

Boundaries

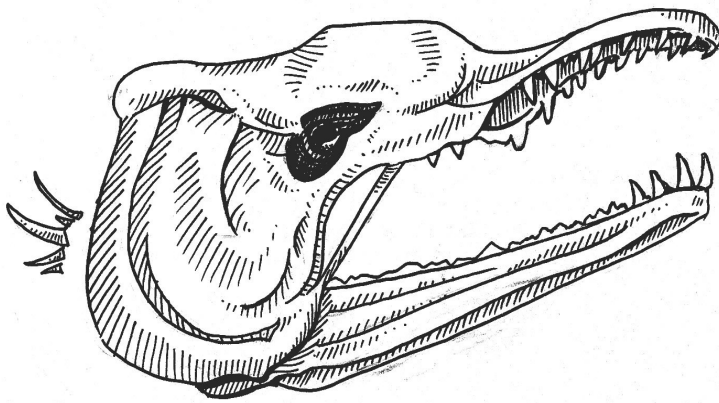
by Jack Nisbet



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Fish Doctor August 2009

Over the past century, nothing in the Columbia Basin has changed so much as the movement of water and the mixture of fish. Commercial fishing pressure downstream reached gigantic proportions in the late 1800s, with the annual harvest of lamprey, sturgeon, and five species of salmon measured in the thousands of tons. All of these are anadromous fish that feed in the ocean, then spawn in fresh water. Their ranges extend far upstream, along the whole length of the Columbia, but there are only scanty historical records available to help judge the impact of fish wheels and related structures on the inland fisheries.



During that same period, avid sport fisherman lobbied for the introduction of familiar game fish from the eastern U.S. and Europe. State and local game departments responded with considerable enthusiasm, planting species such as eastern brook and European brown trout into every tributary, stream, and mountain lake throughout the region, and stocking lower elevation waters with everything from bass to catfish.

The dam-building era of the 20th century restricted the upstream migration of anadromous species with a maze of fish ladders and stopped it cold at Grand Coulee. At the same time, increased demands for agricultural irrigation reconfigured the entire flow of water through the drainage, often replacing rich meandering streams with concrete wasteways. Hatcheries attempted to restore depleted wild fish on an industrial scale, and more new species such as walleye, better adapted for the warm, slow water of the new Columbia, were added to the mix.

The result is a fascinating paradox that pits abundance against scarcity, intelligence against confusion. The opening of fishing season continues to represent one of the banner days throughout the North Columbia country, and anyone who is interested can certainly find fish to catch. Methods for hooking individual kinds are debated at every coffee shop in the region, and local knowledge tracks specific movements and habits at untold thousands of favorite fishing holes. Yet many wild species have

dwindled toward extinction, and the long-term prognosis for river inhabitants is a subject of fierce debate.

One researcher who over the years has tried to provide some perspective on large-scale discussions of the river and its fish is Virginia Butler of Portland State University. Working at the opposite end of the time line from modern fish biologists, Dr. Butler's publications raise intriguing questions about the age-old relationship between humans, water, and fish.

Butler's specialty is studying fish bones from archaeological sites dating back to the end of the last Ice Age. She has looked at extensive bone caches throughout the Columbia drainage, from the central fishery at the Dalles to isolated upslope rock shelters on the east slope of the Cascades. She has developed standard methods for separating natural back eddies of accumulated fish bones from the human processing deposits known as middens, and crunched numbers to gauge the utilization of fish resources by people living their daily routine. Beginning with small fragments of bone, her reports provide baseline knowledge about drainage dynamics, climate change, resource utilization, and the influence of human pressure on a confined population -- exactly the kinds of issues at the forefront of river politics today.

Along an eastern Washington salmon stream where successive human occupations spanned several thousand years, Butler analyzed the fish bones left behind at a group of closely associated rock shelters. In doing so, she pictured the crucial transition from a mobile hunting and gathering society to one that could store food and remain sedentary for an entire winter. Not surprisingly, the stored food came in the form of dried salmon, long known as a key protein supplier for Plateau tribal culture.

Salmon heads contain more fat than salmon bodies. They require a longer drying time, and more heat and labor to preserve. This means that if salmon are meant to be stored for the long term, it is more efficient to separate the heads from the bodies. In deeper, more ancient strata from the rock shelters on this eastern Washington salmon stream, archaeologists found the remains of entire salmon, including head and pectoral fin elements. That led Butler to theorize they might be looking at whole roasted fish that had been consumed directly after being caught.

In shallower, more recent strata, extensive middens contained only salmon vertebrae and pelvic fins, exactly the body parts that would be left if butchers removed the heads and processed the bodies at a separate location. The Canadian artist Paul Kane's 1846 painting titled "Drying Salmon at Kettle Falls" (reproduced in *The Mapmaker's Eye* on page 101), shows a woman sitting before a long drying rack of split salmon, heads removed, patiently turning the exposed bodies to air dry them for winter storage. Her actions demonstrate Butler's point exactly.

But such a revelation only leads to deeper questions about the presence of the fish. What did these mountain streams, small rivers, and the upper Columbia itself look like at the end of the Pleistocene ice age? How long did it take salmon to reestablish their spawning patterns in various drainages? Which of the several salmon species came upriver first? How did long-term climate changes affect the mix of species in any particular river or stream? Did people have any influence over the composition or success of such salmon runs?

The answers to such questions are open to debate, but plant pollen counts, careful archaeological digs, and a growing body of meteorological evidence provide some good clues. If you take the end of the Pleistocene as around 12-13,000 years ago (the latter date is close to the accepted time of the last Lake Missoula flood), anadromous fish had to spend centuries working their way back up the streams of the Columbia that had been closed off by ice. Even after the first pioneering fish made those long swims, it took a lot more time to develop the huge salmon populations that the Big River is legendary for --

those epic runs that fueled many different aspects of the larger ecosystem, including the support of great tribal fisheries like the ones at Celilo and Kettle Falls.

Global temperatures and the composition of local vegetation underwent considerable flux between 4000 and 1000 years before the present, but archaeological sites indicate salmon streams were consistently productive during that period. The bones left behind are far from uniform, however, and Butler describes a noticeable difference in the size of salmon vertebrae between some of the older strata of one Cascade stream, dating back past 3000 years before the present, and more recent layers: whoever lived at the older site was eating significantly larger fish.

Butler and associates that include Harriet Huber of the NOAA marine Mammal Laboratory in Seattle have worked to develop a method for identifying salmon species through a series of measurements on single vertebrae. These measurements indicate that the larger fish from the older site contained more chinook (king) and coho (silver) salmon, while the smaller fish from the more recent strata were weighted toward sockeye salmon and steelhead or rainbow trout. And what does that mean? Could subtle changes in a climatic patterns or ocean food sources have tilted the balance toward the smaller fish? Could some geological event, such as a landslide or earthquake, have changed something about the river conditions? Could human fishing patterns, which naturally would focus on larger chinooks (every fisherman likes to brag about the size of their catch) have skewed the ratio toward the smaller species?

At the moment we can only guess. But the more fish middens that Dr. Butler sifts through, the more information we will have that might prove useful when considering the next dam removal or fish introduction, the impact of large-scale water impoundment, or the possible long-term impacts of global warming. Her work should encourage everyone to look at the long scale of time.

Illustration by Emily Nisbet.

Article can be found at:

<http://www.northcolumbiamonthly.com/boundaries/boundaries0809.shtml>