Operating a Complex System

Hydro Power
Priorities, challenges and trade-offs

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Bonneville Power Administration

Overview

- BPA (a component of the U.S. Department of Energy) is a nonprofit and self-funded federal power marketing Administration in the Pacific Northwest
- BPA markets wholesale electrical power from 31 federal hydroelectric dams in the Pacific Northwest, one nonfederal nuclear plant and several small nonfederal power plants
- BPA operates and owns one of the nation’s largest high-voltage transmission systems – 15 thousand line miles
- BPA is also a leader in energy efficiency programs and funds and administers one of the largest fish and wildlife programs in the world
Federal Columbia River Power System

31 Multi-Purpose Federal Projects
- 21 operated and managed by the U.S. Army, Corps of Engineers
- 10 operated and managed by the U.S. Bureau of Reclamation

The vast majority of the generating capacity is from these 14 dams
Multi-Purpose uses of the FCRPS

- Multiple purposes & interests of the FCRPS
  - Flood Risk Management
  - Irrigation
  - Municipal and Industrial Water Supply
  - Navigation
  - Recreation
  - Operations for listed and unlisted fish species (BiOps)
  - Power
Annual Runoff of the Columbia River

January - July Runoff at The Dalles
1929-2017*

80-yr Avg (1929-2008) = 102 maf
30-yr Avg (1981-2010) = 101 maf
Range: 54- 159 maf

*2017 estimated from NWRFC June 12 ESP
Storage is Limited

Cannot make a wet year a dry year or vice versa
Storage Dams Change Timing of Flows

Typical Annual Operations Cycle

- Natural Flow
- TDA Flow
- Composite Storage
## Storage Projects Operations

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**Legend:**  
- **Fish Operation**  
- **FRM or Power Operation**  
- **Fish and Power Operation**  
- **Other Purposes**
Operations for Fish Passage

- Juvenile fish bypass systems, surface passage structures and spill to guide most juvenile fish away from turbines
  - Spillway weirs and other surface passage structures provide a surface route of passage and allow fish to pass dams at depths where they naturally migrate
  - Surface passage routes currently exist at all eight lower Columbia River and lower Snake River dams

- Fish ladders in place at all eight lower Columbia River and lower Snake River Dams for adult passage
Fish Passage Dam Survival

Dams are meeting performance standards of 96 percent average survival for spring and 93 percent for summer migrating fish.
Changes in Federal Hydro Generation Due to Fish Operations
(Average of 50-year Study)

Annual Average ~ -1,000 aMW
BPA Funded Fish & Wildlife Program

**Tributary habitat (2007 to 2017)**
Protected more than 300,000 acre feet of water.
Opened access to more than 3,416 miles of fish habitat.
Restored 422 miles of stream habitat complexity.

**Estuary mitigation (2007 to 2017)**
Protected or restored more than 9,290 acres of estuary floodplain.
Restored or enhanced more than 49 miles of estuarine tidal channels.

**Wildlife mitigation**
Willamette and Idaho wildlife settlements which permanently resolve mitigation responsibilities.
BPA’s Strategic Plan - Delivering on our public responsibilities through a commercially successful business

Four Strategic Goals

1. **Strengthen Financial Health**
2. **Modernize Assets & System Operations**
3. **Provide Competitive Power Products & Services**
4. **Meet Customer Needs Efficiently & Responsively**

To meet the challenges and leverage the opportunities of a rapidly changing industry, BPA developed the 2018 - 2028 strategic plan with wide input from the region.
Priority firm power rates 2010-2020

FY 2018–19 market estimated with BP-18 Rate Case market price forecast.
Questions