

RECLAMATION

Managing Water in the West

Cle Elum & Kachess Reservoir Inactive Storage and Keechelus to Kachess Pipeline

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YRBWEP Workgroup**



U.S. Department of the Interior
Bureau of Reclamation

Cle Elum Tunnel

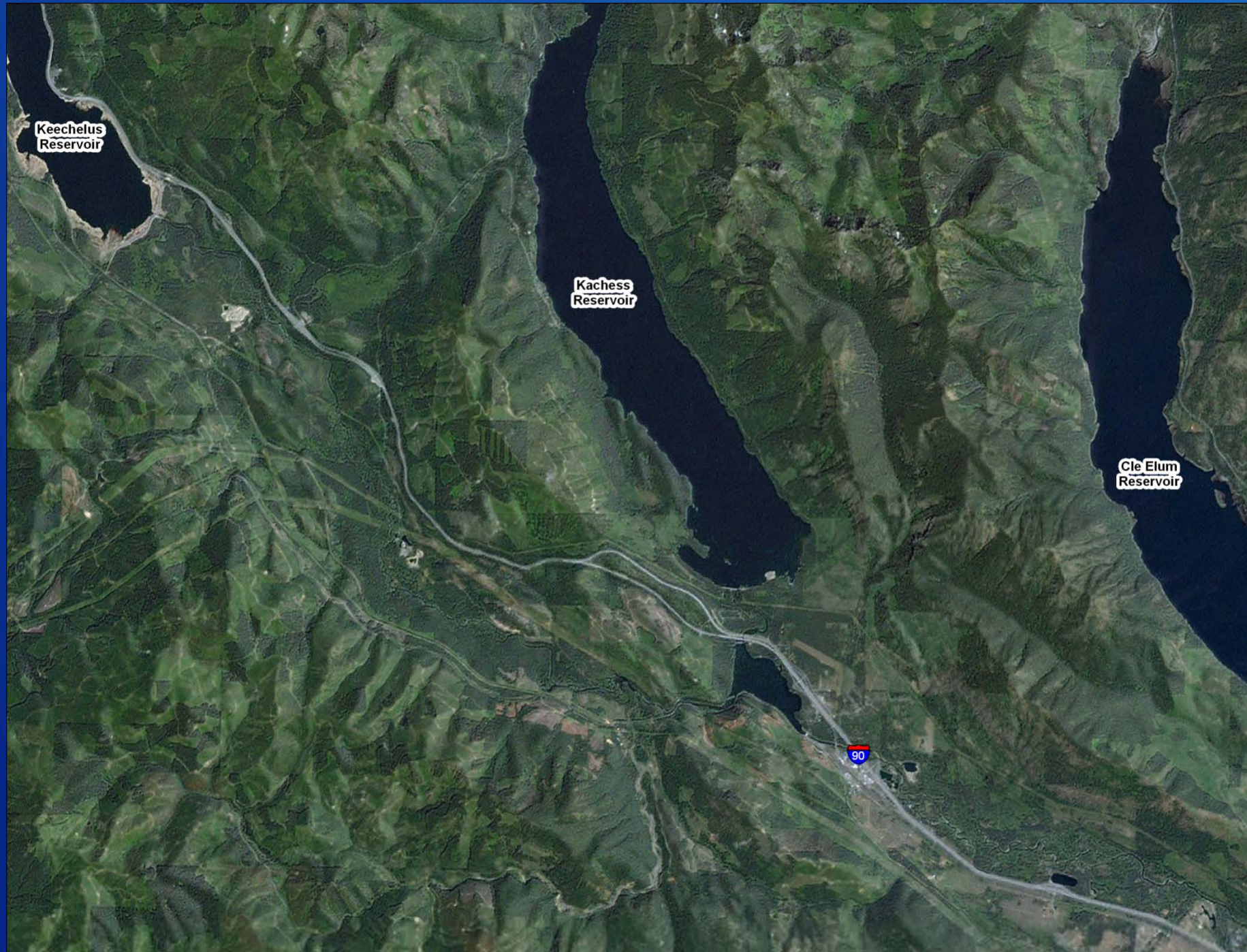


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Cle Elum Reservoir

- **Proposed in 1984 International Engineering Report**
 - **Tunnel - \$27M**
 - **Pump Options**
 - **Floating Pumping Plant**
 - **Vertical Turbine Pumps**
 - **Submersible Pumps**

Kachess Inactive Storage



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Kachess Inactive Storage Use

Assumptions:

- Tested 100 KAF and 250 KAF.
- Two-thirds for irrigation.
- One-third for fish.
- Fish flows for same season.
- Targeted 70% prorationing.
- Maintained status quo in years following use.

Kachess Reservoir Inactive Storage

Additional Acre Feet	100,000	250,000
Tunnel Length	2.5 Miles	7.8 Miles
Estimated Cost	\$122 M	\$381 M
Years helped	1992, 2001, 2005	1992, 2001, 2005
+ Prorationing, %	7, 7, 7	12, 17, 9
Prorationing, %	65, 45, 49	70, 54, 51
Years not helped	1993, 1994	1993, 1994
Storage deficit, AF	100,000	250,000
Recovery time	1 to 5 years	4 to 8 years

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Kachess Reservoir Inactive Storage

Status Quo Recovery time

- **Definition:** time required to be totally out of the inactive pool while maintaining status quo.
- **Longest period:** 2001 to 2007 (250 KAF scenario)
- **Must release from tunnel (or pump).**
- **Could increase releases from Cle Elum and Rimrock.**
- **Modeled additional releases from Cle Elum in 2002.**
- **The 2001, 2003, 2004 droughts impacted 2005.**

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Kachess Reservoir Inactive Storage

Comments on Two Phase Approach

- **If Tunneling:**
 - Requires tunnels at different elevations.
 - Would require two tunnels.
 - Do in one phase not multiple phases.
 - Unless you use a siphon concept.
 - Or combine with pumping
- **If Pumping.**
 - Could be done in phases.

Keechelus to Kachess Pipeline



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Keechelus to Kachess Pipeline

Assumptions:

1. Tested 200 cfs capacity pipeline.
2. Transfer triggers
 1. Kept Keechelus outflow below 800 cfs.
 2. Didn't transfer if Keechelus was too low.
 3. Transferred if Keechelus supply was "ahead of" Kachess.
 4. Lowered threshold if Kachess was in inactive pool.
3. Study was limited to Keechelus to Kachess sub-system.

Keechelus-to-Kachess Pipeline

Some findings

- Helps protect the Keechelus to Easton reach
- Allows greater volumes of water out of Keechelus to Kachess reservoirs.
- Sometimes helps Kachess refill.
- Carry-over is sometimes better.
- Carry-over is sometimes worse.
- Mixed results on Prorationing.
- Results are affected by assumptions about operations.

Keechelus to Kachess Pipeline

Further Study

- Pipe capacity, optimum flow needs to be evaluated.
- Need to further develop water transfer triggers.
- Need to coordinate Keechelus & Kachess sub-system with the other 3 Reservoirs in the System.
- Analysis needs more scrutiny.

Questions?



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