

# North Fork Floating Surface Collector:

Summary of Design and First 6 Months of Operation  
PGE's Clackamas River Hydro Project



Nick Ackerman

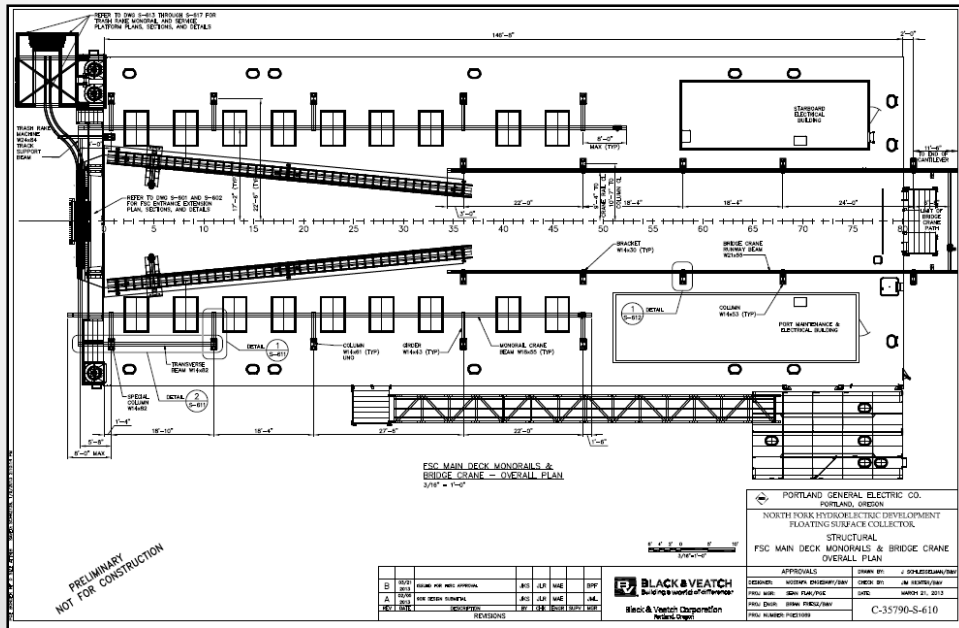
Portland General Electric

Willamette Science Review, 2016

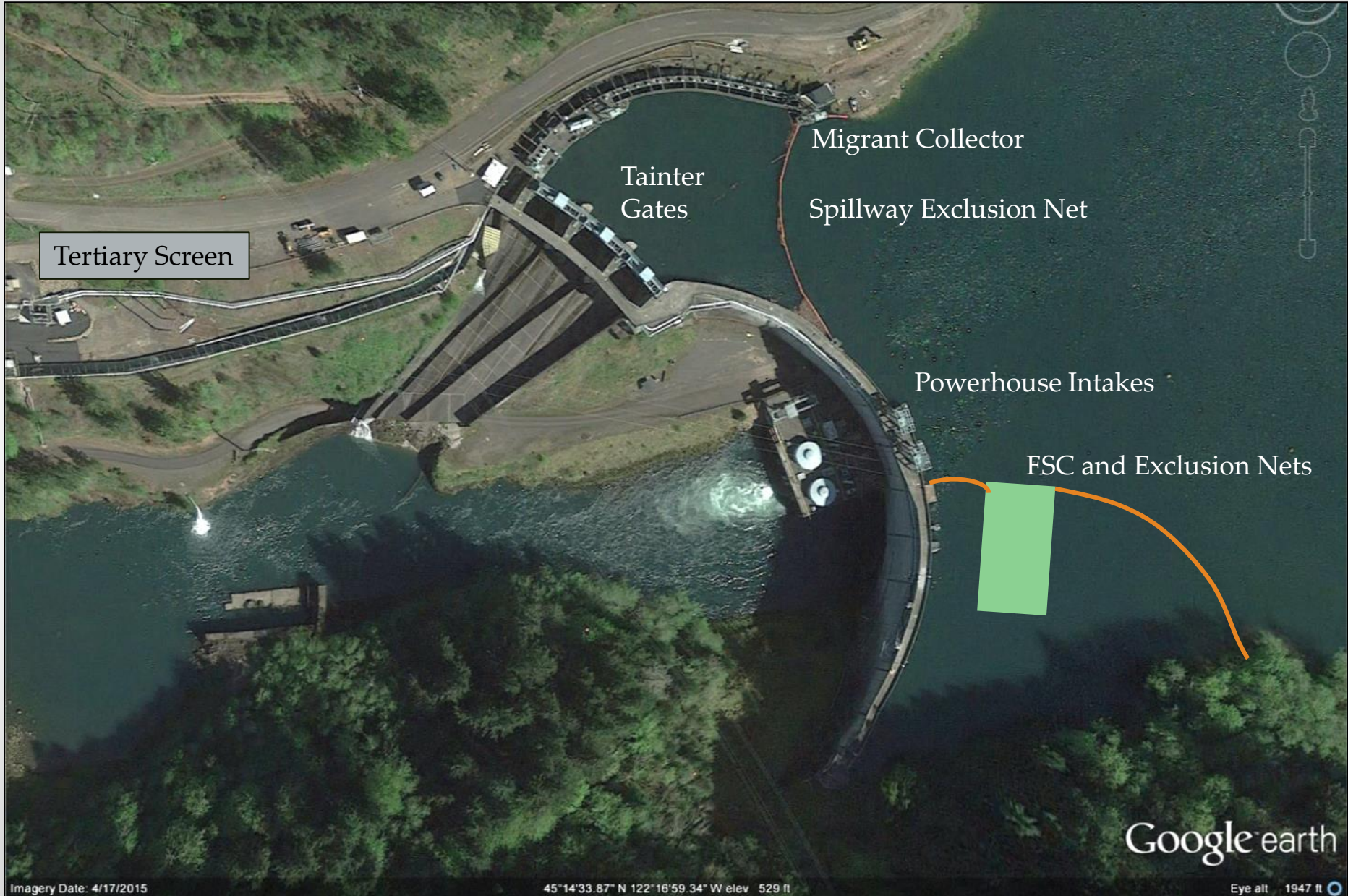


# Overview:

- Siting and Design
- Hydraulic Evaluation
- Operational Experience
- Pilot Fish Guidance Efficiency Test Results



# Siting & Design:



# Siting & Design – North Fork Dam:

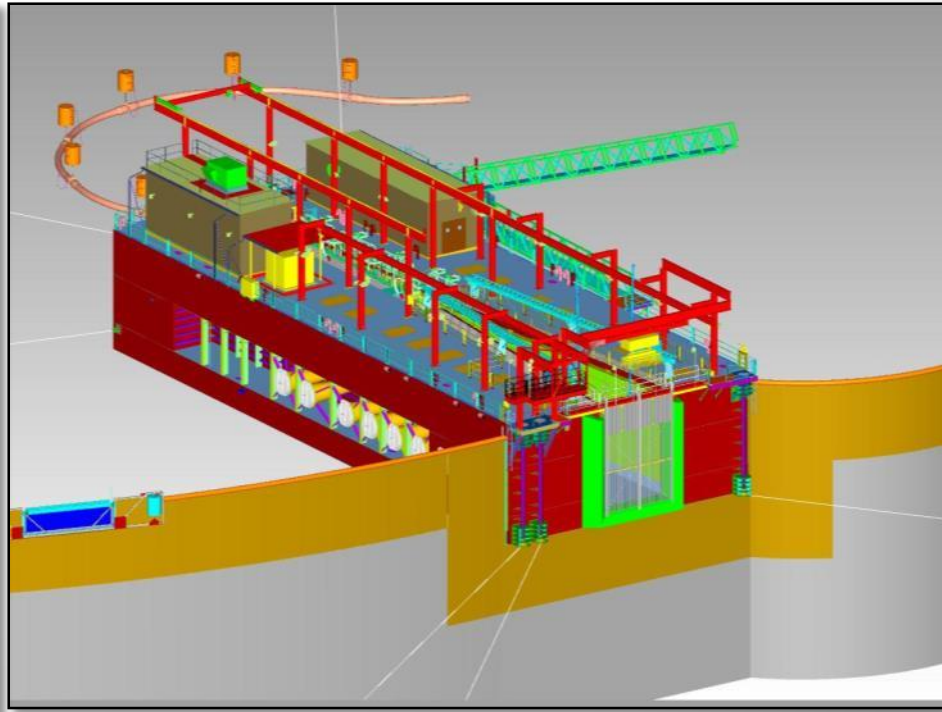


- 54 MW
- Hydraulic Head of 138 feet
- Reservoir is 2.8 miles long and 735 feet wide in forebay
- Forebay typically fluctuates  $< \pm 2$  ft.



# Siting & Design - FSC:

- 1,000 cfs pumped flow
- 18 submersible Flygt pumps
- Entrance is 17.3 feet wide by 20.3 feet deep
- No on board fish sampling facility
- Exclusion nets
- Design/build cost = \$42 million



# Siting & Design - FSC:



# Hydraulic Evaluation:

- NMFS design criteria met
- Entrance flow = 967 cfs
- Capture velocity = 6.3 fps
- No hot spots



Facing downstream through secondary screens

Flow at entrance (3.1 fps)

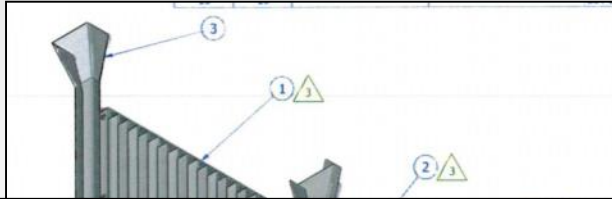
# Operational Experience:





# War on Debris:

Grizzly rack at FSC entrance



# War on Debris:

Screen cleaning systems



# War on Debris:

Cattle Guards

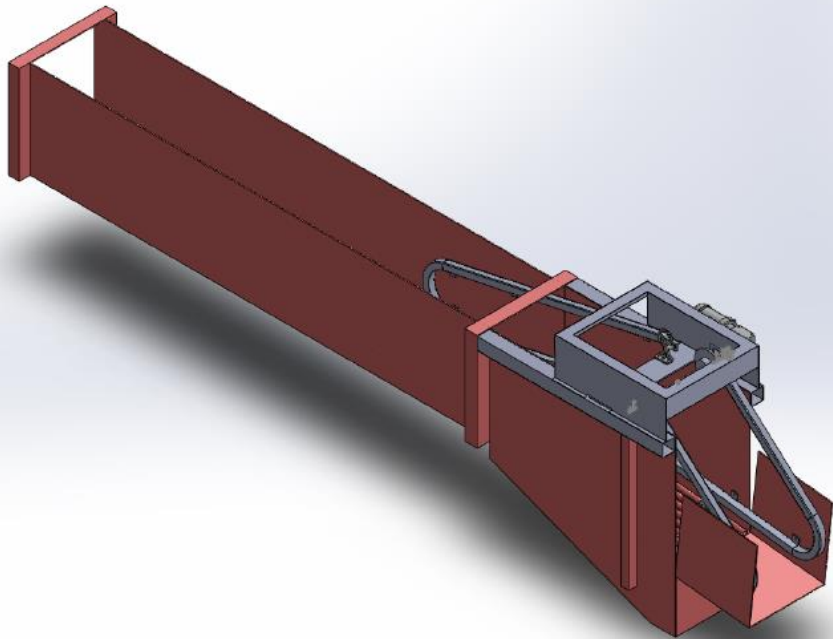


# War on Debris:



# War on Debris:

Juvenile sampling  
facility



# War on Debris:



# Pilot Guidance Test:

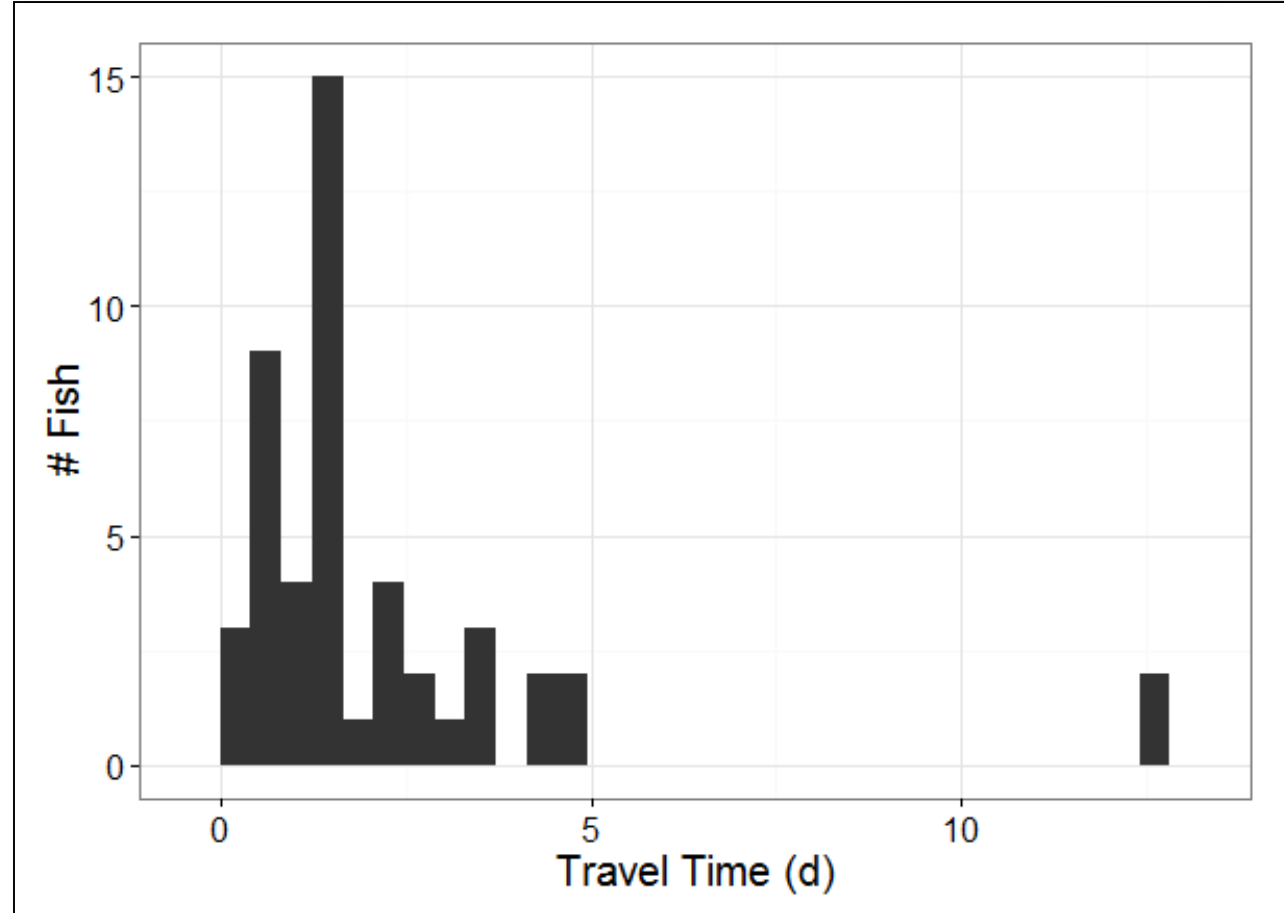
Released 55 Wild Chinook Smolts outside of forebay  
(0.4km from FSC)

Released Nov. 2<sup>nd</sup>

Fish Guidance  
Efficiency = 0.873

Pr FSC = 0.917

Prolonged heavy spill  
beginning on day 16  
may have affected  
FGE.



# Record Downstream Migrant Counts:



## **Downstream Migrant Counts from 1958 – 2015:**

- September 2015: Record count of Chinook juveniles (3x previous record)
- October 2015: Record count of coho juveniles
- November 2015: Record count of coho juveniles (4x previous record)
- November 2015: Record count of steelhead juveniles
- November 2015: Record count of lamprey macrothalmia



# Acknowledgements

Sean Flak –PGE Engineer (formerly)

Tim Keller – PGE Construction Manager

Peter Christensen – R2 Resource Consultants, Inc.

Countless PGE Staff and contractors involved with design,  
construction, and operation



Questions?



# Operations:

| Operation    | % of Time |
|--------------|-----------|
| Normal       | 85.4      |
| Reduced Flow | 2.0       |
| Off          | 12.5      |

