Operations for Resident Fish Species

**Operations for ESA-listed resident fish species**
- **Kootenai River White Sturgeon**
  - Flow pulse and outflow temperature management during spring at Libby Dam to support spawning and egg incubation
- **Bull Trout**
  - Minimum flow requirements and flow fluctuation restrictions at Libby and Hungry Horse dams
  - Pre-drafting storage projects when high flows anticipated to avoid high total dissolved gas

**Operations for non-listed resident fish species**
- **Kokanee**
  - Minimum reservoir elevation for Grand Coulee Dam in Fall to improve access to tributaries for spawning and support zooplankton production (an important food source for kokanee)
  - Stable lake elevation during fall at Albeni Falls to support spawning
  - Minimize spill during spring at Dworshak to keep kokanee in the reservoir
- **Burbot**
  - Flow temperature management during winter at Libby Dam to aid upstream migration to spawning areas in the Kootenai River

Predation on Anadromous Fish in the Columbia River Basin

**Fish Predators**
- Northern pikeminnow predation on juvenile salmon has been reduced by about 40 percent (4.5 million) since 1990

**Avian Predators**
- Actions are underway in the estuary to reduce Caspian tern and double-crested cormorant predation on juvenile salmon
- Actions are underway inland to reduce Caspian tern predation on juvenile salmon
- Hazing occurs at dams to discourage gull and other avian predation on juvenile salmon as they pass the dams

**Pinnipeds (Sea lions)**
- Pinniped predation on returning adult salmon has increased sharply in recent years below Bonneville Dam to the mouth of the Columbia River
- The U.S. Army Corps of Engineers enumerates pinnipeds immediately below Bonneville Dam and installs barriers each year to prevent the sea lions from entering fish ladders at the dam
- The Tribes actively haze pinnipeds below Bonneville Dam to discourage predation on adult salmon
- NOAA and the states of Oregon and Washington are actively managing and removing sea lions from the tailrace of Bonneville Dam

Fish and Wildlife Habitat Improvements

- **Actions in the tributaries from 2007 to 2015:**
  - Protected over 373,000 acre feet of water which is roughly 186,500 Olympic swimming pools of water
  - Opened access to over 3,300 miles of fish habitat, which is about equal to 1.2 times the distance from Los Angeles to New York City
  - Restored 400 miles of stream habitat complexity, which is the equivalent of restoring a stream channel that followed I-84 from Portland to Boise

- **Actions in the estuary from 2007 to 2015:**
  - Protected or restored over 7,700 acres of floodplain = 12.1 square miles
  - Restored or enhanced over 42 miles of estuarine tidal channels

**Fish and wildlife**
- About a million acres of land have been put under conservation easement for fish and wildlife