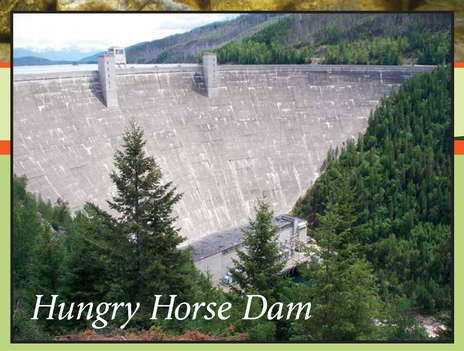
VarQ

Variable Flow Flood Management

VarQ is a modern flood management strategy that has improved reservoir and river operations at Libby and Hungry Horse dams in Montana. It was designed through a collaborative process among Montana Fish, Wildlife & Parks, the Confederated Salish and Kootenai Tribes, the US Army Corps of Engineers, and the US Bureau of Reclamation.

Bull trout *(Salvelinus confluentus)*
— Joel Sartore photo, courtesy of USFWS

How Does VarQ Work?

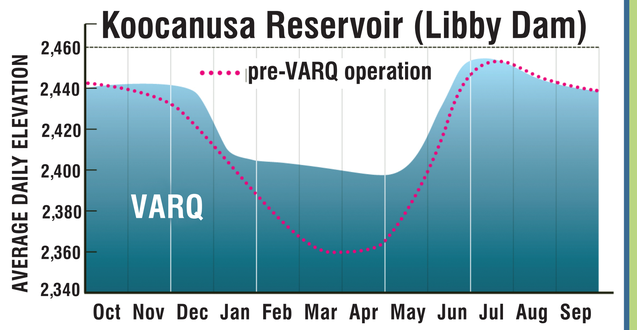


Hungry Horse Dam

Standard flood management (FM) uses forecasts of how much water is expected to flow into a reservoir to determine how much water should be released to create storage space for managing flooding later in the year. FM works well in the wettest years, but in drier years often results in low reservoir levels and unnatural river flows downstream, which negatively impact fisheries and recreation.

VarQ was developed to address this problem. Like FM, it uses forecasted inflow, but in drier years with lower risk of flooding, more flexibility is used to determine when and how much water must be released from a reservoir. VarQ allows more water to be stored in a reservoir in spring. This approach provides more available water in both the reservoir and the stream during periods that are critical for healthy fisheries, and during maximum recreational use. During wet years, operation reverts to FM.

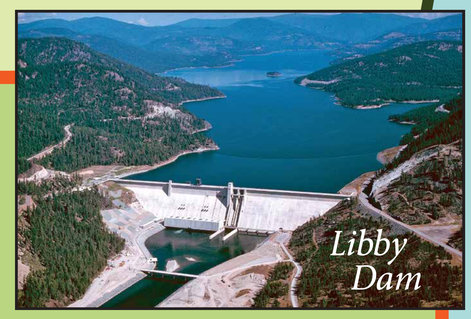
Source — US Army Corps of Engineers



The pink dotted line represents average daily elevations of the reservoir prior to VARQ (1995-2002), compared to levels since the 2003 implementation of VARQ (blue). Other operational requirements for purposes such as fisheries, power, etc., also influence Koocanusa elevations. VARQ ends when the reservoir approaches refill (full pool elevation is 2459).

Source — FWP

VarQ allows dam operators to:



Libby Dam

- Maintain flood protection.
- Improve the likelihood of adequate refill each year, creating a larger reservoir pool which benefits both fisheries and recreation.
- Provide dam discharges which closely mimic the natural annual stream flow pattern, improving fish and wildlife habitat.
- Balance upriver needs with downriver efforts to recover endangered species of fish.
- More reliably provide spring and summer flows for endangered Kootenai white sturgeon, threated bull trout and other native fish.
- Support native fish, not only in Montana, but in the Columbia River downstream, and in Canada as well.

White sturgeon *(Acipenser transmontanus)* FWP Biologist Ryan Sylvester on the Kootenai River — Brian Stevens photo

Montana Fish, Wildlife & Parks

US Army Corps of Engineers

Northwest Power and Conservation Council

U.S. Department of the Interior, Bureau of Reclamation