Title
Plague on the Klamath: The race to prevent a repeat of the West's worst fish kill

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PLAGUE ON THE KLAMATH

The fight to prevent a repeat of the West's worst salmon-kill

By Terray Sylvester

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ABSTRACT: Drought is pushing the salmon fishery in the Klamath River, the third-richest such fishery in the Lower 48, toward collapse—and that collapse may come at the jaws of a microscopic fish parasite called Ichthyophthirius Multifiliis (or Ich for short). In the summer of 2014, Ich proliferated in the lower river for the first time in a decade. The Parasite hadn't been seen in the Klamath since the summer of 2002, when it caused what may be the largest salmon-kill in U.S. history. River managers were able to stave off disaster in 2014, but the parasite thrives in drought conditions—in warm, low water thick with fish. With California four years into the worst drought on record, and water becoming scarcer, Ich may pose a serious threat in the future. This article was accompanied by photos of the tribal fisheries on the Klamath River.

On Monday, Sept. 15, 2014, Mike Belchik, a senior biologist for the Yurok Tribe, was overseeing an emergency laboratory on a remote gravel bar in the Klamath River on the tribe's Northern California reservation. Generators and folding tables stood on shore. Fish blood drifted in the weak current. That morning, crews had netted two dozen salmon from a 20-mile stretch of the lower river. Now they were inspecting their catch for a parasite dubbed "the Ebola of Klamath salmon."

Working quickly, the men snipped a layer of glistening gill tissue from each fish and slid it under a microscope. The parasite — a protozoan named *Ichthyophthirius multifiliis,* or simply *Ich* — is salt-colored and less than a millimeter wide, with a fringe of madly fluttering hairs. Belchik and his crew had monitored for it all summer, but only that weekend had infected fish begun appearing in their nets.

In 2002, *Ich* killed some 70,000 king salmon in the Klamath — the largest such die-off ever recorded on the West Coast. Afterward, the parasite population declined below detection, but it is native to the river, and there was reason to fear its resurgence.

Last September, California was already three years into perhaps its worst drought in more than a millennium, and the Klamath was low and warm. The fall salmon run had begun to arrive, but the fish were confined to pools, stressed and waiting for rain to swell the current and let them migrate upstream. In slow water thick with fish, *Ich* can reproduce rapidly. Thousands might feast on a single salmon. Once engorged with blood, they drop off and anchor to the river bottom. Then each one bursts open, releasing up to 1,000 offspring. The cycle can take as little as a week. "It felt like a catastrophe was looming," Belchik says.

The Yurok crews were trying to determine whether water should be released from reservoirs upstream in an attempt to disrupt the parasite's life cycle. *Ich* are relatively poor swimmers and can survive only a few days without a meal. Increased flows, the thinking goes, might disperse the parasites while letting salmon migrate out of infested holding pools, but such a tactic had never been attempted on an outbreak already

underway. No one knew whether it would work in a fishery stressed nearly to failure by drought and diversions.

After the 2002 die-off, tribes, agencies, dam owners and other parties agreed to release water from reservoirs on the Trinity River, the Klamath's largest tributary, if at least 30 parasites were found in a single layer of gills in at least 5 percent of captured fish. By 1 p.m., Yurok crews had found *Ich* in nearly half of their catch.

Belchik dug out his cellphone and called the reservoirs' managers. Send water, he said, and fast.

[BREAK]

The upper Klamath River is impounded by seven dams, which serve some 170,000 acres of arid southern Oregon farmland. But downstream, the river flows unimpeded for 190 miles before spilling into the Pacific Ocean. This stretch and its tributaries support the third-richest salmon runs in the Lower 48. On an average year, 120,000 kings and a few hundred threatened coho muscle through these waters to spawn.

Relations between farmers and the basin's tribes are notoriously tense, and in 2001, they snapped. That spring, during a severe drought, federal wildlife managers shut off agricultural diversions to protect coho and struggling sucker fish. Farmers, who had already sown potatoes, hay, wheat and other crops, were furious. They protested by forcing open a head gate and refilling an irrigation ditch with buckets.

The conflict caught the attention of the Bush administration, and the next summer — also dry — irrigators received their full water allotments. The Yurok and others protested that the fish needed more water, but "nobody was looking for *Ich,"* Belchik recalls. The parasite was known for ravaging farmed fish, but such kills were almost unheard of in the wild.

By mid-September 2002, flows in the lower Klamath had dwindled to about 60 percent of average. The Yurok were celebrating an important ceremony just above the river when children began carrying dead salmon up to the dance grounds. Fish were dying by the thousands, infested with *Ich*.

"It went from nothing, to major catastrophe, in a span of a few days," Belchik says. One afternoon, standing on a gravel bar, he fielded a phone call from an Associated Press reporter. Belchik described what he smelled: an overwhelming stench of rot.

Due to the die-off, the commercial Pacific salmon season in Northern California and southern Oregon was sharply curtailed in 2004 and 2005, and declared a disaster by the National Marine Fisheries Service in 2006. No one felt the kill like the Yurok. Their reservation, home to roughly 1,000 tribal members, flanks 44 miles of the lower river. The Yurok ply that territory for salmon, steelhead, sturgeon and Pacific lamprey to feed their families. In the tribe's commercial salmon season, a fisherman might earn $3,000 in just a few days — no small haul on a reservation where 40 percent of residents live below the poverty line. "We're a fishing people," says Chairman Thomas O'Rourke. "It was sickening."

[BREAK]

In 2014, the Bureau of Reclamation reacted quickly when it learned another disaster was brewing. The morning after Belchik called, the agency began releasing enough water to double flows in the lower Klamath for a week. Belchik wondered how the parasite would respond. Since the 2002 kill, his crews had inspected salmon weekly during the fall runs. Now they stepped up their effort.

Their initial findings dismayed them. Crews had initially looked for 30 parasites in each fish — the threshold for the emergency response — and then stopped counting, even if more were present. But Belchik soon realized they were overlooking valuable data. He told workers to count to 100, then to 200. Eventually, finding nearly 1,000 parasites in some gills, he said, "Just count them all."

To an extent, tribes and biologists had seen the problem coming. Since the middle of summer, they had pushed the Bureau to release extra water. Such releases, a purely precautionary measure, were a critical component of the post-2002 response measures, but had become increasingly controversial. In 2003, 2004 and 2012, the Bureau granted them as originally discussed, without any sign of an *Ich* outbreak. In 2013, however, the releases triggered a legal challenge from Central Valley irrigators. Last summer, with water supplies exceptionally limited, the agency unexpectedly announced it wouldn't release any water until infected fish were found.

The Bureau's hesitation sparked a backlash. In early August, members of the Hoopa Valley Tribe, on the Trinity, approached Interior Secretary Sally Jewell at a wildfire meeting in nearby Redding. A week later, tribal members and others protested outside the agency's Sacramento office. The Bureau eventually agreed to release preventative flows, but it was late August by the time water started flowing. *Ich* would appear soon after, necessitating the unprecedented emergency releases of mid-September.

Some argue the Bureau's delay meant more water was used in the end. All told, some 80,000 acre-feet poured downstream last summer to protect salmon — more than twice as much as in previous seasons. The Hoopa criticized the agency for its "reactive" approach. An outbreak, says biologist Joshua Strange, an expert on *Ich* in the Klamath, "has an inertia that is hard to stop."

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By mid-October, the salmon had migrated off the Yurok Reservation, but infection levels remained severe. The Hoopa and the Karuk, farther upstream, inspected what fish they could but lacked the Yurok's capacity. Belchik was still anxious to keep tabs on the outbreak, but he was forced to postpone his monitoring until almost November, when he received permission to inspect salmon arriving in a hatchery at Iron Gate Dam, the upper limit of the Klamath run.

What he saw surprised him: not much *Ich*.

A few days later, he inspected fish entering a separate hatchery on the head of the Trinity. Again, very few parasites.

"OK, I get it," he realized. "It's not happening."

The outbreak had apparently dissipated somewhere between the Yurok Reservation and the dams. An unusual number of salmon in the Trinity had failed to spawn, perhaps as a result of *Ich*-induced stress, but no large-scale die-off occurred. "Now," said Belchik, "begins the long process of figuring out what exactly happened."

Of the many questions biologists are asking — How many parasites can a salmon withstand before dying? When, exactly, did the outbreak start, peak and subside? — one of the most critical is whether the mid-September emergency flows averted a catastrophe. Belchik cautions that *Ich* outbreaks are rare and poorly understood, but, he says, "the leading hypothesis is that, yeah, we saved the fish."

The triumph may prove precarious. Belchik, Strange and others think *Ich*'s re-appearance last year was prompted not just by years of drought, but by long-term ecological degradation caused by dams — degradation that's becoming more problematic in the warming, drying West. The 2002 catastrophe prompted a landmark series of settlements, the Klamath Agreements, intended to resolve water conflicts in the basin, partly by removing four dams from the river — a great benefit for salmon. But the enabling legislation has stalled in Congress. For now, Klamath salmon, and the tribes that rely on them, must make do with conditions at hand.

Those conditions look grim: In early April, Trinity Reservoir levels were two-thirds of average, while snowpack in the Klamath Basin was 6 percent of the 30-year median — a record low. With so little snowmelt, the river will decline quickly. O'Rourke, the Yurok chairman, foresees a difficult summer: "I'm thinking we're in trouble."

Primary Sources:

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- Bob Ray, Yurok Tribal Fishery Program
- Toz Soto, Fisheries Biologist, Karuk Tribe
- Thomas O'Rourke, Yurok Tribe Chairman
- Dr. Scott Foott, PhD., Fish Pathologist, U.S. Fish And Wildlife
- Dr. Joshua Strange PhD., Senior Biologist, Stillwater Sciences
- Richard Myers, Yurok Tribal Council Member

RIVER OF LIFE

Photo essay: www.terraysylvester.com/river-of-life/

The Klamath River gathers in the high desert of southern Oregon, then bends south and west, running 250 miles before pouring into the Pacific Ocean on the lush northern California coast. It is home to the third-richest salmon runs in the Lower 48, as well as other fish species, which, throughout the year, swim into the river's mouth and muscle upstream to spawn.

The Klamath Basin is also home to the three largest Native American tribes in California: the Yurok, Hoopa and Karuk. They ply the river with gill nets for salmon, sturgeon and steelhead. They capture lamprey with woven baskets set in the current, and by wielding hooks in the surf at the river's mouth. For decades, they have fought to protect the fishery—and their right to fish it—from water diversions and habitat loss caused by dams on the river's headwaters. California's drought has exacerbated these fierce conflicts, but the Klamath remains a source of income and sustenance for those who live along it.

Captions:

1) Karuk Tribe fisheries workers Jerry Brink (left) and Clayton Tuttle haul a dip net full of king salmon out of the Klamath River at Ishi Pishi Falls in October 2014.

2) Clouds rise from the redwood forests near the Klamath River.

3) Cleaning a green sturgeon beside the Klamath River.

4) A rope swing dangles above the dry bed of Trinity Lake in late March 2015. The reservoir is a crucial source of water for the federally managed Central Valley Project, which supports the crops of California's richest agricultural region. But that water is diverted from the Trinity River, the Klamath's largest tributary, and is dearly needed by salmon and other fish, and by those who rely upon them. The diversions from the Trinity are part of the reason why water politics in the Klamath reverberate throughout the state. As of March, reservoir levels were 62 percent of average as a result of California's severe drought.

5) Klamath River water in late March 2015. With record low snowpack in the mountains at the river's headwaters, little melt water was expected to enter the river during the spring and summer. The Klamath was not yet exceptionally low, but it was receding quickly.

6) Yurok tribal member James Genshaw looks for lamprey in the mouth of the Klamath River on the evening of March 23, 2015. Lamprey enter the Klamath to spawn in late winter and spring. As they do so, waves sweep them over the wide

sandbars at the river's mouth, giving fishermen a fleeting opportunity to hook them from the surf and toss them onto dry sand. A single fisherman might catch a half dozen or more in an evening, but the pursuit can be risky. Fishermen are occasionally surprised by waves and swept out to sea.

7) Lamprey meat is rich and oily, highly regarded by many who live along the river.

8) A gill net in the Klamath River. Tribal members are allowed to fish with the nets under special permits.

9) Cleaning a gill net.

11) A cooler full of steelhead rests in a boat owned by Yurok tribal member Bob Ray in Klamath, California. Steelhead are just one of several anadromous species in the Klamath. As with salmon and sturgeon, their numbers have dwindled in the face of habitat loss due to dams and water diversions, and other pressures.

13) A home on the Yurok Reservation in the steep forests above the Klamath River.

14) Karuk fisheries workers Jerry Brink (left) and Ken Brink fish with a dip net for king salmon in Ishi Pishi Falls on the Klamath River. Fishing at the falls is restricted to tribal members, and dip netting in the only method of take permitted.

20) Louis Myers, a member of the Yurok Tribe, tosses a gill net into the Klamath River below Wauteck Village on the Yurok Reservation in Northern California, in March 2015. Two species of sturgeon—green and white—spawn in the Klamath.

23) A slab of sturgeon meat lies in a cooler owned by Bish Surber, a neighbor of Louis Myers. Myers caught the fish with Surber's net, and then shared half of the meat. Many Yurok fishermen don't simply eat their catch. They use it to repay debts, to barter, and as gifts to friends and relatives.

24) Bish Surber and Louis Myers talk in Surber's home.

25) Wauteck Village.

26) Photos on a bulletin board in a convenience store in the nearby village of Weitchpec.

27) A redwood smokehouse used by Louis Myers, who smokes much of the fish he catches—not just sturgeon, but salmon and steelhead as well. Smokehouses are particularly important to those who live in Wauteck. There is no public electricity supply, making refrigeration costly, and the nearest grocery store is 30 miles away beyond a long, winding section of single-lane road.

29) Yurok Tribal Councilmember Richard Myers holds an eel basket, used for

catching lamprey as they spawn in the Klamath River. Lamprey are often called "eels," though in fact they're a distinct species.

30) An outcropping near the mouth of the Klamath River in the Pacific Ocean.

33) Anthony Henry warms himself beside a driftwood campfire before picking up his lamprey hook and walking back to the surf line. Such fishing often takes place after dark because lamprey are easier to see by the light of a flashlight than by the light of the sun.