Salmon Stuggling in a Changing Climate

by Laura Gephart, CRITFC Climate Change Project Lead

For years, tribal members have been on the front lines of seeing the effects of climate change in the harvest of the First Foods. From earlier ripening times to odd game behavior, they've seen the ancient patterns disrupted more and more. Salmon and other fish are affected by these changes, as well. As the region warms, winter snows instead fall as rain and what snow does fall melts earlier. This results in the water traveling through the system during the winter, leaving much less during the hot summer months. The increased winter flows scour the riverbeds, disturb nests, and cause physical damage to both salmon eggs and juveniles, while the lower summer flows increase water temperatures further and reduces the overall habitat available to salmon.

This year, the Columbia River basin has experienced a winter of extremely low snowfall levels and a summer of high air temperatures, which warmed up the rivers. The snowmelt came off earlier than normal resulting in extreme low flows in the mainstem and tributaries. While the 2015 Columbia River runoff volume is not historically low, the problem for fish is the combination of low flows and high water temperatures. The water temperature above Bonneville Dam, for example, has averaged 73° in recent weeks—9° warmer than the average for the same time period over the last five years. For salmon, that's literally the difference between life and death.

Effects of warm water on salmon

While the low flow conditions help adult fish returning early in the season, the combination of low flows and high water temperatures create a stressful environment in general for migrating adults and juveniles. Often adult salmon will avoid warm freshwater, using precious energy reserves to swim around warm water areas or holding in cooler water refuges such as tributaries or spring-fed lake areas waiting for the temperature in the
mainstem to cool down. This can delay or even prevent spawning. Higher water temperature can also speed up juvenile salmon development. This can result in smolts reaching the ocean before their food source, forcing them to survive on less or starve.

Bacteria that can infect salmon such as *ichthyophthirius multifiliis* (ich) and *columnaris* (gill rot) thrive in warm water. These diseases spread more quickly when the rivers are crowded by low flows, and can lead to increased pre-spawn deaths.

Fishers reported spotting many sockeye with ich infections that occurred in the warmer water. This one was found in Drano Lake, where a large number of sockeye sought refuge in the cooler water there.

**A SYSTEM OUT OF BALANCE**

Warm ocean temperatures favor fish like sardines and albacore tuna, but salmon and steelhead rely on coldwater nutrients. If the warm temperatures continue or expand, however, Pacific Northwest salmon and steelhead could suffer in coming years. This has happened to marine mammals, sea birds, and Pacific salmon in the past. Juvenile salmon and steelhead migrating from the Columbia River to the ocean this year and next may experience poor survival. The salmon region of the North Pacific Ocean has never been so warm for so long in recorded history. The expanse of warm water has sea surface temperatures as much as 3ºC (5.4ºF) higher than average, lasting for months, and is hundreds of miles across. The situation does not match recognized patterns in ocean conditions such as El Niño or La Niña, which both affect marine food webs. NOAA’s National Weather Service estimates a 65 percent chance that a severe El Niño will occur this fall or early winter. This means higher temperatures and lower precipitation for the Columbia River basin.

Although this past winter and summer might be just a rare event, it could be an example of what the new normal predicted by climate models. The tribes have been working on planning for a changing climate, including advocating for river operations modifications, calling for fish passage above Grand Coulee and Chief Joseph Dams, and completing habitat projects designed to help cool down tributaries. These efforts, however, won’t stop a warmer climate. To even begin to do that will require dedicated international cooperation. Knowing this, the tribes have been advocating for the United States to address this issue on a national and international scale.

One of the most precious traditional teachings the tribes hold is the concept that “everything is connected.” For thousands of years, the tribes used this teaching to live in an appropriate and sustainable way on the earth. To properly address this threat, the world must be willing to listen and incorporate this traditional Native wisdom into their activities and actions, not only for theirselves and the future generations, but for the planet itself.

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**Fall Fishery Update**

by Stuart Ellis, CRITFC Harvest Biologist

Following the good spring and summer chinook runs, the good news continues with forecasts predicting very strong fall chinook and coho returns and near average steelhead returns. If these forecasts play out, tribal fall season fisheries should have an opportunity for another very large chinook harvest. If B steelhead catches are moderate, commercial fishing opportunity could again occur into October. Actual harvest rates are determined by the actual not forecast run sizes. So far, cumulative fall chinook counts have been good but steelhead counts have been tracking below expectations if the run is to reach the forecast run size.

A July spike in river temperature significantly affected returning fish, particularly sockeye. Since then, the mainstem temperature has been closer to average. Chinook counts in early August have been above average. The model predicts the main spike of fall chinook to come around the second week in September, with over 41,000 predicted to pass Bonneville Dam on just one of the days.

The tribes set four weeks of commercial gillnet fisheries: August 12-21, August 24-28, August 31-September 5, and September 8-12. Treaty platform and hook-and-line fisheries have been on-going for both subsistence and commercial purposes.
Tribal Expertise on Display at National Conference

by Sara Thompson, CRITFC Public Information

Indian Country was front and center at the national conference of the American Fisheries Society. Staff from the CRITFC and its member tribes were featured throughout the prestigious event that was held in Portland, Oregon on August 17-20.

CRITFC Executive Director Paul Lumley gave the welcome speech at the conference opening. In it, he called upon scientist to address climate change, stating, “when the tribes signed the treaties of 1855 we didn't anticipate climate change. But climate change is here. The warming waters and dying fish are an urgent matter and we need your help.”

Photo: American Fisheries Society

Over the course of the four-day event, CRITFC and tribal staff gave over 27 presentations, displayed 7 research posters, screened 2 documentaries, and were an integral part of the conference’s development and operations. Yakama Nation tribal leader Gerald Lewis provided the conference’s invocation. CRITFC Executive Director Paul Lumley gave the plenary session welcome address to the more than 3,500 fishery professionals from all over the world. Staff presentations highlighted the diversity of their work in genetics, harvest management, cutting-edge fisheries research, sturgeon and lamprey biology, climate change, and many others.

CRITFC, along with several other Columbia River basin tribes and First Nations, received the American Fisheries Society’s 2015 William E. Ricker Resource Conservation Award. This award acknowledges singular accomplishments or long-term contributions that advance aquatic resource conservation at a national or international level. The AFS Past Presidents Advisory Council recognized tribal leadership and their work in creating a common vision for restoring ecosystem function and resiliency to the Columbia River Watershed.

The strong tribal involvement reflects the strength of the science the tribes are doing. The work they are doing is helping fish and human understanding of the complex biology and ecosystem interactions in which they live. This knowledge is being used not only in tribal fisheries management, but in the overall scientific community.

The American Fisheries Society is the world’s oldest and largest organization dedicated to strengthening the fisheries profession, advancing fisheries science, and conserving fisheries resources. The conference was the 145th national conference for the organization.

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Emerson Squiempfen
Donnie Winishut Sr
(541) 553-3257

Photo: American Fisheries Society
American Fisheries Society Annual Conference

This year’s AFS conference was held two blocks from the CRITFC main office in Portland. This provided a great opportunity for involvement, not only in presenting tribal science and other topics, but for staff who normally wouldn’t be able to attend the meeting to participate. See inside for details on the conference and how tribal science has helped improve the general understanding of fish biology and the ecosystems they depend on.