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Columbia River Treaty and System Reservoir Operations

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SPECIALTY SESSION - EXTENDED ABSTRACT

Keywords: Columbia River Treaty, Flood Risk Management, Columbia River Basin, Hydropower, Ecosystem Function

1. THE COLUMBIA RIVER BASIN

The river headwaters of the Columbia River originate in British Columbia and ultimately enter the Pacific Ocean near Astoria, Oregon (1,214 miles). About 15% of the basin is in Canada, and 35% of the average annual flow comes from Canada (as measured at The Dalles, Oregon). Historically, the largest flood run-offs occur in the spring, primarily driven by snowmelt. The basin has the most hydropower capacity, ~37 GW, in North America. U.S. federal projects are authorized to meet multiple purposes: flood risk, hydropower, fish and wildlife, navigation, irrigation, recreation, and municipal and water supply.



Figure 1. The Columbia River Basin

2. THE COLUMBIA RIVER TREATY

The Treaty required Canada to construct and operate three large dams (Mica, Arrow, and Duncan) with 15.5 million acre-feet (Maf) of storage in the upper Columbia River basin in Canada “for improving the flow of the Columbia River.” 8.95 Maf (of the 15.5 Maf) of the Canadian Treaty storage is operated for flood control in Canada and the U.S. by the U.S. Army Corps of Engineers.

The entire 15.5 Maf of Treaty storage in Canada is operated for optimum power generation within flood control constraints. The Treaty allowed the U.S. to construct and operate Libby Dam, with 5 Maf of storage on the Kootenai River in Montana, for “flood control and other purposes.” U.S. and Canada are to share equally the downstream power benefits produced in the U.S. from the operation of Canadian Treaty storage. Reservoir storage is operated to reduce flood flows and shift energy from low-value time periods to high-value time periods.

3. FLOOD RISK MANAGEMENT

Current Treaty: Canadian Entity is obligated for the first 60 years to operate 8.95 Maf of reservoir storage according to the Flood Control Operating Plan prepared by the Corps for the U.S. Entity (pre-paid by the U.S.). Canadian Entity must also operate all additional storage on an on-call basis as requested and paid for by the U.S. In September 2024, the coordinated operation of 8.95 Maf of flood control storage ends and is replaced with an undefined called upon operation.

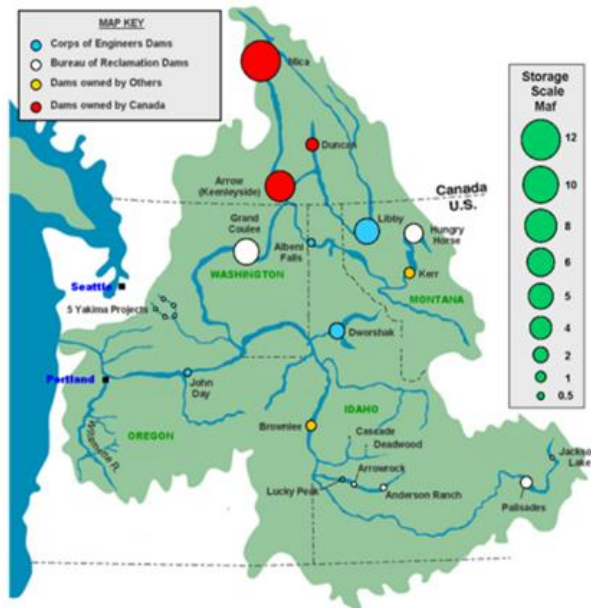


Figure 2. Flood Risk Management – Storage Scales

Post-2024: U.S. must request and pay for called upon storage in Canada, limited to potential floods that cannot be adequately controlled by all related U.S. storage.

4. TREATY HYDROPOWER

Current: Up to 15.5 Maf of Canadian Treaty storage for optimum power generation downstream in Canada and the United States (within flood control constraints). The U.S. must deliver electric power to Canada equal to one-half the U.S. power benefits from the operation of Canadian Treaty storage. Non-federal hydro-project owners (five mid-Columbia projects) deliver 27.5% of the return of downstream power benefits to BPA for delivery to B.C.

Post-2024: Existing Treaty hydropower procedures, operations, and return of Canada’s share of the downstream power benefits continue.

5. ECOSYSTEM FUNCTION AND FUTURE AGREEMENTS

Current: By securing cooperative measures for hydropower and flood control through the Treaty, other benefits are made possible. Supplemental operating agreements have been mutually agreed upon in support of ESA and ecosystem requirements in both countries (including non-Treaty storage in Canada).

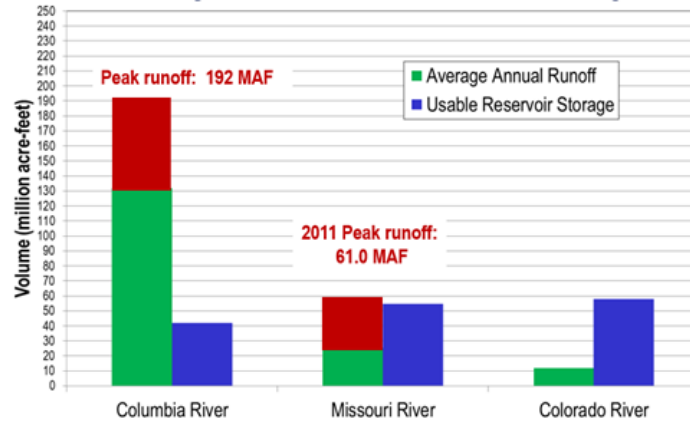


Figure 3. Usable Storage and Average Annual Runoff

Post-2024: The Regional Recommendation, submitted by the U.S. Entity to the Department of State in December 2013 stated: “it is important to achieve a modernized framework for the Treaty that balances power production, flood risk management, and ecosystem-based function as the primary purposes, while also recognizing and implementing all authorized purposes.” An official agreement with Canada on reservoir operations post-2024 is important to the Region’s economy, ecosystem, and infrastructure requirements.