

Bonneville Power & Demand Response

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State of the FCRPS & FCRTS

- BPA's physical generation and transmission systems have provided tremendous value to the region for a very long time. However, due to a variety of factors, both have started to approach their physical limits.
 - Wind integration – while most of the wind built in the northwest is sold outside of the region, BPA currently supplies within-hour balancing reserves for generation leaving its balancing authority (BA).
 - Transmission Service needs – due primarily to shifting loads, wind development, and load growth, the transmission system has become constrained during certain hours in a few specific locations.
 - FCRPS – providing balancing reserves requires taking advantage of the flexibility of the hydro system. However, due to an aging infrastructure and statutory constraints (e.g., enhanced Bi-op, Canadian Treaty, navigation, flood control, recreation, etc.), less flexibility is available for this purpose.



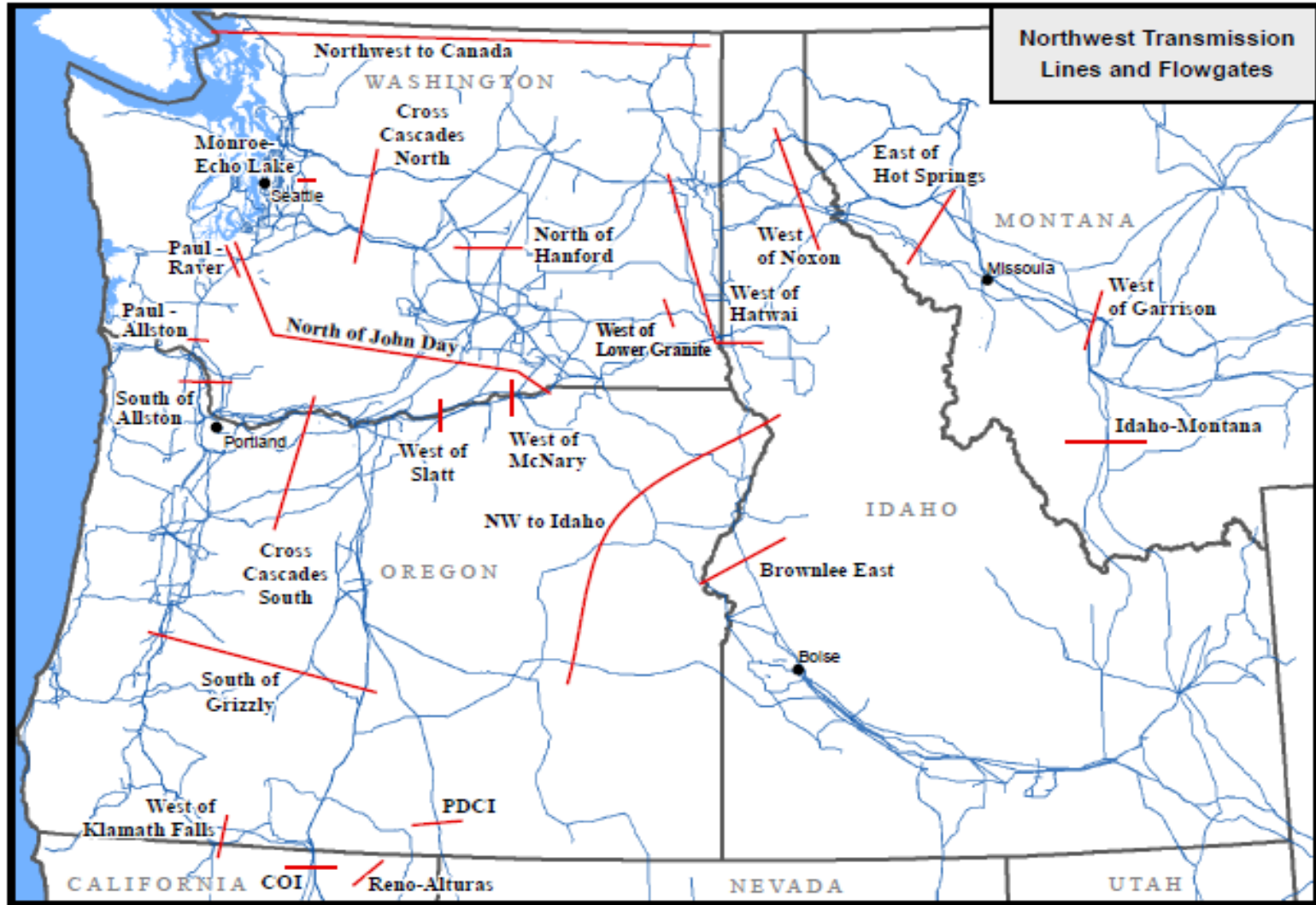
Types of Hydro Operations for Fish

With Rationale & Power System Effect

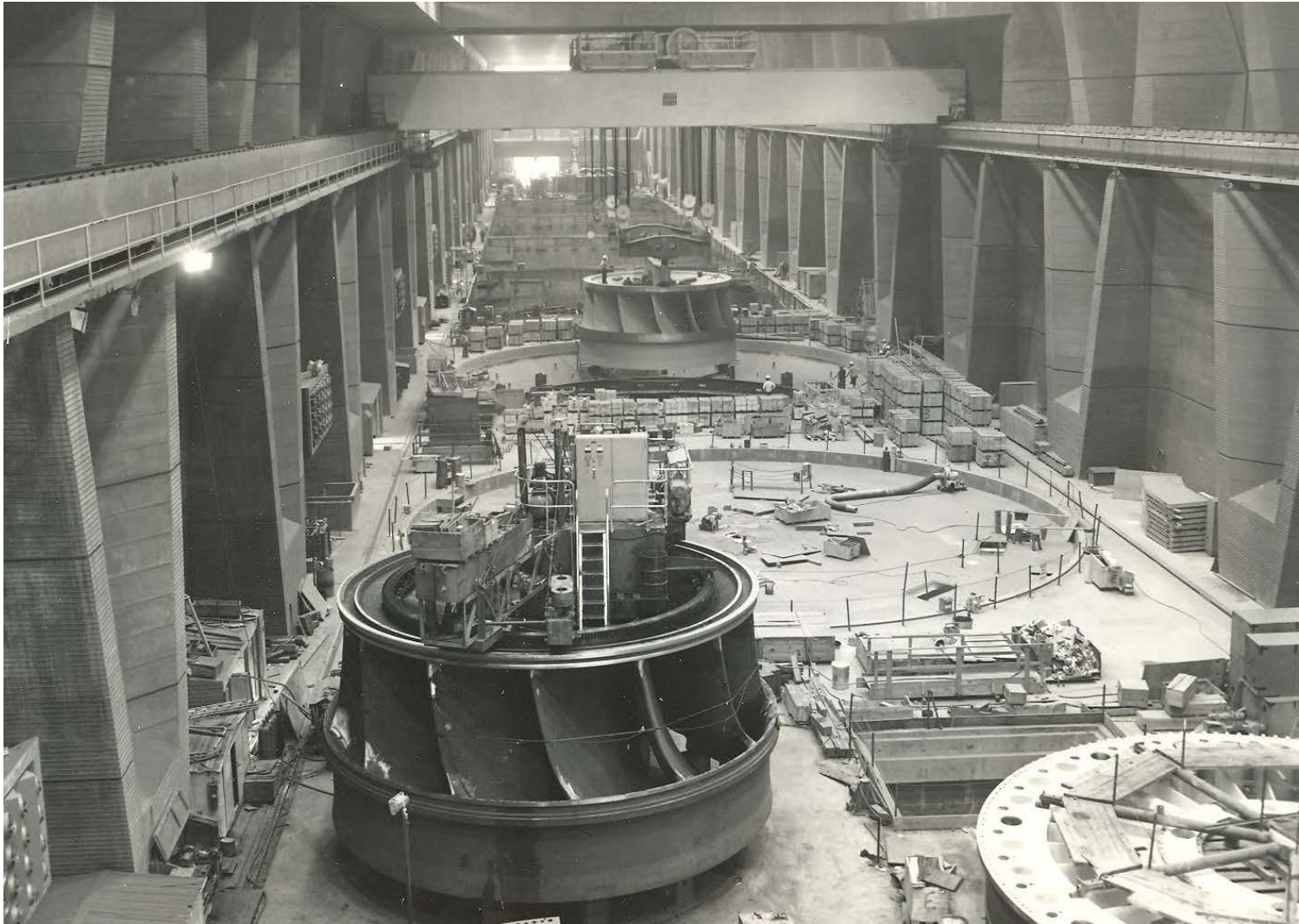
- **Minimum Flow Requirements:** Maintain flows during spawning and incubation periods to reduce risk of dewatering salmon spawning grounds and eggs (redds).
- **Flow Targets / Flow Augmentation:** Increase spring and summer river flows to enhance conditions for juvenile salmon and steelhead outmigrants.
- **Spill:** Provides a high-survival, non-turbine, and non-mechanical passage route for downstream migrants.
- **Storage Reservoir Elevation Constraints:** Ensure that water is available to help meet flow targets and provide flow augmentation.
- **Run-of-River Reservoir Elevation Constraints:** Lower pool elevation potentially increases the water velocity and fish migration speed through the lower mainstem reservoirs.
- **Turbine Efficiency Constraints:** During spring/summer outmigration period, turbines are operated within 1% of peak efficiency to minimize adverse conditions for fish passing through the turbines.



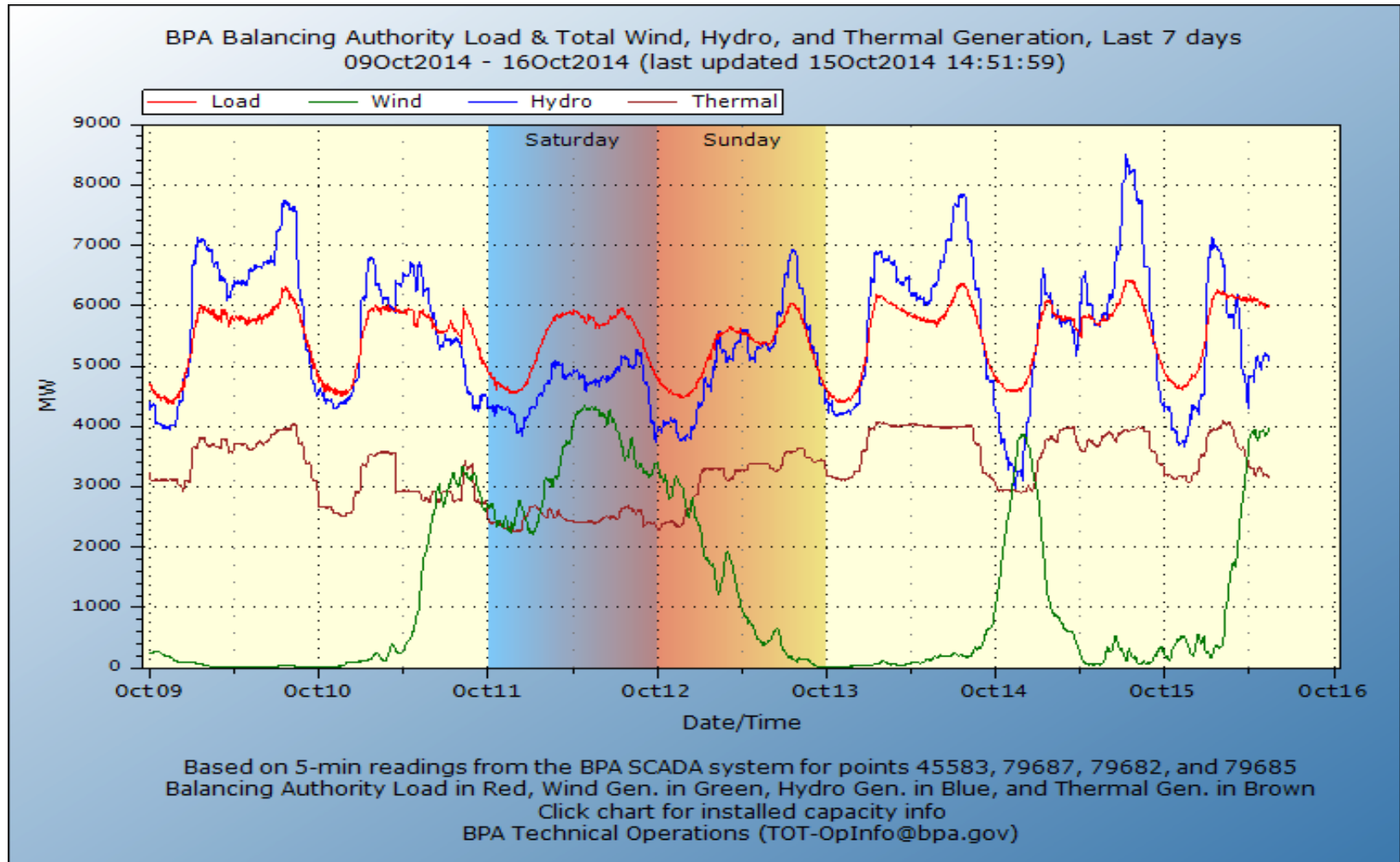
BPA Flowgates



Grand Coulee Third Powerplant Overhaul



Total BA Load, Generation & Wind Oct 9 - 16th



Drivers for Demand Response

Demand Response has the ability to serve a number of BA needs, depending upon the load supplying the reserves. Specifically, DR can supply:

- Within-hour Imbalance Capacity.
- Additional capacity for extreme weather – both winter & summer.
- Deferral of Transmission Builds.
- A cost effective alternative to traditional capacity provided by generation.



The Importance of Reliability

- Because any imbalance capacity BPA purchases is utilized to manage the reliability of the BA, it must be extremely dependable. In fact, close to 100%.
- BPA's commercial agreements for imbalance capacity include stiff penalties for non-performance, up-to and including contract termination.
- The value of any demand response hinges on the loads' ability to recharge quickly and deploy the needed reserves multiple times over short periods.
- To provide value to BPA, any demand response offered for non-pilot use needs to be large enough in size to be operationally significant to the BA.



Questions?

