A Tale of 4 Rivers and 4 Solutions

NHA Annual Conference

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PGE'S HYDRO OPERATIONS

- 4 river basins
- 4 very different projects
- The same overarching goal for all 4: protect generation and valuable operating flexibility while significantly improving fish protection

Which leads to 4 different strategies

- Bull Run: Success through Surrender
- Willamette: Overcoming Bad Karma
- Deschutes: The Big Kahuna
- Clackamas: Every day, in every way, getting better and better

Elements in Common

- Highly adaptive
- Developed using independent science
- Goals oriented to what we can control
- Implemented by an internal team that also worked on the licensing
- Long term involvement from agencies, tribes and NGOs.

Bull Run

Success through Surrender

Bull Run: Project and Issues

- Turn of the 20th century engineering marvel
- Complex system of diversions, canals, tunnels and flumes
- O&M costs high
- Generation value low
- Temperature, passage and minimum flow issues

Bull Run: Solution

- Remove the project

Willamette

Overcoming Bad Karma

Willamette: Project and Issues

- Small, but steady generation
- Oldest project
- 12 unscreened units; one “eicher” screen
- History as a part of a larger industrial complex; “fish killer”
- All salmon coming down the river pass through the project

Willamette: Solution

- Tiered implementation of passage improvements
- Tied to performance standards

Deschutes

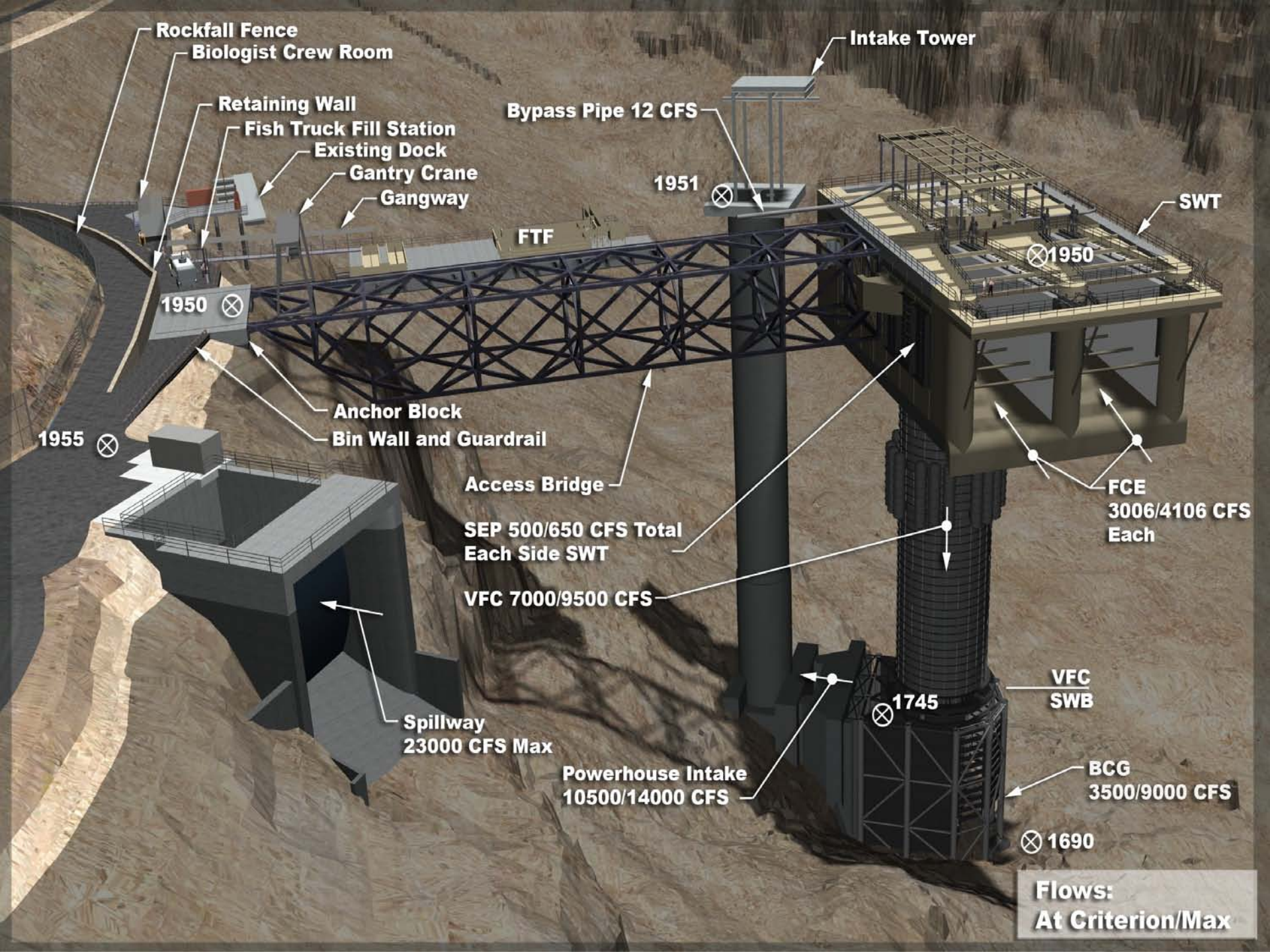
The Big Kahuna

Deschutes: Project and Issues

- Largest project on PGE's system
- Irreplaceable peaking and system benefits
- World renowned fisheries; previously failed attempt at passage
- Project is partially on the Warm Springs reservation and is co-owned with the Tribes.

Deschutes: Solution

- Comprehensive fisheries program with Selective Water withdrawal and anadromous reintroduction as the cornerstone
- Protection of project operating flexibility
- One shot
- Supplemented by a habitat fund


Rockfall Fence
Biologist Crew Room
Retaining Wall
Fish Truck Fill Station
Existing Dock
Gantry Crane
Gangway
Intake Tower
Bypass Pipe 12 CFS
1951
SWT
FTF
1950
1950
Anchor Block
Bin Wall and Guardrail
1955
Access Bridge
SEP 500/650 CFS Total
Each Side SWT
VFC 7000/9500 CFS
FCE
3006/4106 CFS
Each
VFC
SWB
1745
Spillway
23000 CFS Max
Powerhouse Intake
10500/14000 CFS
BCG
3500/9000 CFS
1690
Flows:
At Criterion/Max

Clackamas

Every day, in every way, getting better and better

Clackamas: Project and Issues

- Most geographically widespread
- Widely varying project ages (1911-1957)
- Passage throughout main stem portion of the project
- Wide range of issues (passage efficacy, flows, temperature, habitat quality)
- Not well understood project benefits

Clackamas: Solution

- Some improvement at virtually every place a project impact was identified
- Significantly modified project operations
- Amount of improvement depended on ratio of cost/benefit
- Success/compliance is measured differently depending on the measure