



THE MIGRATION

TROUBLED WATERS

IT BEGINS AS A GENTLE OUTFLOW FROM LITTLE LAVA LAKE, A TRANQUIL STILL-WATER WITHIN VIEW OF SNOW-CAPPED MOUNTAINS IN OREGON'S CASCADE RANGE. THE UPPER DESCHUTES RIVER FLOWS THROUGH A SERIES OF HIGH LAKES AND THE CITY OF BEND, OREGON, BEFORE FLOWING INTO A RESERVOIR NAMED LAKE BILLY CHINOOK. THE UPPER DESCHUTES, TOGETHER WITH THE CROOKED RIVER RUNNING FROM THE EAST THROUGH AGRICULTURAL AND HIGH DESERT LANDSCAPES, AND THE SPRING-FED, COLD, CLEAR, AND PRISTINE METOLIUS RIVER NOTCHED THROUGH AN AGELESS PONDEROSA FOREST, COMPOSE THE UPPER DESCHUTES BASIN; ALL THREE RIVERS MEET IN LAKE BILLY CHINOOK.



Trout on the lower Deschutes River are feeling the effects of a water management strategy designed to bring salmon and steelhead back to the upper Deschutes, Metolius, and Crooked rivers.

ARIAN STEVENS - PHOTO

WHAT IS HAPPENING ON THE LOWER DESCHUTES RIVER?

GLENN ZINKUS

The Wild & Scenic lower Deschutes River emerges from a complex of reservoirs and three dams owned and operated by Portland General Electric (PGE) and the Confederated Tribes of Warm Springs Reservation (CTWSR). The lower river flows 100 miles over rapids and through basalt-rimmed canyons before draining into the Columbia River. It is one of America's trout treasures, home of both big water, and the brawling wild redband rainbows, nicknamed redsides. Since the dams were built in the 1960s, the Upper Basin headwaters and the lower river have been disconnected, effectively limiting movement of both anadromous and resident fish.

In 2005, PGE and the CTWSR received a new 50-year operating license for the dam complex. The license requirements include specific measures to restore anadromous fish passage in the Upper Deschutes Basin, and manage water quality in the lower Deschutes River. A \$108 million selective water withdrawal (SWW) tower started up in December 2009. This tower is the cornerstone of anadromous fish restoration to the Deschutes headwaters, designed to create surface currents over Lake Billy Chinook that guide juvenile salmon and steelhead into collection facilities at the Round Butte Dam for transport downstream. This tower includes multi-level water intakes that draw water from the



COURTESY OF PGE - PHOTO

The selective water withdrawal (SWW) tower installed at Lake Billy Chinook allows PGE to draw surface water or colder bottom water to benefit anadromous fish passage to and from the Upper Deschutes Basin.

warmer surface layer or the cold bottom layer of the reservoir to control the temperature of the river downstream.

While the restoration of anadromous fish into the headwaters is an exciting and laudable goal, observers of the lower Deschutes River report significant water quality deterioration since the project implementation. The nutrient-laden warmer waters from the lake surface discharge are creating algal growth in the lower river that coats the riverbed, changes aquatic insect life in the river, changes trout behavior, and leads to parasitic attacks on both salmon and trout.

PGE'S VISION

To achieve PGE's goal of establishing self-sustaining and harvestable runs of Chinook salmon, sockeye salmon, and steelhead into the Upper Deschutes Basin, PGE created a road map that includes increasing juvenile capture efficiency at the SWW tower, increasing adult returns to essentially 1,000 of each species of fish, and achieving natural anadromous fish reproduction in the Deschutes tributaries. Megan Hill, PGE's manager of fisheries and water quality notes that sockeye

potential could be big: "It may be possible to eventually establish a run exceeding 10,000 adults, notably larger than other upper basin runs of anadromous fish."

She also qualifies this set of goals: "We recognize that achieving these levels will take several generations of returns."

PGE is still early in what will be a long-term effort. They are not without their challenges and critics. Fish returns, with just a few notable exceptions, are typically low. Adult returns most years are fewer than 100 fish of each species, with occasional outlier years such as a comparatively strong sockeye return in excess of 500 adults during the 2016 season, and surprisingly strong fall Chinook return this past year.

What many longtime lovers of the Deschutes River fear is that the lower river is paying the price for attempts at reintroducing anadromous fish in the Upper Basin. Two of the first to notice something different on the Deschutes River were John and Amy Hazel. Both are Deschutes River fly-fishing guides and the owners of the Deschutes Angler fly shop in Maupin, Oregon. John explains: "We first observed a dramatic visual change in 2011. We noticed the color and nuisance

algae. There were fewer insects. For the first year or two, we thought these were odd years." But John was onto something. "That's when we put this together; a group got together and organized what became the Deschutes River Alliance."

These anglers, guides, and business owners organized meetings to formalize discussions. The group started as the Lower Deschutes River Coalition, meeting monthly to dive into issues on the lower Deschutes. Given agency funding limitations, the group took on responsibility to define and investigate issues. The Deschutes River Alliance (DRA) grew out of these first years of the coalition, with objectives to understand and solve issues founded on detailed, science-based reviews and studies.

WATER ISSUES

Both the DRA and PGE monitor water quality, both producing annual water quality reports summarizing lower Deschutes River water quality. In addition, PGE completed a comprehensive three-year water quality study in 2019.

The DRA, PGE, and Oregon Department of Environmental Quality (ODEQ)

water quality monitoring results indicate seasonal issues with key water quality parameters such as low dissolved oxygen during spawning and rearing times, high water temperatures, and high pH. Most of the issues are caused by surface water released from the SWW tower. The surface water of Lake Billy Chinook is significantly warmer, and composed of Crooked River water. The Crooked River watershed is primarily agricultural and ranching lands, and subsequently contaminated with plankton and nutrients in comparison to the crystalline waters of the Metolius.

Compounding the temperature problem is PGE's methodology for managing temperature in the lower river, which is based on flow-weighted averages of seven-day maximum temperatures on each of the three tributaries entering Billy Chinook, making this temperature target artificially high.

ALGAE AND THE BUGS

The higher nutrient loads and warmer water temperatures have increased algal growth in the lower Deschutes River. The shallow, wadable riverbed is covered in a slick coating. Worse, algae is shifting to a species that the once abundant mayflies and stoneflies don't feed upon. Separate benthic studies by both the DRA and PGE demonstrate a corresponding shift in aquatic insect life.

Rick Hafele sits on the DRA board of directors. Fittingly, Hafele is a recognized authority on aquatic entomology, and the author of numerous books on the subject. He leads DRA macroinvertebrate study efforts, and is also well versed on PGE studies. Hafele reports: "There's an increased abundance of more non-insect taxa—the snails and worms in the river." This increased abundance, in Hafele's opinion, is a direct result from the nutrient enrichment from the change in water releases. He concludes: "This is a classic indicator of a disturbed invertebrate community." With warmer water temperatures, the hatches happen earlier and over a condensed period of time, with a majority of hatch activity now occurring from early April until the end of June. By July, hatches are relatively sparse and sporadic.

In 2014, after concerned anglers and conservation groups voiced their concerns about trout in the lower Deschutes, Oregon Department of Fish and Wildlife (ODFW) began studies of redband trout. ODFW, assisted by DRA, surveyed the

same river stretches as previous studies in the 1980s in order to make direct comparisons. They studied trout age structure, food consumption, condition, growth/size, disease, and beginning in the 2019 included population studies using mark-and-recapture methods.

The 2019 population study was conducted only in one stretch, the Nena Creek area. Results indicate that the population of trout is just above the average of historical populations. Additional population studies began in 2020, but the

data is incomplete as efforts ceased with the spread of Covid-19 during the spring of 2020. Official results are pending, but ODFW reports similar results with population estimates similar to the 1980s-era studies in two additional sections.

Since SWW tower implementation, redband trout began exhibiting black spots. Snails are the intermediate hosts of black-spot-causing *Neascus* parasites. As the populations of snails increase, the infection rate rises proportionately. Steve Pribyl, a retired ODFW fish biologist and

With more snails in the Deschutes, more redband rainbow trout are showing signs of the *Neascus* spp. parasite, which causes black spot. Population studies in the Nena Creek area show the trout population is slightly above historic averages.



JAMIE MITCHELL, COURTESY OF DRA - PHOTO

SOME ANGLERS LOOKING FOR A STRICTLY DRY-FLY EXPERIENCE ARE GOING ELSEWHERE. NOT ONLY DOES THIS AFFECT THE FLY SHOP AND GUIDES, BUT ALSO LOCAL MOTELS AND RESTAURANTS, GAS STATIONS, GROCERY STORES, AND THE SHUTTLE SERVICES.



ARIAN STEVENS - PHOTO

The lower Deschutes River—long known as a dry-fly paradise—has changed in recent years with earlier, more condensed hatches; more algae; and more nymph fishing. The good news is that the Deschutes River Alliance and other organizations are studying these water quality issues, and working with dam operators to make improvements.

DRA member, handled 3,000 to 5,000 Deschutes redbands per year during his career, and he reports never seeing black-spot on a resident redband. Now, some studies indicate in excess 60 percent of all trout have some degree of black spot.

Although thought to be nonlethal, black spot is known to be an irritation and cause of stress in trout. Black spot may cause blindness in heavily infected mature trout. Limited information in the scientific literature exists documenting the effects of black spot on trout, so the long-term effects cannot be predicted. Despite the prevalence of black spot, the fitness level of Deschutes redbands remains incredible. John Hazel comments: “There is no other Western trout like a Deschutes redband.”

Another issue caused by the shift in macroinvertebrates to non-insect taxa is the presence of *Ceratonova shasta*, a parasite that infects Chinook salmon. The recent abundance of polychaete worms that serve as an intermediate host of *C. shasta* is to blame. Both returning adult Chinooks and the out-migrating juveniles are vulnerable, potentially sabotaging PGE’s attempts at reintroducing this species.

Observations of early trout spawning also alarm experienced and knowledgeable

observers including John Hazel and Steve Pribyl. They’ve seen redband trout mature and spawn during December and January. Pribyl goes on to say: “Redbands are spring spawners for a reason.” If the occasional late winter/early spring floods create a major event, then “We just lost that entire class year of juveniles.” This is an observation worthy of more attention and study.

ADAPTIVE MANAGEMENT

PGE approaches to managing anadromous fish, water quality and power generation change through their adaptive management methodology. As Megan Hill explained: “We identify an issue, gather information, and make operational changes to implement improvements.” A Fish Committee, composed of local, state, federal, and conservation-related nongovernmental organizations, was established during the relicensing process. The Fish Committee reviews data, the water quality and other studies, and works to identify potential solutions to known issues—they guide PGE actions.

One example of the PGE adaptive management approach is the nighttime power generation modification. PGE learned juvenile anadromous fish tend to move in

the low-light hours. PGE implemented this night flow in 2017 to attract more fish into the facility; they operate this regime between March 15 and June 15.

PGE knows there is a trade-off between juvenile fish capture efficiency and water quality when using more bottom water. When blending top and bottom water, they modify operations to release higher flows of surface water in the evenings to help with juvenile fish movement and capture, and then blend in more bottom water during the daytime when these juvenile fish are not moving. For example, if the blend requirement calls for a 20 percent bottom water, PGE operations will send down 100 percent surface water at night and a 40 percent blend of bottom water during the day in an attempt to cool daytime water releases.

ALTERED REALITY

Ten years since the SWW tower began operation, anglers and businesses are adapting to the altered river. When a fly shop goes from dry-fly-based guided trips to nymphing trips, that’s a noticeable change, and it is sometimes not what traveling fly fishers are looking for. Some anglers looking for a strictly

dry-fly experience are going elsewhere. Not only does this affect the fly shop and guides, but also local motels and restaurants, gas stations, grocery stores, and the shuttle services.

John and Amy Hazel's Deschutes Angler now sells the river as a strong nymph fishery, with periodic dry-fly hatches. Their operation went from employing five guides to two or three at any one time, and they now regularly use Euro nymphing techniques on the Deschutes. It's a killer method for catching trout, but it's different and not everyone wants to fish this way.

WHAT'S NEXT

The DRA sees its role as an enforcer of the Clean Water Act water quality standards, especially when they see little or no enforcement by state agencies. In June 2020, the DRA filed its opening brief with the U.S. Court of Appeals in a case against PGE and the CTWSR to overturn an earlier court decision dismissing the DRA case against the dam owner/operators for issues related to water quality standard violations.

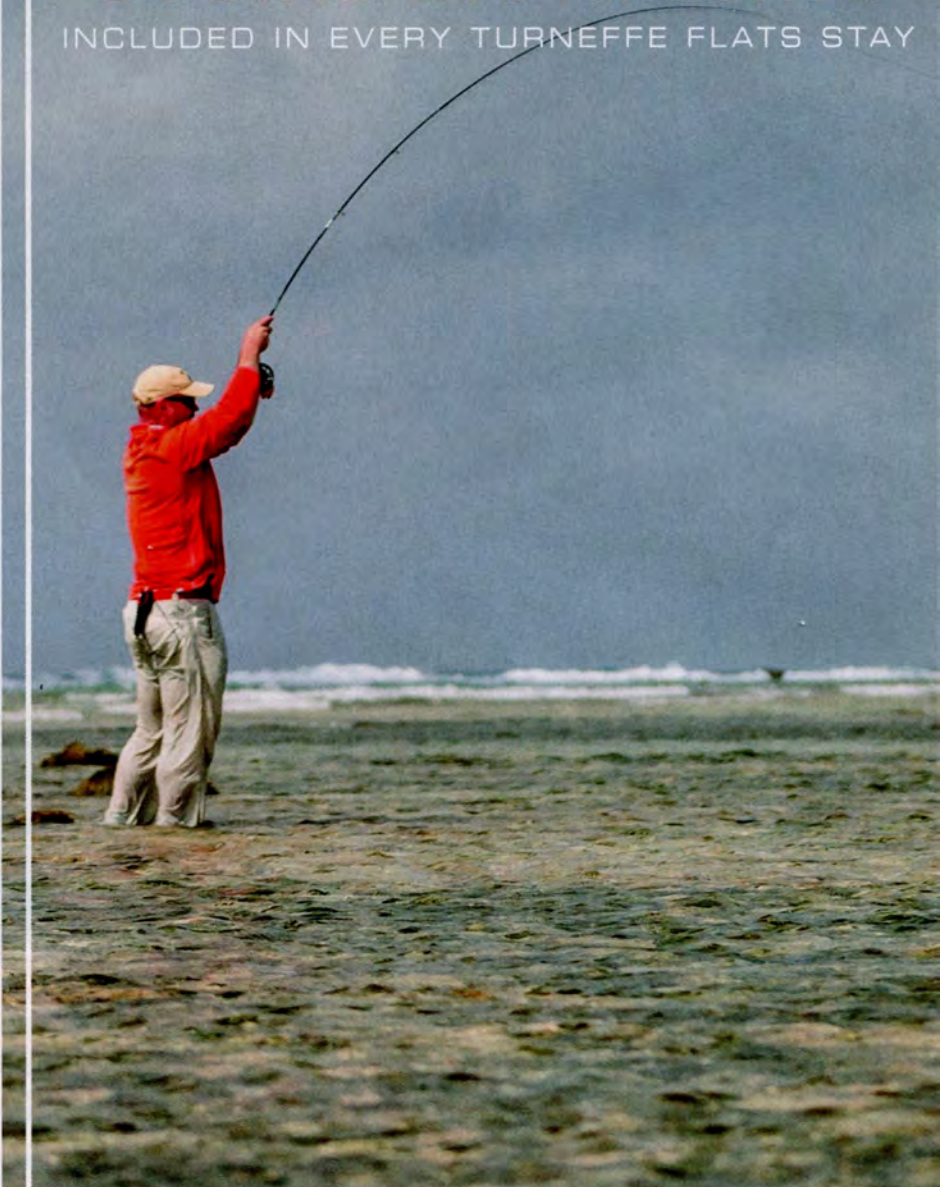
The DRA continues with ongoing scientific data collection and analysis, including an annual water quality study, and macroinvertebrate study and offers solutions to the problem. For example, if salmon and steelhead were trucked around not only the dams (as they presently are) but around Lake Billy Chinook as well, they contend juvenile migration and adult returns could be higher. In turn, this allows for greater changes to the mix and timing of water releases that might substantially restore water quality in the lower river.

PGE continues with its own water quality studies, funding of local enhancement projects including support to ODFW for fish studies as well as other NGOs, and work to improve fish passage and water quality. PGE released the results of a three-year water quality study in 2019. As a result, the Fish Committee formed a water quality working group, and is currently exploring ways to reduce or mitigate nutrient loading, modifications to SWW tower operation, installation of algae screens, and other measures. ~

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