AGENDA

- JACKSON PROJECT OPERATIONS OVERVIEW
- HISTORY OF DEVELOPMENT - THE SULTAN RIVER PROJECT
- DISCUSS TEMPERATURE DYNAMICS TIED TO PROJECT OPERATIONS
  - Why is water temperature important?
  - How does the project impact temperature?
  - How have we met temperature requirements in the past?
  - What changed?
- IMPROVEMENTS MADE TO MEET THE NEW REQUIREMENTS
Routing of outflow
1929 – City of Everett constructs Diversion Dam and begins diverting from river to meet municipal water supply needs.
HISTORY OF DEVELOPMENT - SULTAN RIVER PROJECT

Everett Water Supply
Cross Section of Dam
Sept. 30, 30
HISTORY OF DEVELOPMENT - SULTAN RIVER PROJECT

Everett Water Supply
East End Diversion Dam
2702'
Sept. 30, 30
1965 – Culmback Dam (Stage-1) is constructed. Water stored and released to reliably meet municipal water demands.
HISTORY OF DEVELOPMENT - SULTAN RIVER PROJECT

STAGE-1 CREST CULMBACK DAM

STAGE-1 MORNING GLORY SPILLWAY

DIVERSION TUNNEL

SULTAN RIVER
1984 – Completion of the JHP (referred to as Stage 2).
- Raised Culmback Dam (90’)
- Increased storage (4.5 x)
- Constructed generation facilities
Routing of outflow
THE IMPORTANCE OF WATER TEMPERATURE TO SALMONIDS (SALMON, TROUT, & CHAR)

- Each life stage (egg, fry, juvenile, adult) has specific requirements and thermal tolerances.

- In general, concerns tend to focus on the impact from temperatures that are too warm as they can be lethal to fish rearing in the river and/or impact spawning populations.

- However, cold temperatures can delay spawning and egg incubation and/or limit juvenile growth.
Seasonal temperature stratification

Winter

Spring

Summer

Autumn
Releases from the bottom of the reservoir are cold!

FIXED INLET FROM 1965

COLD ALL YEAR, COLDER THAN STAGE 1
Releases from the top of the reservoir are too warm!
SELECTIVE WITHDRAWAL
SELECTIVE WITHDRAWAL
SELECTIVE WITHDRAWAL
SELECTIVE WITHDRAWAL

FLOW

PANEL #1

PANEL #2

PANEL #3
NEW LICENSE IN 2011 / NEW REQUIREMENT

FISH PASSAGE AT DIVERSION DAM, COMPLETED FALL 2016

- NOW, all 3 reaches are accessible to anadromous fish (salmon and steelhead)
- Traditional practice of delivering water to Reach 3 through a deep water release from the reservoir will not support salmon and steelhead – too cold!
WATER TEMPERATURE CONDITIONING
PROJECT DESIGN CRITERIA

- Collect large volume of warmer water from near the surface
- Function with 85-ft fluctuations in reservoir elevations.
- Convey flows to the other side of the dam.
- Dissipate energy (200-feet of head pressure) prior to release.
WATER TEMPERATURE CONDITIONING
SELECTIVE WITHDRAWAL
WATER TEMPERATURE CONDITIONING
CONVEYANCE TO THE RIVER

- PIPING TO RIVER
- TUNNEL PORTAL
- TUNNEL ALIGNMENT
- TUNNEL PLUG
- CONNECTION TO THE EXISTING

SULTAN RIVER

SPILLWAY
INTAKE
POWER TUNNEL

Google Earth
PROJECT - FUTURE

Jackson Hydroelectric Project
Flow During Normal Operation
QUESTIONS/DISCUSSION