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UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

PORTLAND DIVISION

DESCHUTES RIVER ALLIANCE, an Oregon nonprofit corporation,

Plaintiff,

v.

PORTLAND GENERAL ELECTRIC COMPANY, an Oregon corporation,

Defendant.

Case No.: 16-cv-01644-SI

DECLARATION OF DON RATLIFF

1. My name is Don Ratliff. I am competent to testify to the matters stated herein, which are true and correct to the best of my knowledge, information, and belief. Except as otherwise indicated, this declaration is based on my personal knowledge.

2. I received a Bachelor of Science Degree in Fisheries Science from Oregon State University in 1970. From April 1971 to July 2014, I worked as a fisheries biologist for Portland General Electric Company (PGE) at the Pelton Round Butte Hydroelectric Project (Project) and retired as the Project's Senior Biologist.

3. I am also a lifelong angler and fish advocate. During the 1970s I was President of the Jefferson County Steelheaders, and during the 1980s I was the Lower Deschutes Regional Director for Oregon Trout. In 1983, I was elected President of the Oregon Chapter of the American Fisheries Society (ORAFS), the professional organization of fisheries workers, and the largest chapter in the nation. During my tenure as President, ORAFS publicly opposed the licensing and construction of the Salt Caves Hydroelectric Project on the Klamath River because of the negative effects that it would have on native salmonids at the time, and the future ability to reestablish anadromous salmon runs back into the upper Klamath Basin. In response to the opposition of ORAFS and other fish advocates, that hydro project was never approved. Among the awards that I have received for my work on behalf of fisheries resources are the ORAFS "Fisheries Worker of the Year Award" in 1992, largely for calling attention to the plight of bull trout populations in Oregon, and the ORAFS "Lifetime Achievement Award" in 2013. These honors are only awarded to one person in Oregon annually, and some years not at all. To my knowledge, I am the only employee of a utility company to have received either of these awards.

4. Throughout my 43-year career at (PGE) I was involved in studies of resident and anadromous fish populations native to the Deschutes River and helped biologists from federal and state agencies and from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) develop strategies for restoring and enhancing these very important

populations. When the Federal Energy Regulatory Commission (FERC) relicensing process for the Project began in 1996, I represented PGE on the Fisheries Technical Subcommittee. This advisory group, formed by PGE in 1997, had one representative each from: (1) the U.S. Fish and Wildlife Service; (2) the National Marine Fisheries Service (now called NOAA Fisheries); (3) CTWSRO Fisheries; (4) CTWSRO Water and Soils (for Water Quality); (5) Oregon Department of Fish and Wildlife, (6) Oregon Department of Environmental Quality (DEQ) (for Water Quality); (7) U.S. Forest Service-Sisters Ranger District, (8) Bureau of Land Management-Prineville District; and (9) an individual representing Non-Governmental (Environmental) groups, normally from either American Rivers or Trout Unlimited. The only caveats to this list are that CTWSRO Fisheries and Water and Soils representatives did not participate during the period early in relicensing when the CTWSRO was actively working on its own competing FERC license application and a Bureau of Indian Affairs representative joined after the license was granted in 2005. The Fisheries Technical Committee met nearly monthly from 1997 until the new FERC license was granted jointly to PGE and the CTWSRO during 2005. The new license assigned this committee, which was renamed the "Fish Committee," a role in reviewing Project plans and operations. It continues to meet regularly, tracking the success of and giving advice on the required Project mitigation efforts, such as lower Deschutes temperature management and downstream fish passage. During the 8-year relicensing period, I coordinated the fisheries and geomorphology relicensing studies, including research regarding pre-Project fish runs, anadromous fisheries ecosystem functions in the Deschutes River Basin, and the history of the Project's fisheries program. I also served on the engineering design team that designed the Selective Water Withdrawal Facility (SWW) at Round Butte Dam.

5. Early during the relicensing period, the Fish Committee identified two major problems caused by the Project. First, wild anadromous salmon and steelhead runs that once had ascended into the Crooked River, the Middle Deschutes River, and the Metolius River ecosystems upstream from the hydro Project had been lost when downstream fish passage failed during the late 1960s. This failure was due to the absence of sufficient reservoir surface flows to attract juvenile downstream migrants (smolts) to historic downstream fish facilities built during initial construction of Round Butte Dam. Relatively early in the relicensing process, it became apparent that the federal fisheries agencies, the U.S. Fish and Wildlife Service and NOAA Fisheries, would likely condition the new license to require passage for anadromous salmon and steelhead. Second, because of the large volume of Lake Billy Chinook, the reservoir impounded by Round Butte Dam, the annual warming and cooling cycle of the Deschutes River downstream of the Project was delayed about six weeks from 1965 until spring of 2010 when the SWW began operation. Large volumes of water retain their heat, or lack of heat, for a long time. Consequently, cold water, stored in the reservoir during winter, was released during the spring and early summer. And then, when all the available cold water was drained out the bottom outlet of the dam, warmer water stored on top of the cold during the summer was released during the late summer and fall when the lower Deschutes River should naturally have been cooling down. The warmer temperatures downstream than the river would have been without the Project were not consistent with water quality standards. Both the major problems, (1) lack of surface attraction flows to Round Butte Dam for downstream juvenile fish passage and (2) excessively warm water discharged during late summer and fall, were attributed to having just one outlet at Round Butte Dam, the historic deep outlet.

6. To understand these problems better, and under the guidance of the Fish Committee, PGE worked with Dr. Tarang Khangaonkar, starting during the late 1990s. Dr. Khangaonkar is a noted expert computer modeler of the movements and temperatures of large water bodies. His charge was to develop a three-dimensional, hydrodynamic computer model of Lake Billy Chinook that would allow simulations to study potential effects of different new facilities and outlet levels on discharge temperatures and surface currents. Dr. Khangaonkar and coworkers were employed by several different consulting firms, and later during the many years of his assistance, the Pacific Northwest National Laboratory in Seattle, Washington. This multi-year effort to develop a reservoir model was finally completed and computer simulations began. With this model, we learned that curtains to force deep water to the surface would not likely solve these problems. When the computer was used to simulate flows and discharge temperatures with water withdrawn both from near the surface in the forebay and from the deep historic intake, mixed results were observed. Success in theoretically solving these problems depended upon the timing of when and how much water was withdrawn from each level. Thus began repetitive model runs to observe how much water from surface versus deep theoretical intakes in the model might be successful in solving these two problems. The guidance given to the modelers was that warmer water than discharged during the first license period could be discharged during spring and early summer up to what the temperature would be without the dams in place, without violating temperature standards. The point of compliance for lower Deschutes River temperatures was and still is the Madras USGS stream-gauging station located at River Mile 100, immediately downstream of the Project. Finally, on the 13th model run, a scenario of blending water was developed in the computer model that appeared to address both problems. This mix of surface and bottom

water during late spring, summer, and fall was termed "Blend 13." As time went on, improvements in the blend and outputs were made, resulting in Blends 14, 15, and 16.

7. With the knowledge that a facility withdrawing water from both the surface and deep locations in the forebay of Round Butte Dam might solve both these problems, intensive design work began on potential facilities with the engineering firm CH2M-Hill, the primary design contractor. I participated in monthly meetings with the engineers for several years to give a fisheries perspective to questions as designs progressed. However, this was not a linear process as no combination facility of this magnitude, capable of selectively withdrawing water for downstream temperature management and safely capturing juvenile salmonids, had ever been designed and constructed at a major high dam. Several different prospective designs were advanced, only to become infeasible, or unbuildable, or have fatal flaws detected. Finally, a 3-part facility—the SWW—was designed that had: (1) a deep withdrawal structure, with gates and fish exclusion screens included, that when sunk in place would marry up to the historic deep intake; (2) a floating surface withdrawal facility that included two large V-screens for safely collecting and separating the juvenile fish from the generation water; and (3) a large vertical flow conduit that would connect the two and transport fishless water from the surface facility down to the historic power intake tunnel. The floating surface fish collector and water withdrawal structure was to be held in place in the forebay over the deep intake by a floating steel bridge.

8. However, a major problem that arose was how to safely move the small fish captured from the intake location out in the forebay to the shoreline where they could be processed and transported downstream. If they were moved in a pipe using gravity, the surface of the water in the holding structure would need to be many feet below the surface of the

reservoir near shore. NOAA Fisheries, the federal agency that governs anadromous fish facilities, had never approved a pumping facility that moved all the juvenile fish in a major system. We determined at the time that several irrigation diversion systems on the Klamath and Sacramento River systems were successfully using Hidrostal fish pumps to move small fish that had been diverted safely back upstream to their original habitats. We were able to get permission to test the pump being used by the Bureau of Reclamation at their Klamath A Canal to pump juvenile endangered suckers back upstream into Lower Klamath Lake. We conducted multiple tests that showed no injury for juvenile salmonids up to 15 inches moved through this fish pump. Thus, a fish pump was approved by the federal fish-passage agencies and included in the design to elevate these fish in water so they could be moved down a pipe to the Fish Transfer Facility near shore.

9. Through all these fish and geomorphology studies, modeling, and fish-facility design wows and successes, the members of the Fish Committee were continually consulted. In addition, because so much information was being learned and applied, PGE started having twice-annual Pelton Round Butte Fisheries Workshops. Researchers, designers, graduate students, and modelers all gave presentations at these open workshops held in a public auditorium in Madras during early spring and the fall. In the spring, presentations mostly centered on study plans—proposed activities for the coming field season—and in the fall they mostly presented tentative results for the annual efforts. All attendees had the opportunity to, and were invited to, improve these efforts if they had better ideas. These workshops were well received by area biologists, water quality experts, and other resource professionals, anglers, fishing guides, and interested locals with normally more than 100 individuals in attendance.

These workshops were so important to communicating the fisheries program that an annual fisheries workshop is now required in the new FERC operating license, and they still continue.

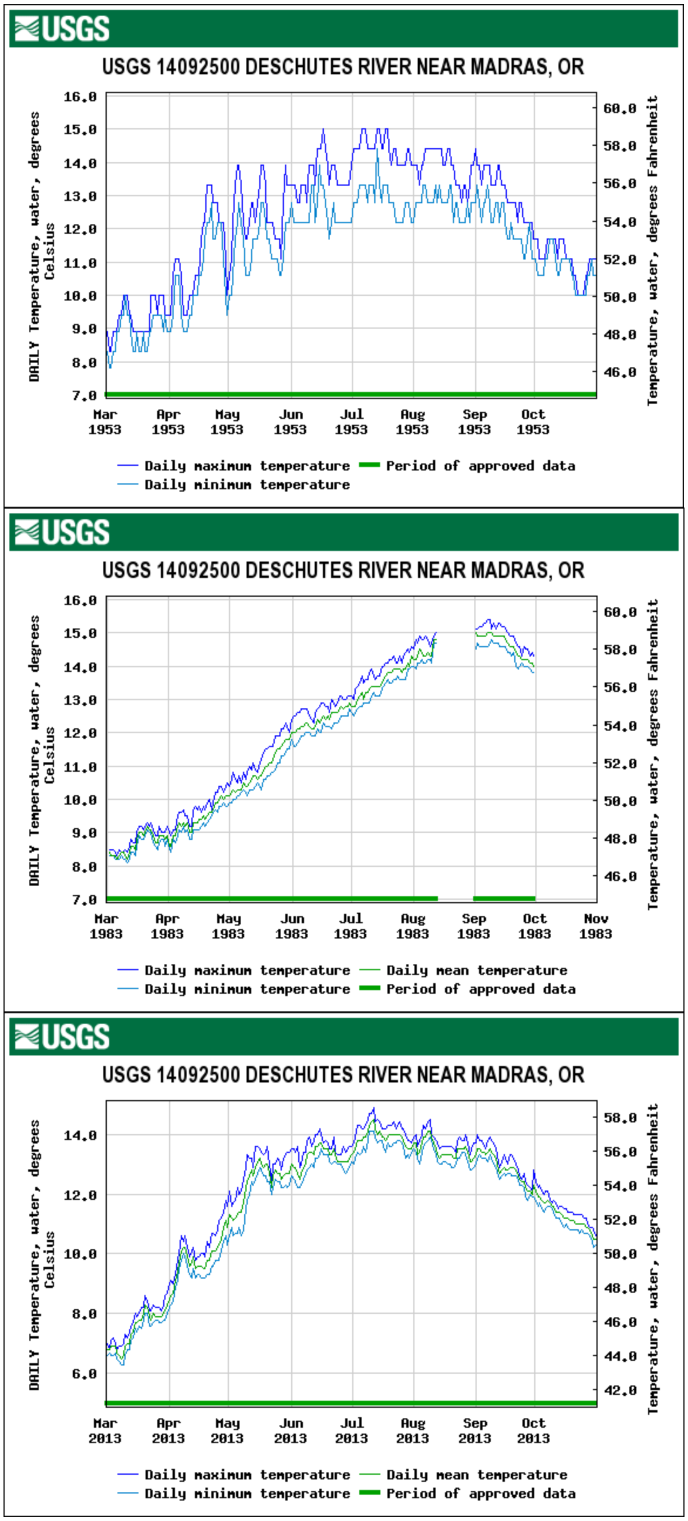
10. Before the completion of the SWW in 2010, all generation discharge water at Round Butte Dam was withdrawn at the bottom of the historic tower with a mean entrance depth of 240 feet at full pool. After the SWW was completed, nearly all the generation water was withdrawn from the surface 45 feet during the cool months from late fall through early spring of the next year. Water coming from the top structure travels through the fish screens and then down the vertical flow conduit. At the bottom it turns north into the historic power tunnel under the dam to the Round Butte Powerhouse. Starting usually during mid- to late-May, some colder deep water is mixed from the new deep intake and joins with and cools the water coming from the surface withdrawal to achieve the desired temperature. The position of the bottom gates can be adjusted to change the blend in increasing amounts of colder bottom water with the surface water as the weather and incoming stream temperatures and surface of the reservoir all get warmer. There are no gates in the top structure of the SWW to completely shut off surface flow through the SWW. When the SWW's bottom gates are fully open, water continues to flow through the top of the SWW, such that the maximum proportion of bottom flow that can be discharged through the SWW is approximately 60 percent. Flow from the surface of the reservoir through the SWW ceases only when the generation units at Round Butte Dam are not operating, and no water is discharged through the SWW downstream.

11. During the design of the SWW, no water quality need was identified to withdraw only bottom water by entirely shutting off surface flow. If only bottom water was withdrawn for a significant time during mid-summer, the cold deep water could be depleted,

resulting in excessively high discharge temperatures in late summer and early fall—a situation similar to that which the SWW was designed to fix. Moreover, maintaining surface withdrawals through the SWW provides the reservoir surface attraction flows essential for the collection of downstream fish migrants that desire to emigrate during these periods. During planning, fish agencies stressed the need to continue fish passage during the less-used portion of the year to maintain genetic diversity needed to allow these fish stocks to evolve. Under the terms of the Fish Passage Plan incorporated by reference in DEQ's Clean Water Act section 401 certification for the Project, upstream and downstream fish passage through the Project must be provided throughout the year.

12. In my opinion, the temperature management program has been relatively successful in shifting the seasonal temperature back about six weeks to the timing that it had before the Project was constructed. The three graphs in Figure 1 below show the problem and how the new SWW is addressing it. The top graph is the March through October summer temperature cycle as measured by the USGS in 1953, before the Project's dams were constructed. The middle graph (with some missing data) is the summer temperature cycle as measured 30 years later (1983) during the first FERC license period with just the deep intake at Round Butte Dam. It shows the river water temperature cooler than pre-Project temperatures in the spring and early summer, and not peaking until early September. The lower graph, from data gathered 30 years later, shows the temperature cycle in 2013 after construction of the SWW with the required temperature management program in place. This temperature graph follows a pattern similar to that in 1953, before the Project was constructed.

13. Figure 2 is another graph showing the 2012 water temperature cycle. This graph illustrates both the pre-SWW temperature problem and how the SWW and new



Summer Temperature Cycle 1953

Before Pelton and Round Butte Dams

Summer Temperature Cycle 1983

All Water from Deep Intake

Summer Temperature Cycle 2013

With Temperature Management

Figure 1. Comparison between the summer temperatures of the Lower Deschutes River at the Madras USGS gauging station (RM 100) in 1953, before Pelton and Round Butte Dams were constructed, 30 years later in 1983 when all water was withdrawn from the historic deep intake, and in 2013 with temperature management.

temperature management program are correcting it. The black line is the average temperature for the last four years without the SWW (2006-2009), when all water was discharged through the deep intake. The green line is the calculated temperature that would have occurred during 2012 had the dams not been built. The difference between the black and green line when the black line is higher in the late summer gives a good representation of the problem. During this period of the year, the discharge water was both higher than the pre-Project river temperature and higher than the applicable temperature standard. On Figure 2, the blue line was the actual river temperature just below the Project with the SWW and temperature management. The

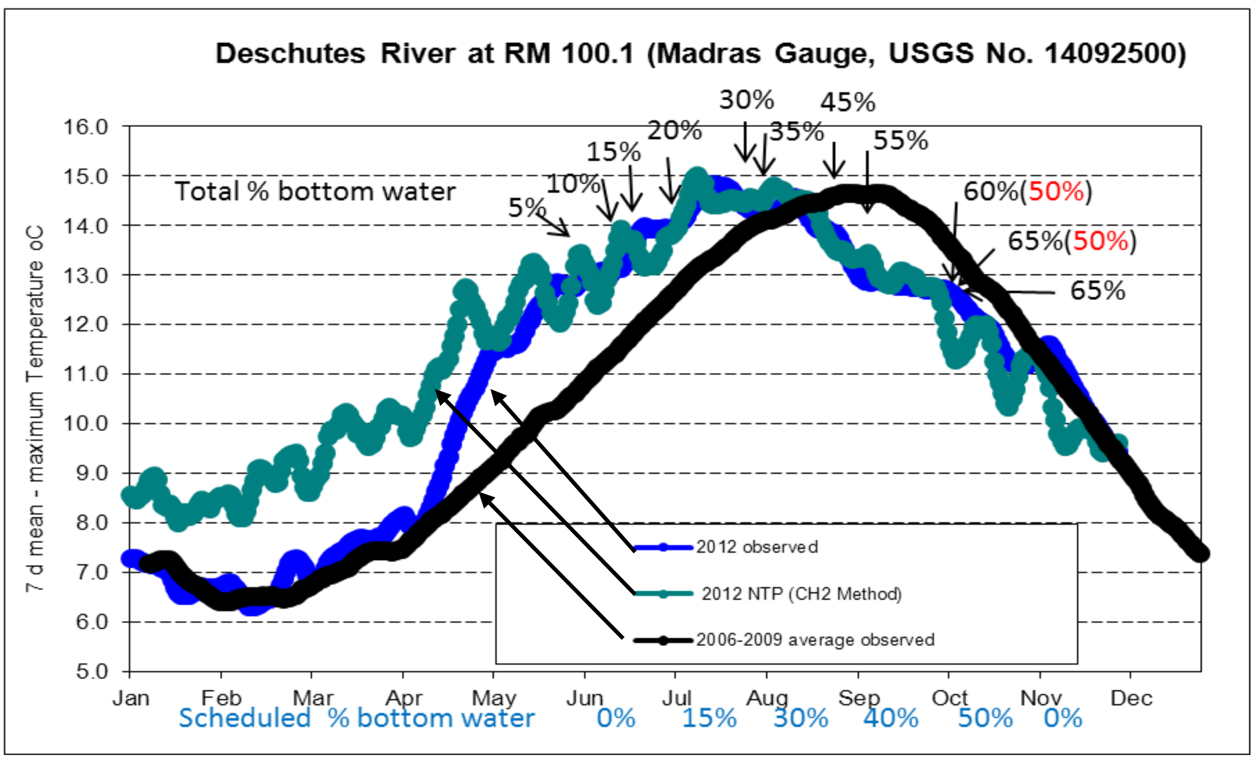


Figure 2. Comparison of the actual water temperature at the Madras USGS gauge during 2012 with the calculated temperature that would occur at the gauge if the dams were not there, and the average temperature during the last four years of bottom withdrawal, 2006-2009**.** The scheduled % bottom water would be following Blend 16.

little arrows and percentage numbers are the percent bottom water in the discharge mix. The blue line (actual river temperatures) is much closer to the green line (calculated without-Project river temperatures) than the black line (4-year average pre-SWW river temperatures with only bottom withdrawal).

14. Although the warmer water after about August 15, before the SWW was installed, exceeded the applicable water quality standards for temperature, the much cooler water during late winter, spring, and early summer (the difference between the green line and black line in Figure 2 during those periods) was a much more serious biological problem. Salmonids, and most of their food items, are cold- blooded, *i.e.*, they are the same temperature as the water. That means that their metabolism operates much slower at 48.2 °F (9.0 °C) than at 52.7 °F (11.5 °C), which is the difference between pre- and post-SWW river temperatures at the Madras USGS gauge on about May 1st, as shown on Figure 2. When temperatures were that much colder with just the deep intake, salmon and trout did not eat as much and did not grow as fast as they should have. Their eggs also developed more slowly in their body. As a consequence, from the construction of Round Butte Dam in 1964 until spring 2010, when the SWW began operation and temperature management, larger trout did not fully utilize the abundance of food during the salmon fly hatch during spring to grow larger. I have experienced better trout fishing on the river downstream of the Project during the salmon fly hatch with the warmer temperatures, I believe because the fish take the fly more aggressively. I have also seen more large trout caught than before the installation of the SWW. A number of progressive fishing guides are picking up on this improvement and are now targeting these big trout in the upper portion of the lower Deschutes River.

15. The colder water during the spring and summer before the SWW was installed also meant that most fall Chinook juveniles rearing in the upper portion of the lower Deschutes River did not grow fast enough to be able to migrate to the ocean during spring when they should have. Studies by ODFW in the 1980s showed that juvenile fall Chinook salmon rearing below the Reregulating Dam emigrated from the Deschutes River into the Columbia River about two months later than fall Chinook rearing below Sherars Falls further down the Deschutes River, where the water was warmer during the spring. During years that the Columbia River was high and cool, that did not matter much. During years that it was low and much warmer, it mattered a lot. During years with decreased Columbia River flows and warmer temperatures, the slower growth of juvenile Chinook in the Deschutes River caused migrating smolts to have to run the gantlet of active predators and disease in the lower Columbia River. Faster growth of juvenile fall Chinook with the warmer water from the SWW starting in 2010 is the most likely explanation for the huge increase in the numbers of fall Chinook entering the Pelton Fish Trap at the Reregulating Dam starting in 2012 (Figure 3).

16. The Water Quality Management and Monitoring Plan (WQMMP) incorporated into the DEQ section 401 certification assumed that blends ranging between Blends 13 and 16 would provide an appropriate balance for fish passage and water quality. After the new FERC license was issued in 2005, and temperature management began in 2010, the members of the Fish Committee, including DEQ, agreed that a slight modification to Blend 16 in late October and November, known as “Blend 17,” would provide a better balance of fish passage and water quality needs. DEQ and the Tribal Water Control Board directed PGE to follow Blend

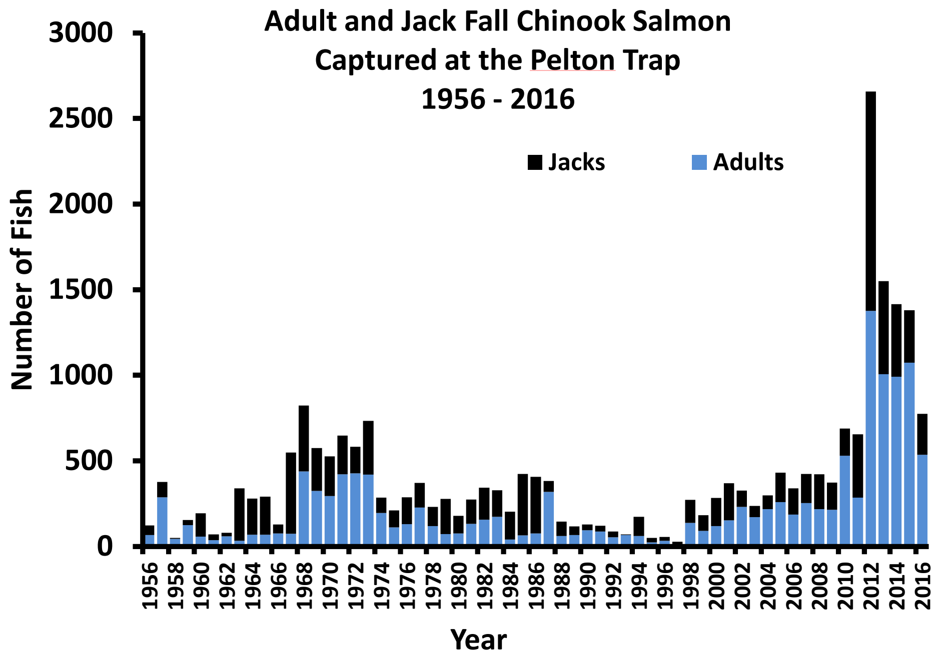


Figure 3. **W**ild adult and jack fall Chinook captured in the Pelton Fish Trap at the Reregulating Dam annually from 1956 through 2016. Temperature management began in the spring of 2010

17 throughout the year unless, based on river temperature monitoring data, additional bottom water withdrawal was needed to reduce temperatures downstream of the Project in accordance with the adaptive management provisions of the WQMMP. In reality, because several consecutive days of either sunny or cloudy weather during spring and early summer can have an enormous effect on the 7-day average daily maximum temperature of the inflows (the temperature standard the program is based upon), inflow and outflow temperatures are constantly monitored during the temperature-management period (approximately May through October), and changes in the mix made through adaptive management when needed.

17. In addition to the river temperature improvements that the SWW has provided, surface flows at Lake Billy Chinook have been critically important for downstream fish

passage to allow reintroduced anadromous salmonids to find their way downstream out of Lake Billy Chinook. Although reintroduced anadromous species are not yet self-sustaining upstream of the Project, adult steelhead spawn annually in the Crooked River and middle Deschutes River systems, and large adult spring Chinook salmon are found in the Crooked and Metolius Rivers annually. In 2016, over 500 wild adult sockeye salmon returned, nearly all of them native Deschutes River stock (Figure 4). Most of these sockeye were passed upstream to spawn naturally in the Metolius River and its tributaries. Sockeye utilize the standing water of a lake or reservoir for juvenile rearing habitat. One of only two historic sockeye populations in Oregon returned to Suttle Lake in the Metolius River Basin, spawning in Link Creek, just upstream. To create a substantial run of anadromous sockeye salmon, the fish passage program is allowing wild, adfluvial kokanee, with native Deschutes River genetics, to convert back into sockeye. However, it will take time as losses of juvenile kokanee/sockeye through the turbines at Round Butte Dam via the historic deep intake selected against migratory behavior from 1968 through 2009. The approximately 300 adult sockeye that returned to the Pelton Trap during 1973 and 1976 (Figure 4) were from turbine-passed smolts that survived. The turbine intakes at Round Butte Dam and the surface oriented upper intake are now both fully screened. Thus, all emigrants move downstream through the surface collection system and no fish are lost as before, except for very infrequent floods requiring spill. I think floods requiring spill have only occurred at the project six or seven times since the completion of Round Butte Dam in late 1964. As far as I know, this is the only hydro dam that has complete fish-screening for downstream migrants at all flows except extreme floods.

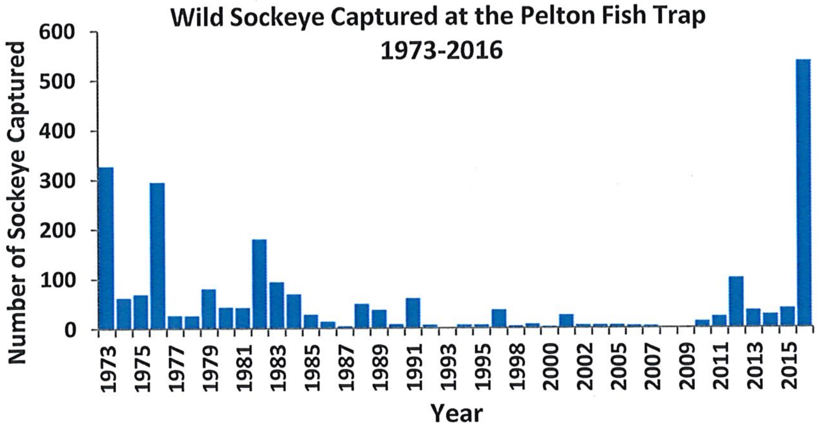


Figure 4. Adult sockeye salmon captured annually at the Pelton Fish Trap.

18. Introductions of sockeye and other anadromous salmonids elsewhere have taken considerable time to be successful, especially where adaptation was necessary to enhance survival within new habitats. My vision is that, in 20 years, lower river guides will be helping clients swing small, bright flies for chromer adult sockeye during late June and July, and Tribal Members will be very busy harvesting them at Sherars Falls like their ancestors did historically.

I declare under penalty of perjury that the foregoing is true and correct.

DATED this 24th day of April, 2018, in Madras, Oregon.

Don Ratliff