A multi-dam, fish passage standard

CLACKAMAS RIVER HYDROELECTRIC PROJECT (FERC No. 2195)

2013 NHA Annual Conference - 04/22/13

The Problem

Facing us during relicensing

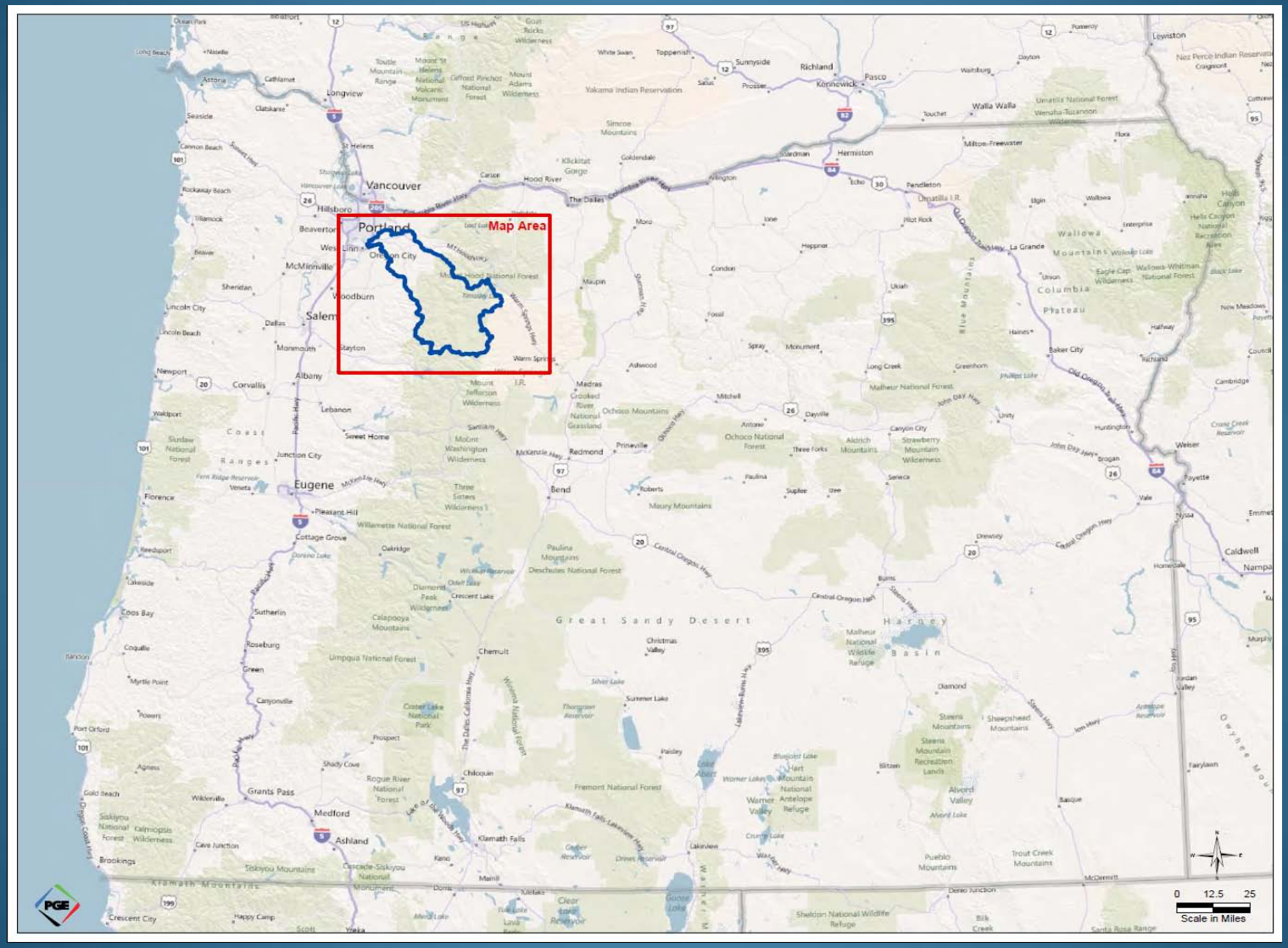
- A multi-dam system with varying levels of downstream fish passage protection
- 3 ESA protected salmon species
- Project economics that prohibited fixing everything
- Resource agencies requiring certainty

The Problem

The settlement opportunity

- A lot of project knowledge
- Computer simulation model to evaluate fish passage alternatives
- A single project-wide survival standard
  - Several key fish passage improvements
  - Tiered decision for subsequent actions

Clackamas River Basin, NW Oregon



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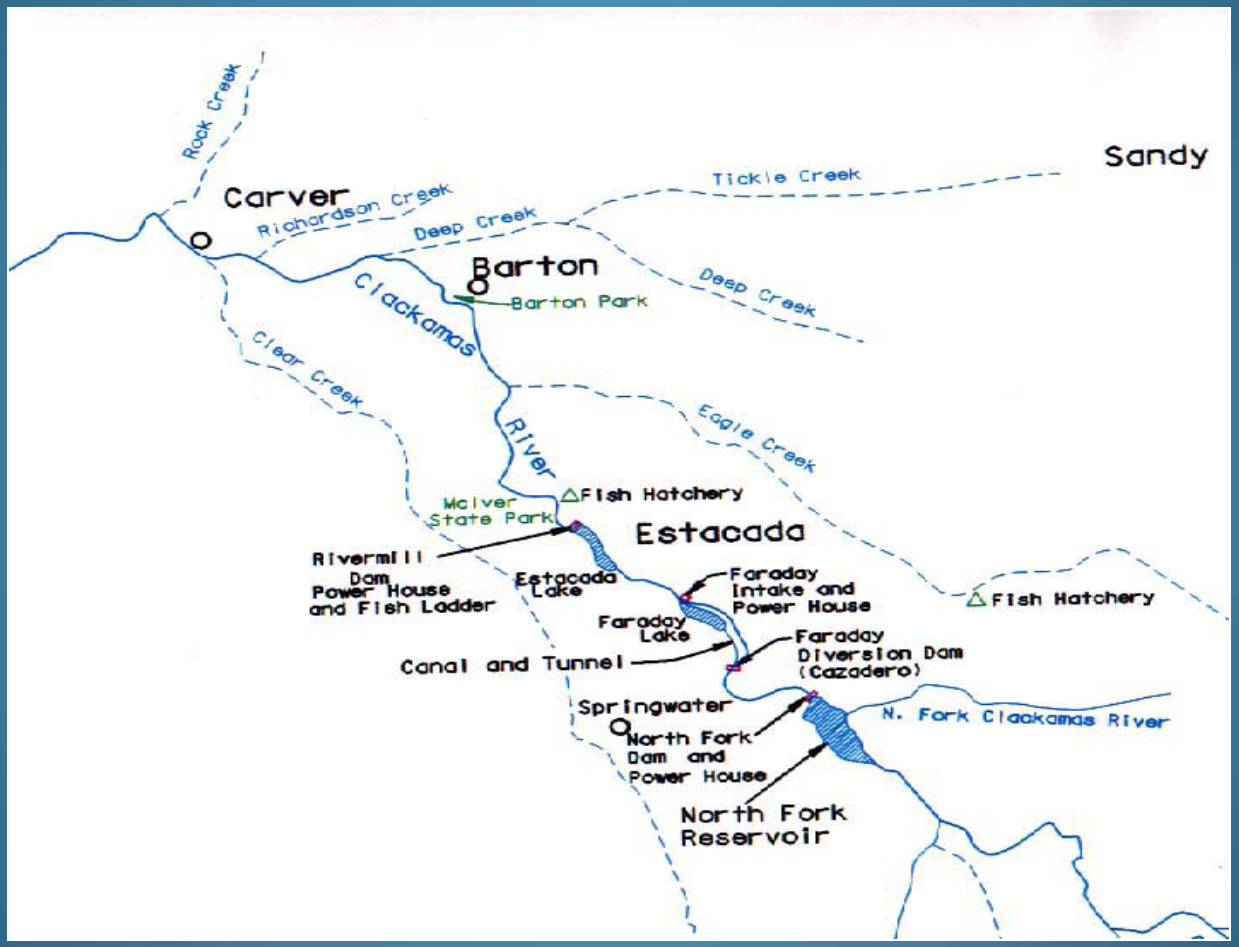
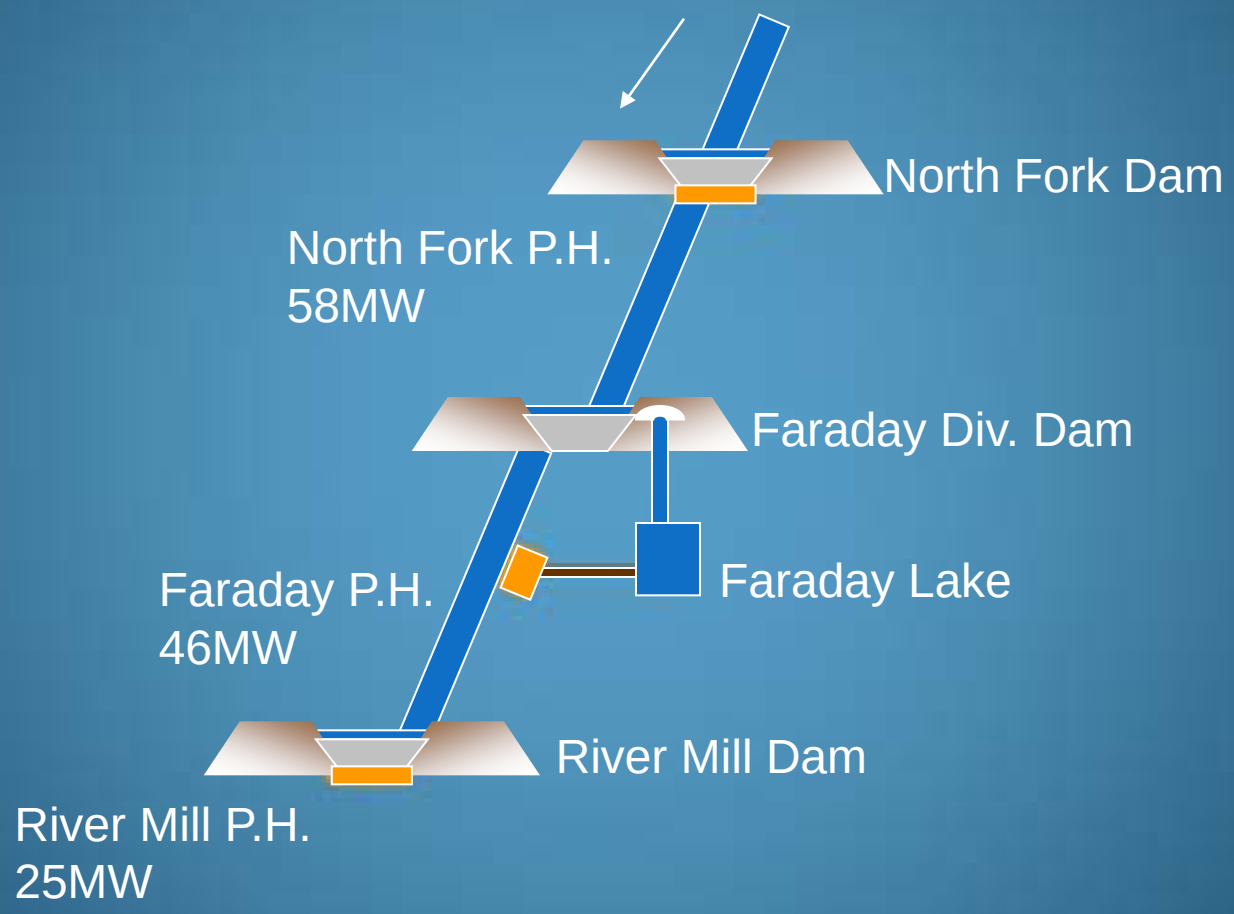
Clackamas River



Mainstem Project "plumbing"



North Fork Dam

Faraday Diversion Dam

Faraday Lake

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River Mill Dam

Downstream Migrant Mortality Model (DM3)

Establishing the priority improvements

- Daily simulation model routes water (and fish) through the various flow routes
- Incorporates periodicity of migrants
- Uses the water history of the project (1909 – 2011)
- Route selection associated with each species at various flows
- A mortality rate associated with each route and species

Downstream Migrant Mortality Model (DM3)

Establishing the priority improvements

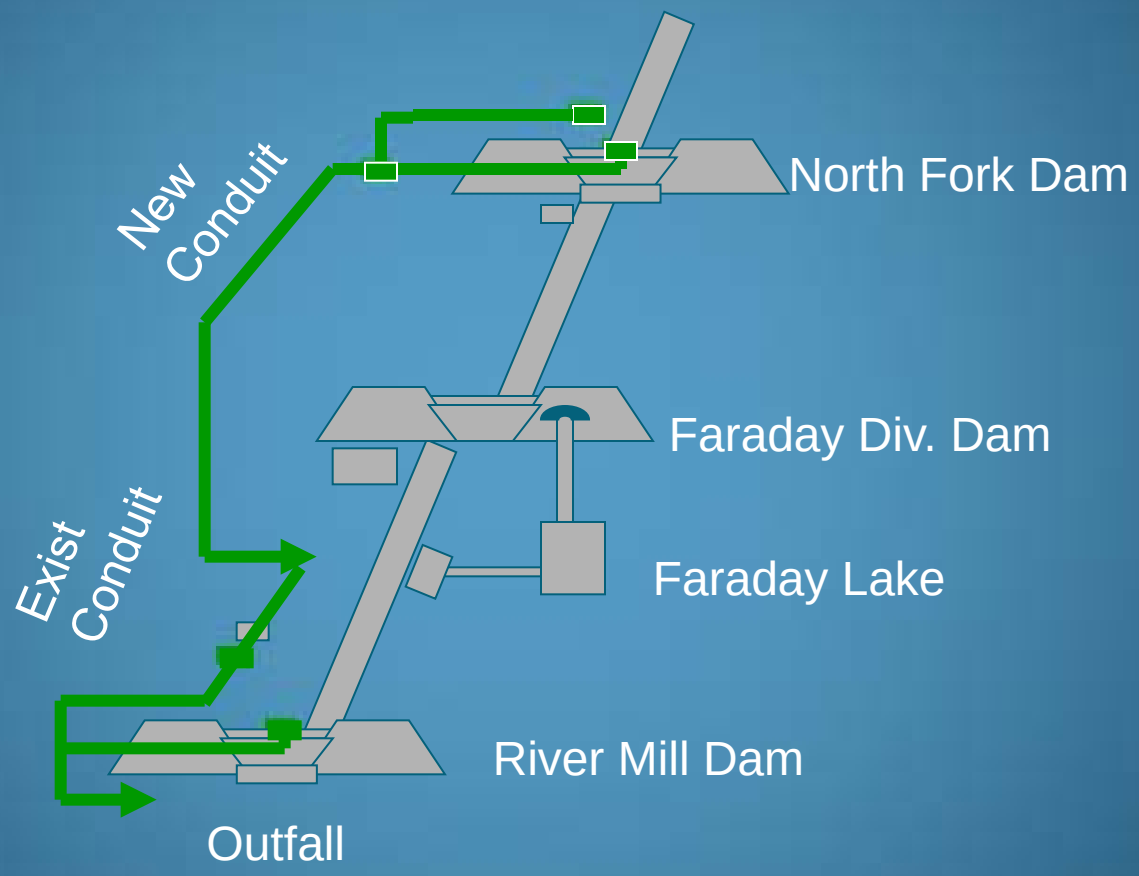
- “Flow Response Factor” allows adjustment of rate of migration based on changes in flows
- Can “game” passage improvement options
- Constantly refined as passage studies are implemented
- Will be used to help prove our project wide survival standard is being met

The Core Solution . . .

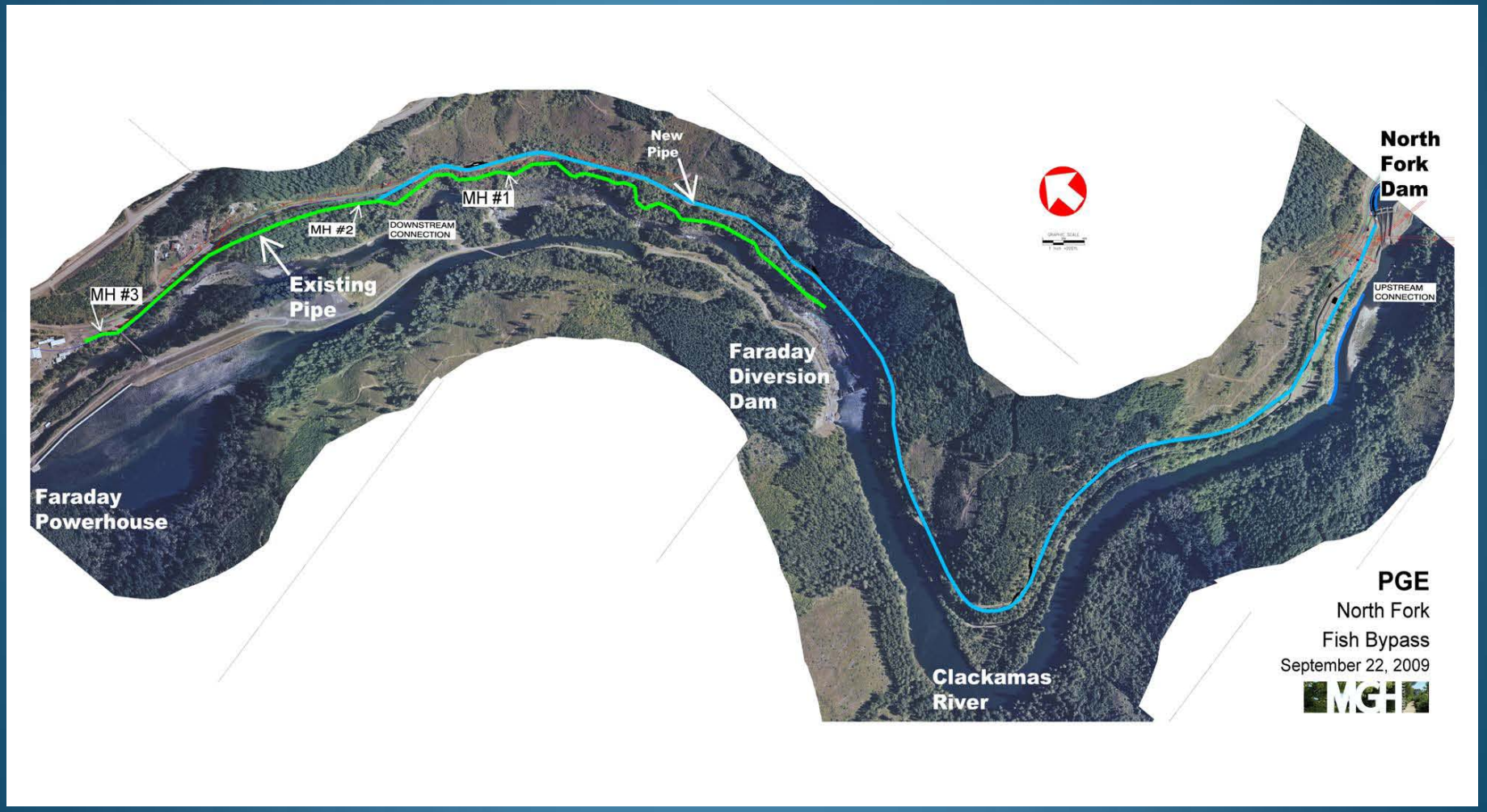
Getting the migrants out of the river

- Collect as many fish as possible at NF
- Route them into a 6.8 mile fish pipe
- Release them into the tailrace of RM
- Existing NF collector had “issues”
  - Shared ladder with adult salmonids
  - Spring Chinook

Downstream Fish Passage



The Fish Pipe



The Fish Pipe

High-density polyethelene (HDPE)

The Fish Pipe

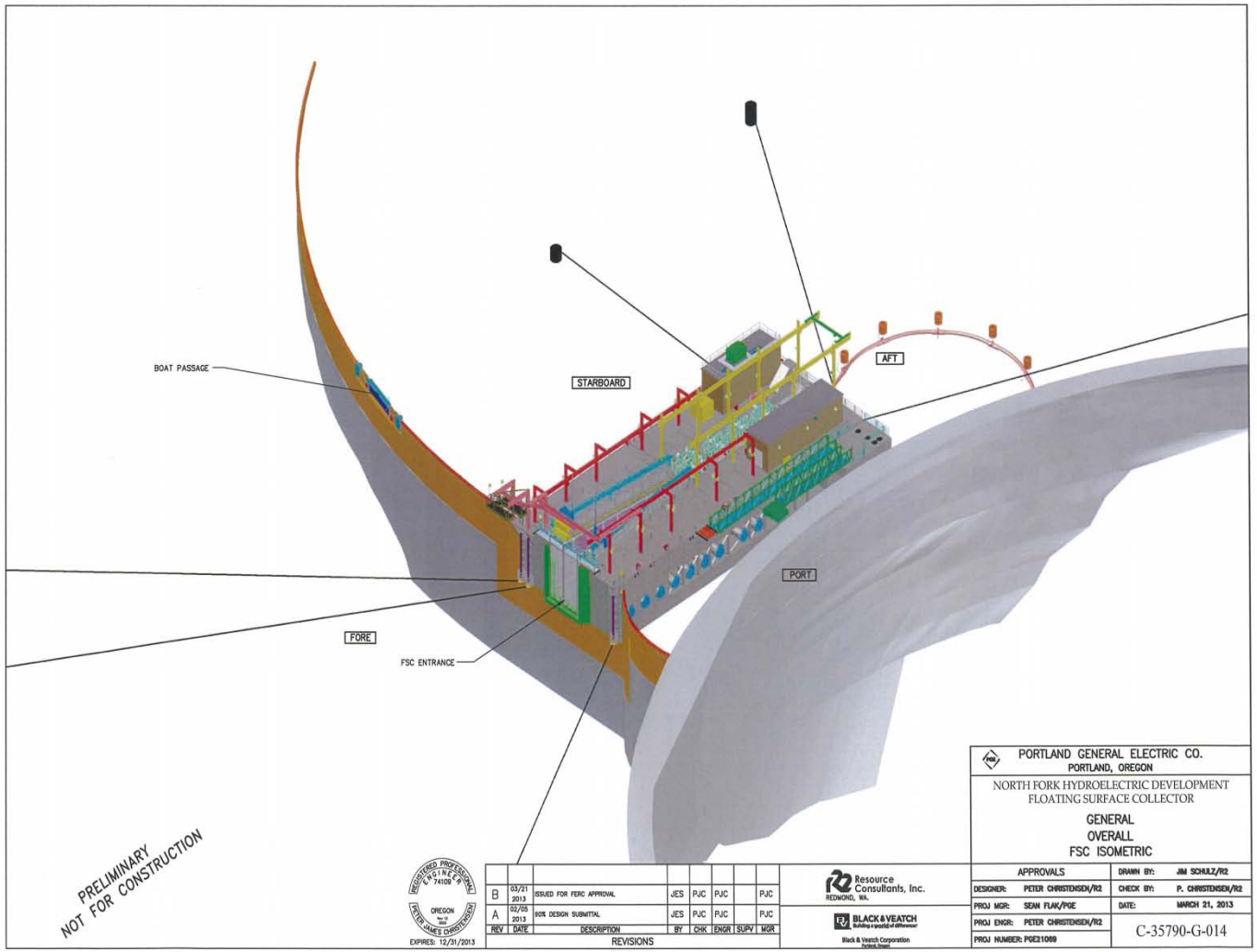
High-density polyethelene (HDPE)

A New NF Surface Collector

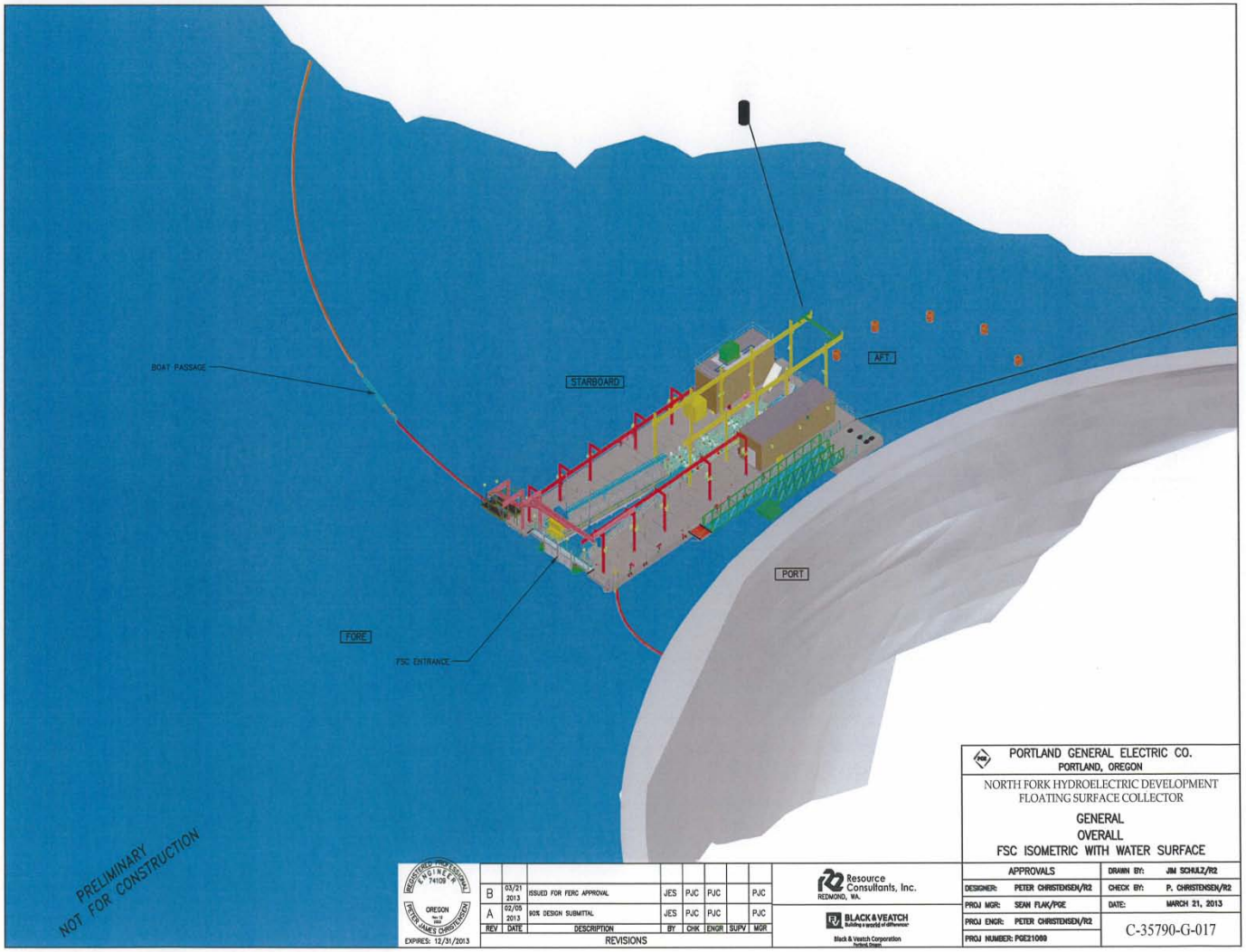
Is it big enough?

- Evidence that Spring Chinook were being entrained into the NF powerhouse
- Other species effectively captured in existing collector
- Agencies wanted 3000 cfs collector plumed to the powerhouse
- Agreed to a 1000 cfs floating, pumped collector

A New NF Surface Collector



A New NF Surface Collector



River Mill Surface Collector

A late addition to our settlement

- Increasing salmon spawning occurring near the head of the reservoir
- Only “operational” fish protection measures were in place
- One of five turbines to be screened
- Anticipate behavioral response by smolts to be effective

River Mill Dam "Surface Collector"

River Mill Dam "Surface Collector"

Tier 2, Tier 3, Tier 4 Measures

Providing the agencies certainty

- A series of additional measures
- Flexibility in which ones are implemented
- Validation testing between tiers
- Minimal performance at each tier
  - Tier 1 at least 88% or $$ solution
  - Tier 2 at least 91% or $$ solution
  - Tier 3 at least 95% or $$ solution
- Standard pProven with DM3 model and tests

Tier 2, Tier 3, Tier 4 Measures

Examples of additional measures

- Replace existing NF collector screens
- NF spillway improvement
- Block fish from entering Faraday Lake
- Screen units at Faraday powerhouse
- Reduce trash rack spacing at RM Dam
- Screen additional units at RM powerhouse
- 3000 cfs collector plumbed to the deep water intake at NF ($$)

Benefits of this Approach

Lower cost than agency solutions

- Facilities designed to a performance goal but acceptance is not drive by agency criteria
- Opportunity to concentrate efforts on most beneficial measures
- Ability to stop operational measures if passage standard is being met
- Agency support for modifying passage measures as the performance standard remains

Risks of this Approach

Licensee owns more risk

- You are betting you can meet the standard with measures identified
- If forced to implement lots of additional measures, project economics are at risk
- You need a lot of project knowledge
- Unexpected and emerging issues
- Maintain collaborative relationship with agencies

Thank You

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