Water Quality - Temperature

Introduction

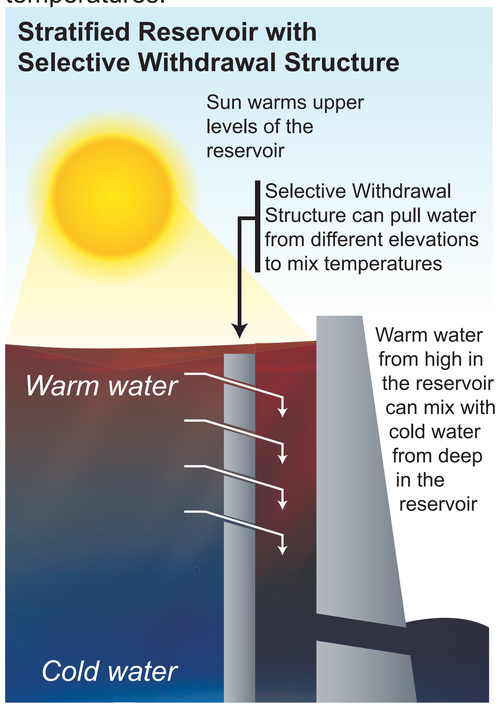
Water quality is important for the health of aquatic species, including ESA-listed fish. The Agencies operate the Columbia River Basin dams to manage total dissolved gas (TDG) and temperatures in the rivers. The Agencies also monitor other water quality parameters such as nutrients, potassium, pH, conductivity, dissolved oxygen, and others.

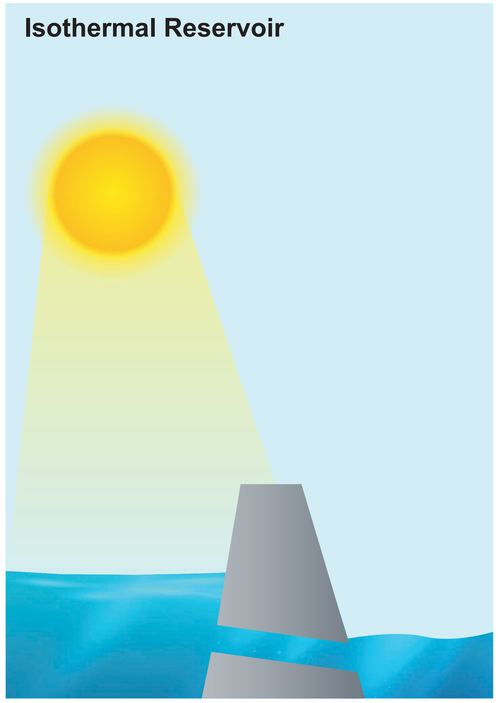
Which Reservoirs Can Help Manage Temperatures?

Some reservoirs stratify (warm water stays on top, while cold water sinks to the bottom). Water from these reservoirs can sometimes be used to help manage temperature conditions for aquatic species downstream. Depending on the time of year, warmer or cooler water can be released to help manage downstream temperatures.

Other reservoirs are isothermal (temperature is nearly the same from top to bottom). These reservoirs cannot be used for temperature management downstream.

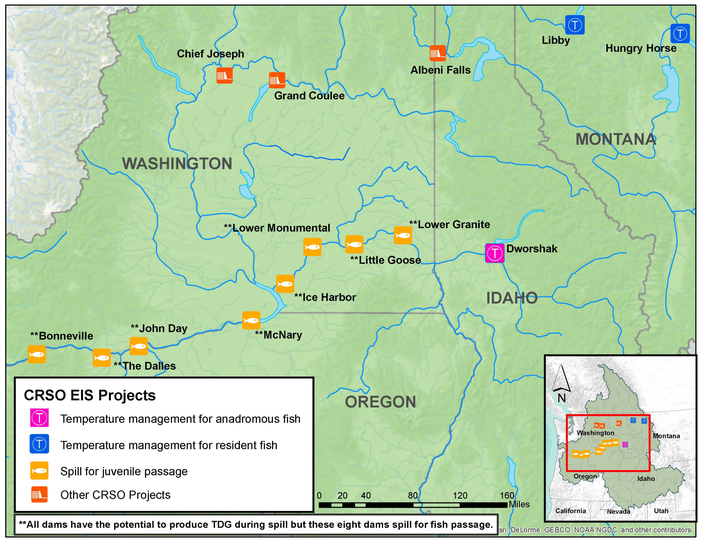
Some reservoirs are stratified in the summer and isothermal in the fall and winter, which can limit the Agencies' ability to manage downstream temperatures.



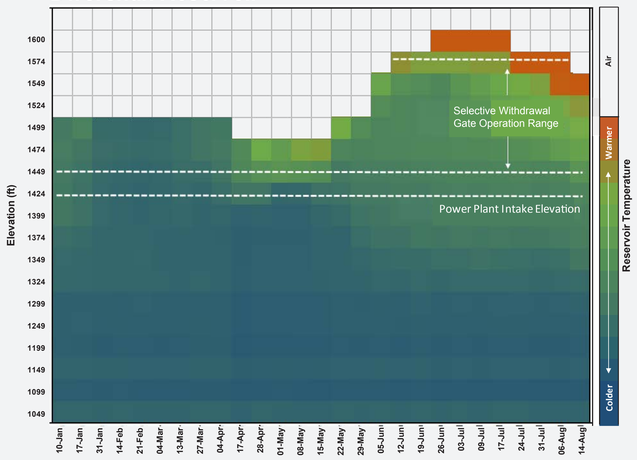


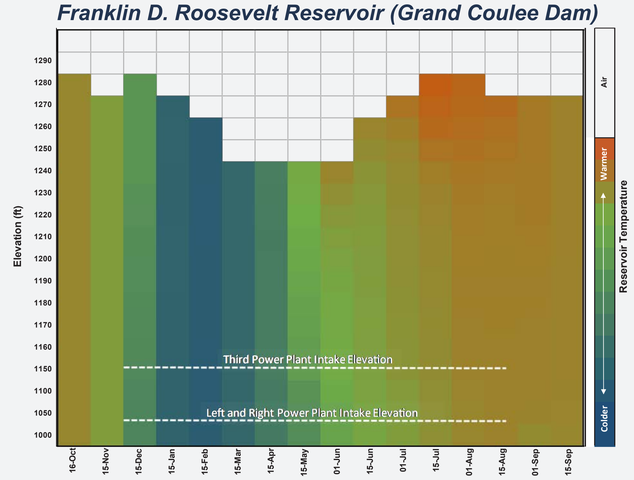
WQ Operations Map

Libby and Hungry Horse dams in Montana, and Dworshak Dam in Idaho all have reservoirs that stratify and have selective withdrawal structures to release warmer or cooler water for downstream temperature management. Temperature influences are strongest immediately downstream of the dam but lessen as this water travels farther downstream.



Changes in Reservoir Temperature Over Time





Dworshak Reservoir stratifies in the summer with warm and cool water accessible through the dam's selective withdrawal gates. Dworshak is used in the summer months to help cool temperatures on the lower Snake River.

In an average year, the Columbia River flow at Grand Coulee Dam is enough to fill the project approximately eight times. With the high volume of water that flows through the reservoir, the pool weakly stratifies. Grand Coulee Dam has two elevations from which to draw water into three power plants. At these elevations the temperatures are very similar throughout the year. In early summer the outflows from Grand Coulee Dam are typically cooler than the inflows to the reservoir near the border with Canada.