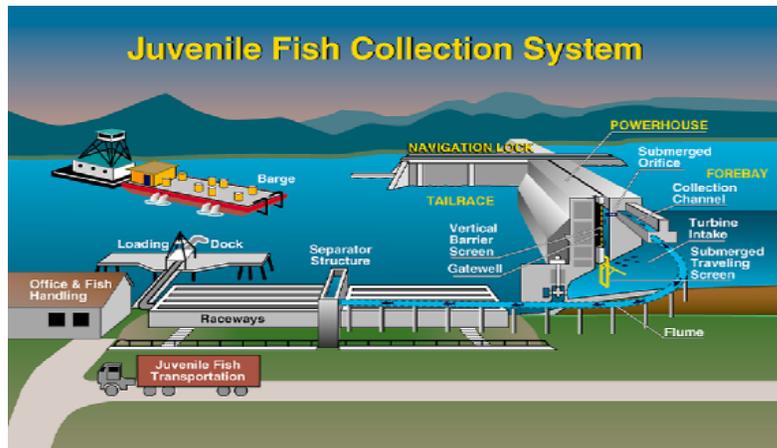
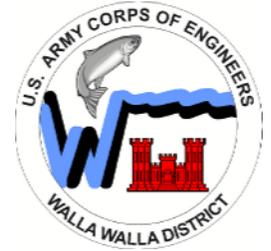
- Endangered Species / Regional Impacts
- Recovery Plan Options
 - Dam Removals
 - System Improvements



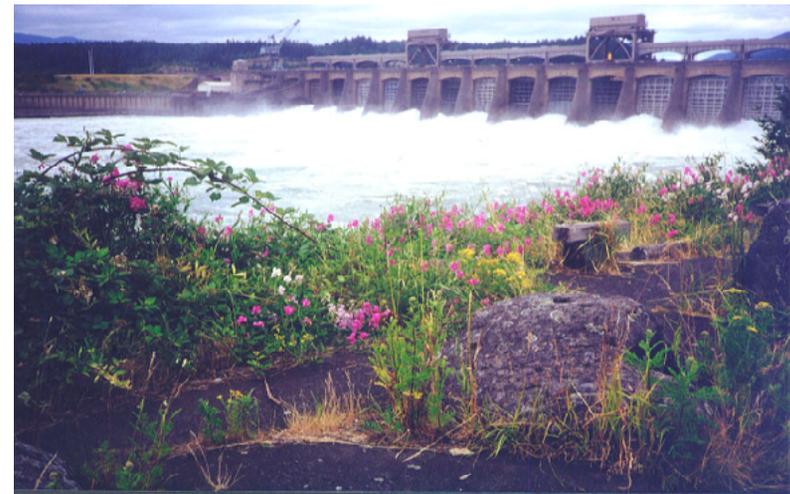


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FISH PASSAGE ROUTES



- Juvenile Fish Passage Methods
 - Multiple Paths
 - Traditional Spill Currently Favored for In-River





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TRADITIONAL FISH SPILL DRAWBACKS



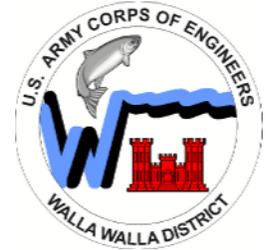
- Fish Passage
 - Deep Spill Gates
- Water Quality
 - Exceeds 110% TDG
- Forgone Power
 - \$186 Million Annually (LCR and LSR)
 - \$40 Million Annually (LSR)





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SURFACE BYPASS SPILL ALTERNATIVE

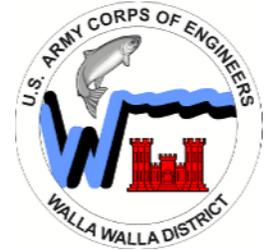


- Fish Goals
 - Increase Passage Non-Turbine Routes
 - Increase Survival
 - Reduce Delay
- Water Quality Goals
 - Lower Dissolved Gas Levels
- Power Goals
 - Higher Revenues



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SURFACE BYPASS DEVELOPMENT



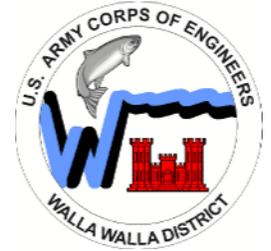
Lower Granite Dam

- Columbia and Snake River Projects
 - Numerous Prototypes (mid 1990's / early 2000's)
 - Lower Granite Dam

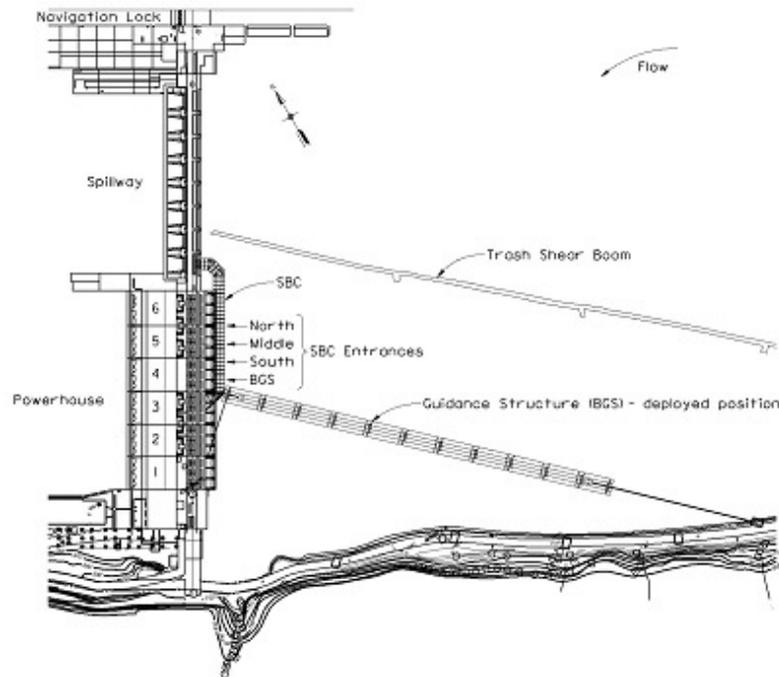


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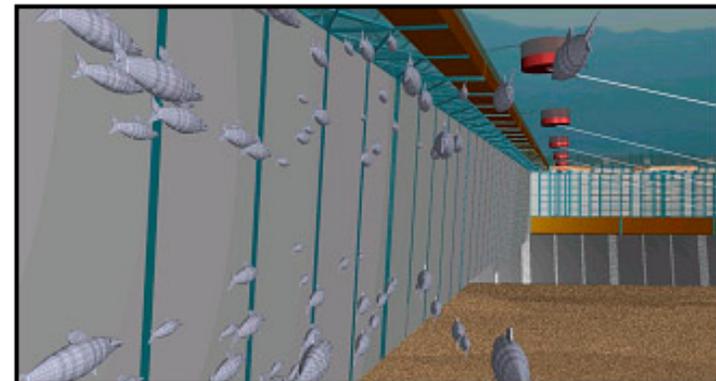
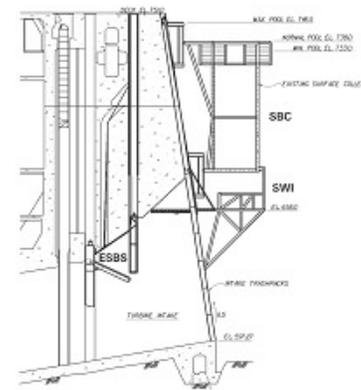
LOWER GRANITE PRE-RSW DEVELOPMENT



Powerhouse / SBC – Side View



Site Plan
(1998-2000)

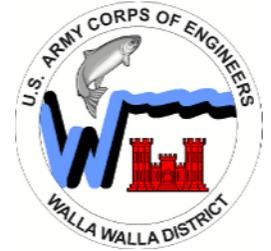


BGS – Isometric View



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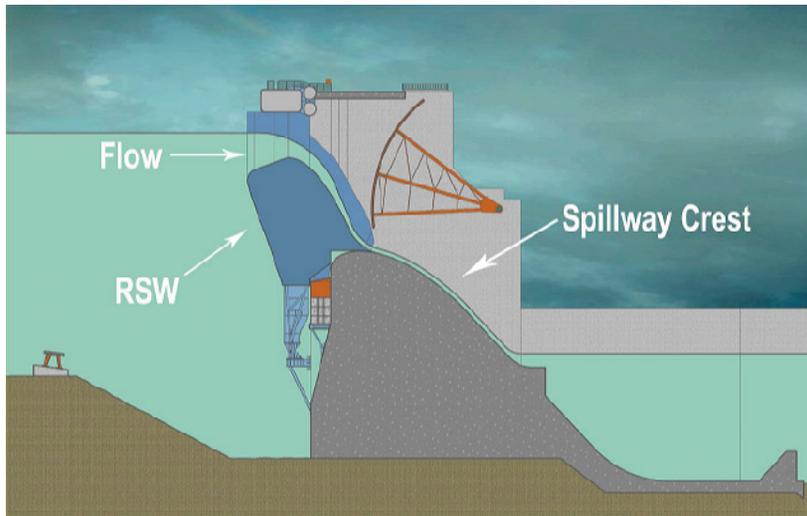
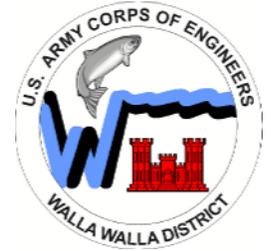
LOWER GRANITE RSW DESCRIPTION



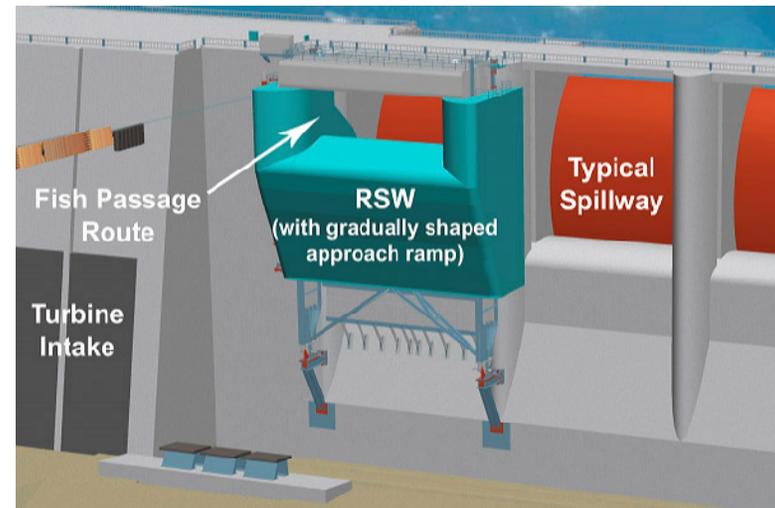


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LOWER GRANITE RSW OPERATING POSITION



Side View

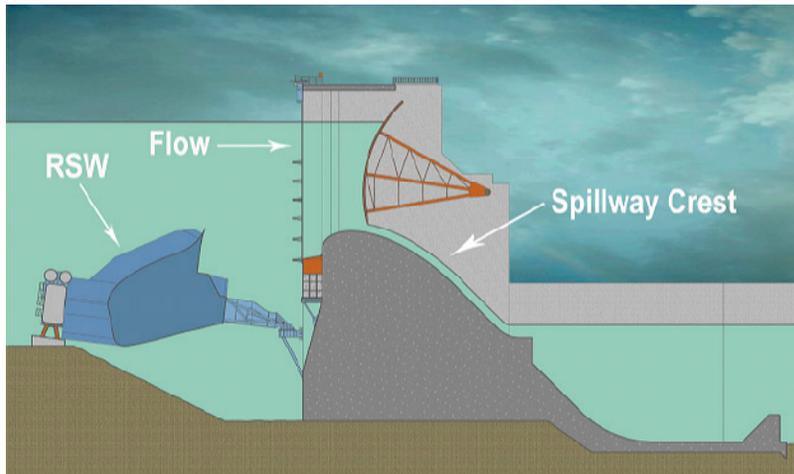
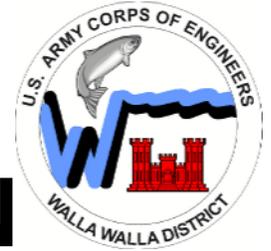


Isometric View

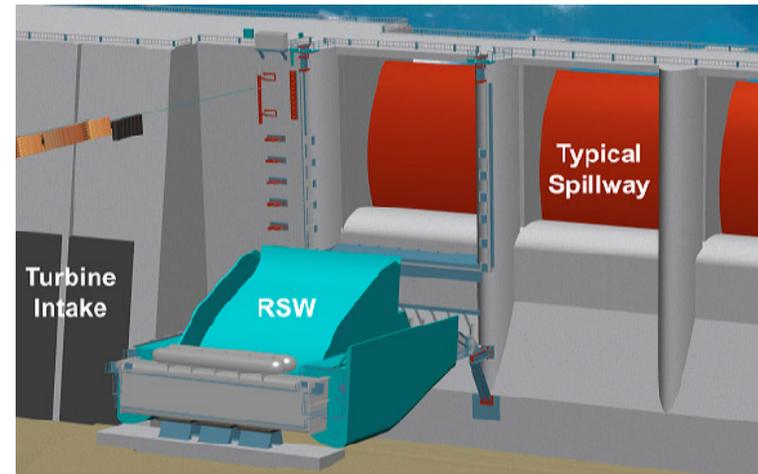


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LOWER GRANITE RSW FLOOD CONTROL POSITION



Side View

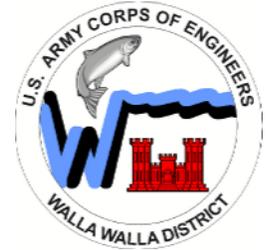


Isometric View

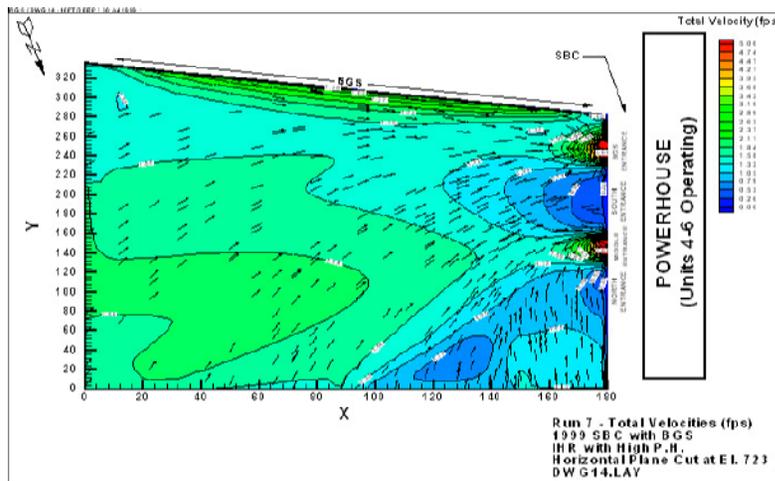
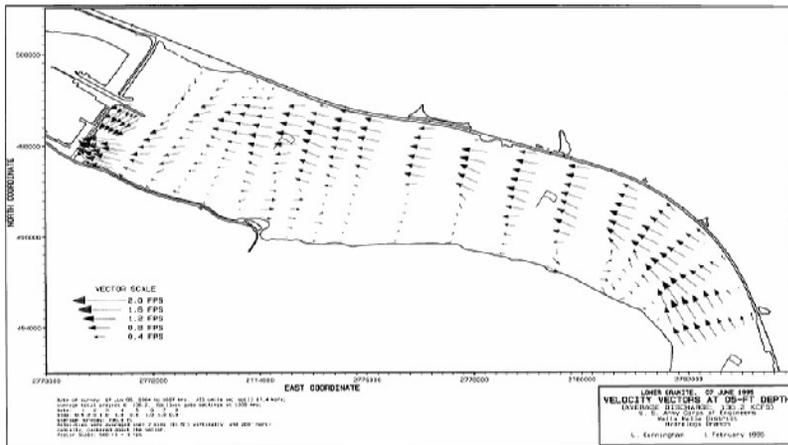


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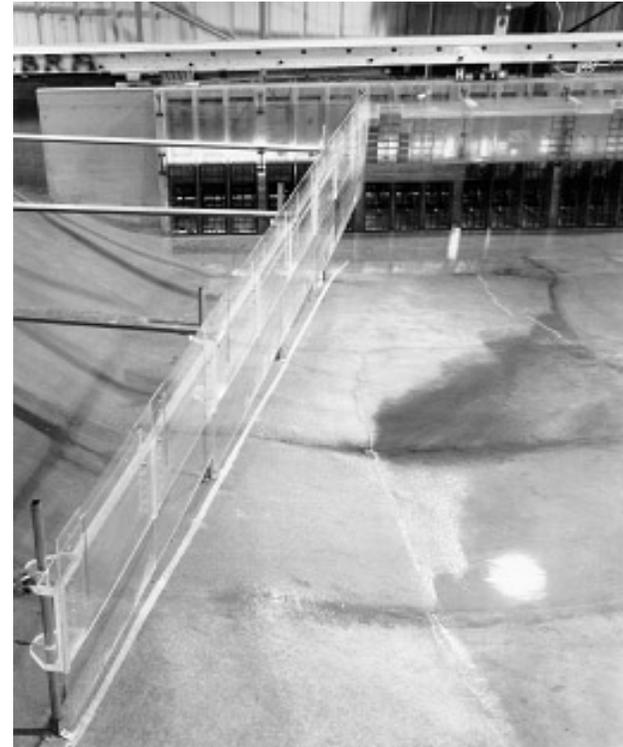
HYDRAULIC EVALUATIONS



Field Measurements



Numeric Models

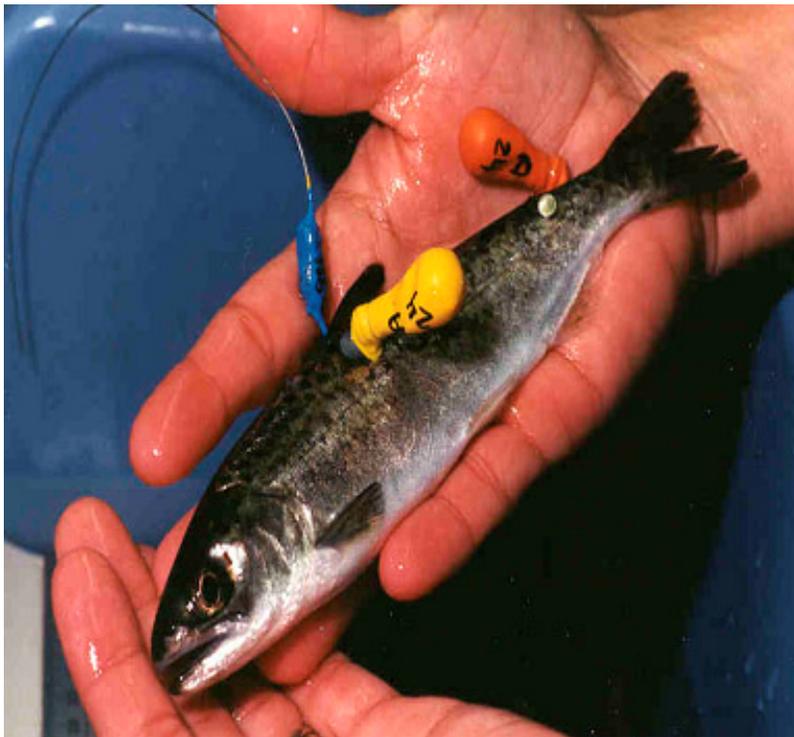
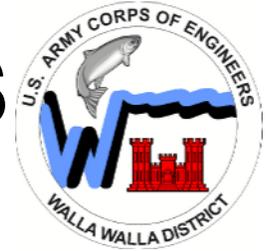


Physical Models



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BIOLOGICAL EVALUATIONS

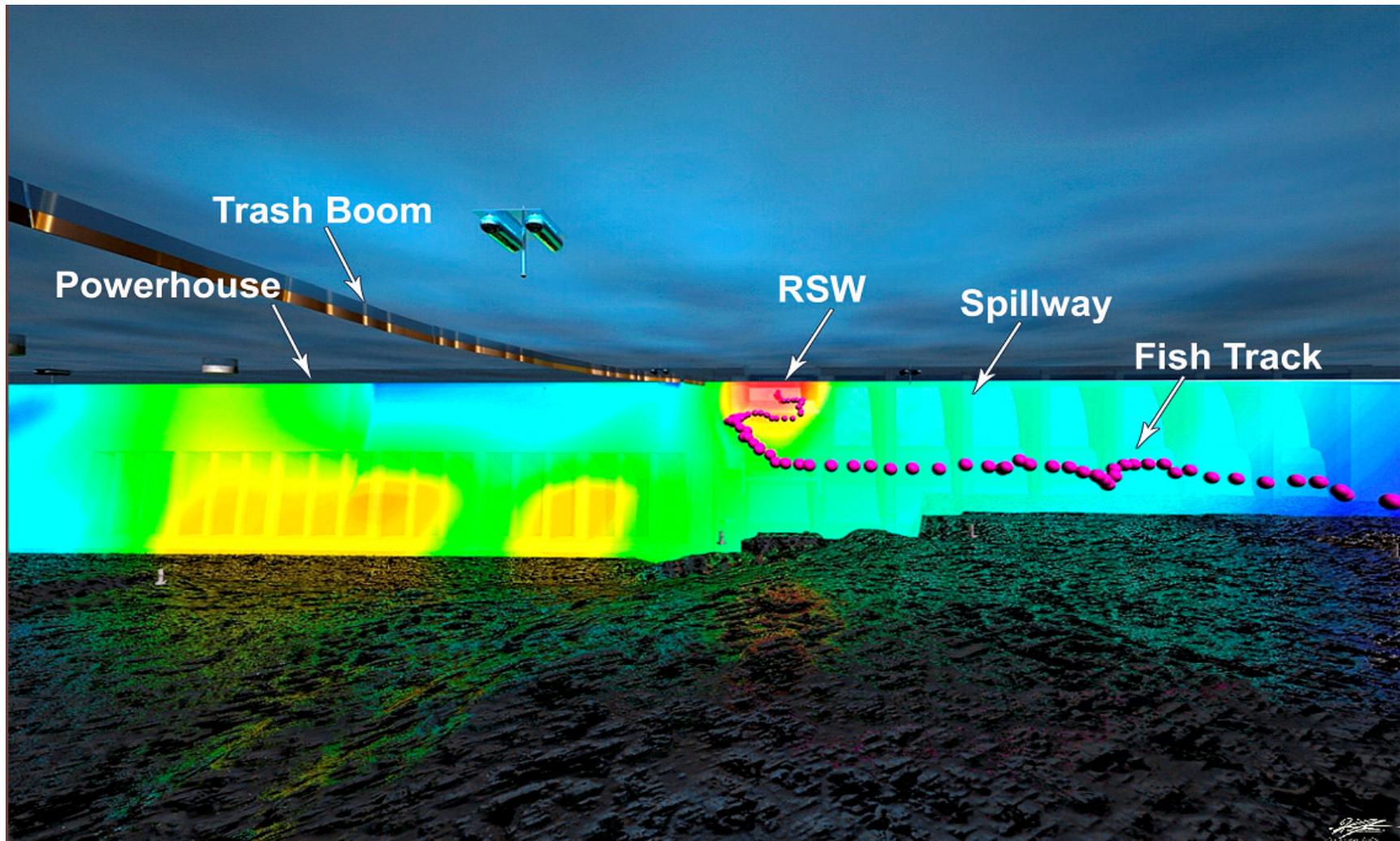
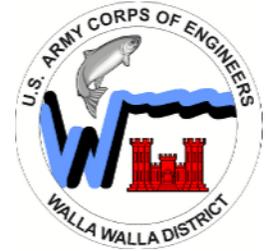


- Biological Methods
 - Radio Tracking
 - Hydroacoustics
 - Balloon Tags
 - Acoustic Tags / 3D Tracking



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CORRELATION FISH BEHAVIOR / HYDRAULICS

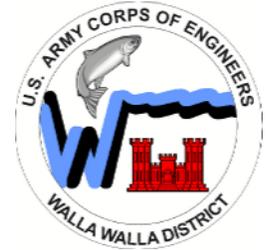




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RSW

RESULTS AND BENEFITS

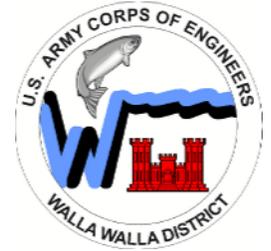


- Improved Fish Passage
 - Highly Efficient
 - Less Delay
 - Greater Survival Potential
- Better Water Quality
 - 120% to 110% TDG
- Increased Power Revenues
 - \$13-20 Million Annual Savings (Four LSR Dams)



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FUTURE



- Broad Regional Support
- Lower Granite RSW Normal Operations
- Ice Harbor RSW in 2005
- High Interest for Other Projects

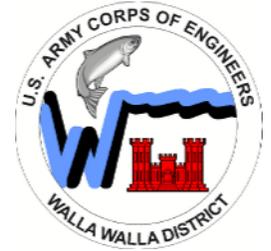


Ice Harbor Dam



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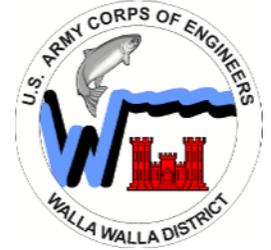
QUESTIONS?





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CONTACT INFORMATION



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