

The Changing River: Reservoir Sedimentation

by Jeremy FiveCrows, CRITFC Public Affairs



The Hood River delta. The river depth at the marker indicated by the red circle was over 50 feet prior to a 2006 flooding event. Photo: Paul Thompson.

From the moment springs and creeks begin in the mountains, they begin a process of erosion, slowly eating away the rock and soil over which they flow. The water picks up bits of silt and sand on its journey to the sea and carries these materials as long as it has enough speed. As the water slows, it drops what it is carrying, with the larger pebbles and sand falling out first and the silt and fine sediment falling out last. It is a natural process that, among other things, helps to clean out waterways and supply downstream areas with fertile new soil. Salmon benefitted from this annual cycle because the gravel streambeds were cleaned of silt in time for them to build redds and the estuary received nutrients that helped the migrating smolts.

Historically, the Columbia River basin carried millions of tons of sediment. Some made it all the way to the ocean while some dropped to the riverbed in the slower stretches. This riverbed sediment was not permanent since the spring floods would wash it further downstream and out to the ocean. The Columbia is a low sediment, fast moving river, so its sediment build up is below the ocean surface or carried further up the coast by ocean currents. The Columbia River bar that extends past the river mouth into the Pacific Ocean is the result of this process.

CHANGING THE RIVER INTO A SERIES OF LAKES

In the 1930s, humans began a complete transformation of this natural system with the construction of the first mainstem dams. Once the free-flowing river was converted into a series of reservoirs and much of the sediment that the river carried settled behind the dams instead of travelling further downstream. As each dam was added to the system, more sediment was trapped, where it is slowly filling each reservoir.

Scientists estimate that the Columbia River transported 16.4 million tons of sediment each year up until 1935, when Bonneville Dam was built. Despite a significant increase in soil runoff from agriculture and other human development, today only 8 million tons of Columbia River sediment reaches the Pacific Ocean. Sediment still enters the river system, only now over half of it builds up behind each of

the dams. High water years can help somewhat, as the faster water speed and open dam floodgates flushes extra sediment downriver. Unfortunately,



A Liebherr T-282b, the largest dump truck in the world—capable of carrying 400 tons—would need to make over 41,000 trips to transport the same amount of sediment the Columbia River moves every year.

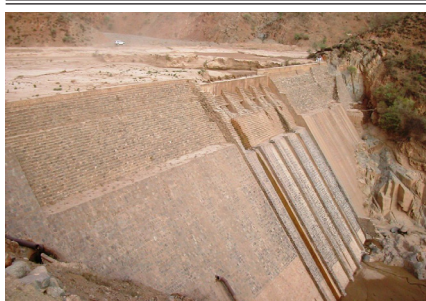


these events aren't common enough to prevent sediment build-up. Without the annual floods to wash sediment downstream, the reservoirs are slowly filling in.



In some places, engineers have tried to stop sediment build-up by installing base drains that can be opened up occasionally to flush out the system. The base drains at the Xiaolangdi Dam on China's Yellow River are opened annually to flush the estimated 30 million tons of sediment that builds up each year. No Columbia or Snake River dams have this feature. Photo: China Photo Press.

Halting sediment flow is a problem with all dams and has catastrophic effects on ecosystems and natural resources. The rate that a reservoir fills with sediment depends on the amount of sediment a river carries and how fast the river flows. Fortunately the Columbia River system is a low sediment river, so the process isn't happening as quickly as high sediment rivers like the



The reservoir behind the Denadai Dam in the African nation of Eritrea is completely silted in and is now just a meandering stream that falls over the face of the dam. Photo: Adriano de Vito from Google Maps.

Mississippi or Colorado Rivers. Worldwide, there are examples of dams on high sediment rivers already completely filled in, making them useless for fish passage, power generation, flood control, or irrigation.

Here in the Columbia Basin, the Corps of Engineers regularly dredges some reservoirs to keep shipping lanes open and prevent boats from grounding. This is increasingly common in the Lower Granite reservoir, which captures much of the sediment coming out of Idaho. In 1992, the Corps of Engineers drew down the reservoir behind Lower Granite Dam. The photo of Red Wolf Marina in Clarkston, Washington ►, shows the extent of built up sediment only 17 years after the dam was built.

AFFECTING THE TREATY FISHERY

In low water years like this one, the silt build-up is more obvious. Fishers throughout Zone 6 have seen sand bars in new locations, traditional fishing holes filled in with sediment, and changes to the river flow. These changes are particularly noticeable at the mouths of tributaries. When a fast-moving river meets the still water of a reservoir, it can no longer carry much sediment, which quickly settles, creating a sand bar or delta.

Significant deltas, sand bars, and filled fishing locations are at the mouths of the Hood, White Salmon, Little White Salmon, and Deschutes Rivers.

This is continually happening, and major flooding events can bring quick changes. In November 2006, Hood River had a flood that dumped thousands of cubic yards of debris right at its mouth, greatly expanding



The Hood River delta was greatly expanded during a flooding event in 2006.

the delta that extends into the Columbia. This issue has the potential to impact the treaty fishery in Zone 6 and beyond and CRITFC and the tribes want to gather as much information about it as possible in order to formulate and advocate for a solution.

If you have seen any changes like the ones listed above, please report the change, location, and date to Stuart Ellis at CRITFC (ells@critfc.org). By providing information about these changes, tribal fishers can help CRITFC and the tribes gain a greater understanding of the extent of the problem. 🦋



A marina in Clarkston, Washington during the 1992 Lower Granite drawdown. Photo: Port of Lewiston.

Pacific Marine Expo

by Buck Jones, Salmon Marketing Coordinator

The Annual Pacific Marine Expo in Seattle will be held November 18-20 at the CenturyLink Field Event Center (where the Seattle Seahawks play). To register, visit bit.ly/marine-expo. Tickets to the event are \$50, but CRITFC Salmon Marketing has set up a special priority code that allows Indian fishers to attend the Expo for free.

The Expo has many exhibits that can benefit fishers including equipment, gear, services, suppliers, new products and ideas. With the hundreds of suppliers, attendees can speak with these vendors face-to-face.

Contact Buck Jones at (971) 221-2546 to get the the Indian fisher discount code or if you need help with registration. 🏹



Fish Canning Class

by Buck Jones, Salmon Marketing Coordinator

The CRITFC Salmon Marketing program will be hosting a Fundamentals of Canning and Drying class next month. The class cover the basic concepts required to safely can and dry products at home. The class will also provide additional information for those who are interested in commercial sales of canned or dried fish.

Class attendees get to participate in the process with instructors Mark Whitham and Yakama Nation tribal member Sharon Dick.

The class is on December 2 at the Lyle Community Center from 10:00 am to 4:00 pm. Seating is limited. Register by contacting Buck Jones at (971) 221-2546. 🏹

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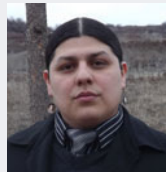
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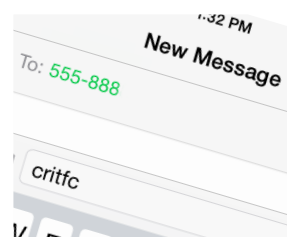
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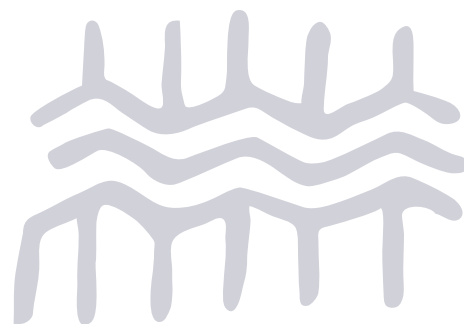
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Fall Chinook Set New McNary Dam Record

Columbia River salmon restoration efforts reached another milestone yesterday when fall chinook set a new passage record at McNary Dam. The 4,672 chinook that passed on Monday, October 13 pushed the total number of fall chinook to 456,043 fish that have passed over McNary Dam so far this year. This broke the previous record for the 61-year-old dam, set in 2013, of 454,991.

"Reaching this milestone is something that the region can truly celebrate," said Paul Lumley, Executive Director of the Columbia River Inter-Tribal Fish Commission. "The success of this fall chinook run reflects the region's commitment to healthy salmon runs and the collaborative spirit that has made it possible. While we can celebrate this year's return, our protection and restoration work will continue. The lessons the region has learned in achieving the success we've seen so far will help us address upcoming impacts such as the predicted El Niño this winter and the long-term effects of climate change." 🐟