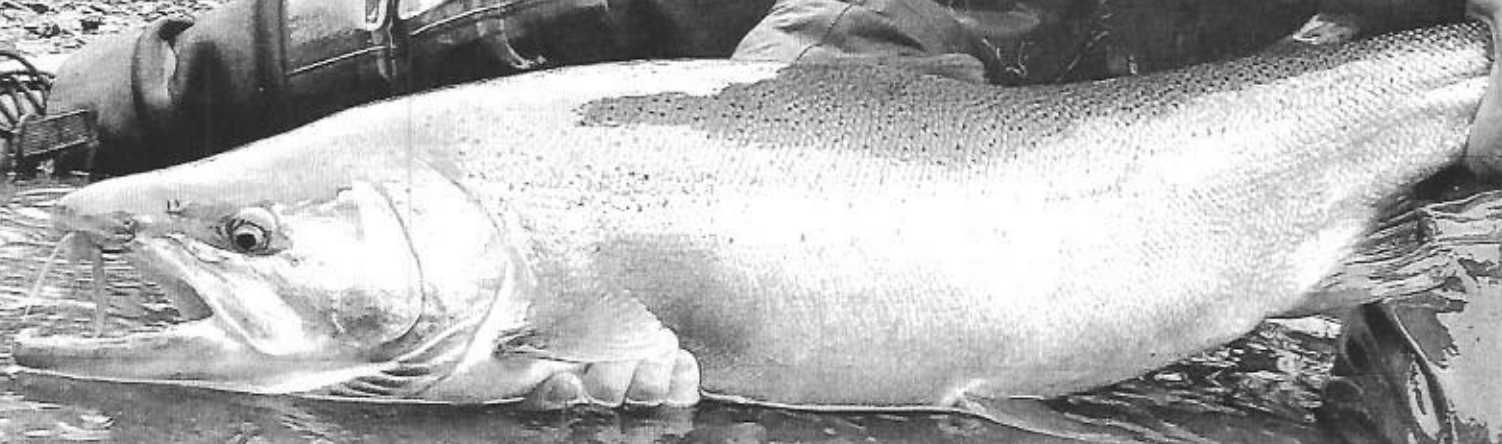


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OLD GUYS

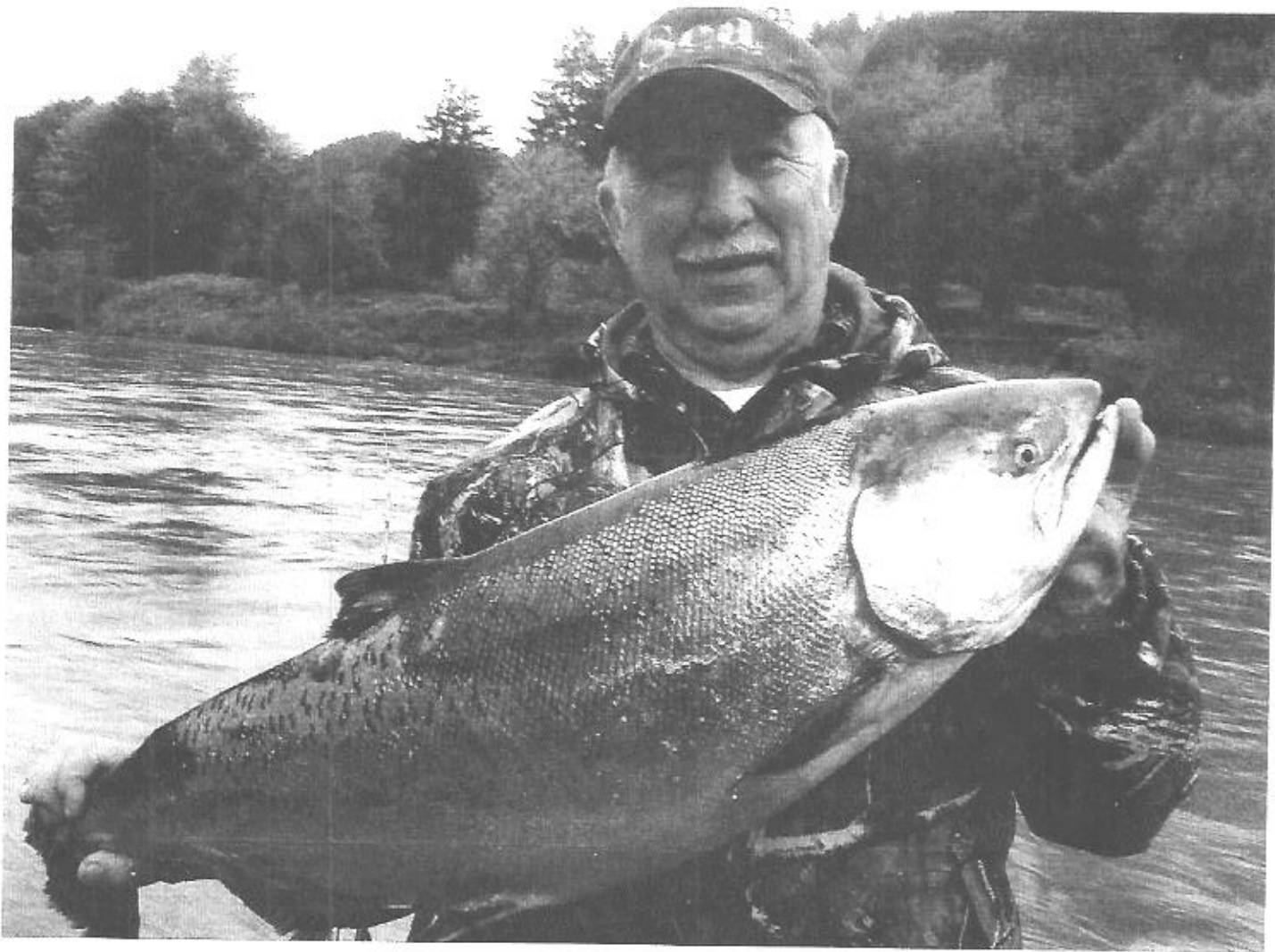
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OREGON HATCHERY RESOURCE CENTER

In Oregon, hatcheries vary in their approach to collecting adults and fertilizing the eggs.



The author with an Umpqua River Chinook salmon.

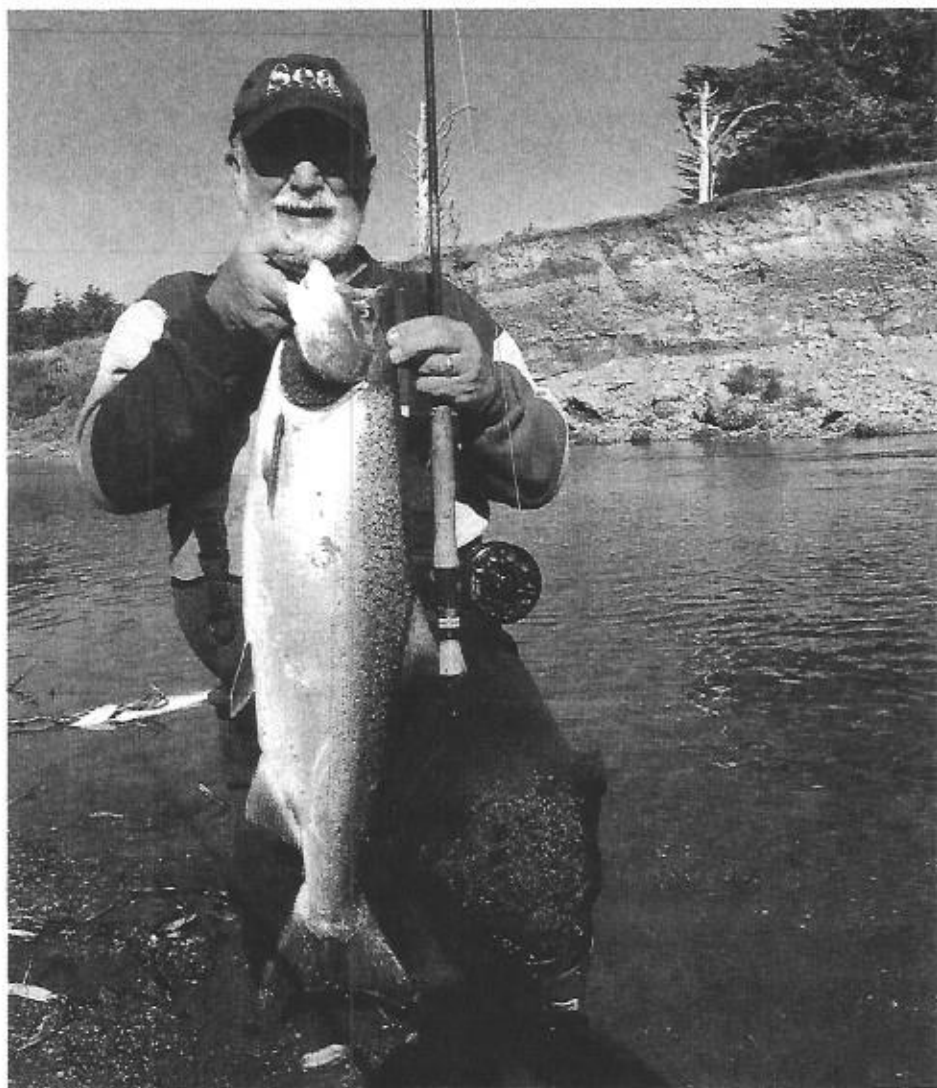
In my early years, the rivers were full of hatchery and natural spawning fish. I lived in Southern Oregon and there were days when limits of three Chinook or two steelhead were not difficult. The year started with winter steelhead, then moved to spring Chinook, summer steelhead and finally fall steelhead and Chinook on the Rogue River. Those were great times to be a sport fisherman, especially with large numbers of hatchery fish available.

In the 1990s, research papers out of Oregon State University fisheries department

started labeling hatchery fish as inferior to the native fish. This was despite the fact that some hatchery fish were genetically from the same local stock. Some research papers were so anti-hatchery, the authors recommended only releasing smolts into impoundments that had no outlets. A review of several other papers pointed to problems such as smaller fish, fewer eggs per fish and less reproductive fitness. This should not be unexpected. Get on the internet and look up the effects of inbreeding of any species. These characteristics rise to the top. In many of these papers, there

was a common general belief that all hatchery fish were equal and all-natural spawning fish were equal. Usually the papers did not describe the hatchery spawning methods. Some may have used antiquated data from hatcheries that have discontinued these old methods and moved on to new methods.

In Oregon, hatcheries vary in their approach to collecting adults and fertilizing the eggs. In the past, the eggs may have been placed in a bucket and sperm is introduced from several males accounting for complete fertilization of the eggs. It was later suspected



Jim Pex, Sr. hook this Elk River Chinook salmon with his fly rod.

that by the time the second male was used, all the eggs were fertilized by the first male. The biologist simply reached in the bucket with his hands and stirred it up. The result, all the offspring from that bucket have the same father. When they returned there were no visible marks to determine the genetic relationship of the females to the males, it was certain that some inbreeding was going to occur. Now consider this same process used for over one hundred years. It is reasonable there would be subsequent problems. However, some researchers were quick to dismiss inbreeding and pointed to nearly every aspect of raising hatchery fish as a potential problem. Each time a paper was published, OSU would sensationalize it in the media. Concerned citizens went to their legislators and requested something be done. But the seed had been planted, hatchery fish were bad. As expected, response from the public relied only on the media for information. What the public was not told was that the native fish in many coastal streams were extinct back in the early 1900s. The current natural spawning

fish were of hatchery origin and at times from outside the watershed. The current theory is that after a hatchery fish spawned in a river, the first generation (F1) was inferior to the natural origin fish. By F3, the offspring were considered "naturalized" and considered a native origin fish. The genetics ideology here makes no sense to me, but it apparently does to others. What changed, other than retaining an adipose fin? Is it the truth or a belief in the absence of the truth? Adding further complexity, I have yet to read a research paper that has mentioned the percent of hatchery fish that were fin clipped in their assessment of hatchery origin (HO) fish compared to natural origin (NO) fish. Fin clipping did not start until the 1960s and only in the last few years have the hatcheries been mandated to provide one hundred percent fin clipping. All unclipped fish that returned to the river were ordained "wild" and worthy of protection. In the past, this number could exceed fifty percent of the total hatchery releases. Does this matter? I think so. The line that separates scientific fact from belief has become blurred.

In 2005, Oregon launched the Oregon Hatchery Research Center (OHRC) on Fall Creek, a tributary of the Alsea River. The center is controlled by ODFW in cooperation with OSU. The cost to the taxpayer was seven million to construct and an annual operating budget of 1.2 million. The primary function of the center was to determine the differences between hatchery origin and natural origin fishes. The assumption at the time was that all hatchery fish are a problem and the term "wild" was used only for the NO (natural origin) fish. In reality, all the anadromous fish in Oregon are wild. By now, there exists a genetic hatchery fish influence on every river in Oregon, the John Day may be the only exception. If the fish in a hatchery originate from the river next to the hatchery and a number of hatchery fish spawn in the river year after year for maybe 40 years, just how different are they? It is believed by some that any hatchery fish mating with a natural origin fish is a failure.

Despite the bad press here in Oregon about hatchery fish, the tribes in the Northwest started raising their own fish, hired their own biologists and had different results when compared to work done at OSU. A paper published in 2012 by the Columbia Intertribal Fish Commission made the following statement in their abstract:

"We conclude that fish chosen for hatchery rearing did not have a detectable negative impact on the fitness of wild fish by mating with them in a single generation."

This was modified later to say, "Overall, when spawning in nature, hatchery origin fish demonstrated a trend toward lower RS (reproductive fitness) compared to natural origin fish. However, when hatchery origin successfully spawned with natural origin fish, they had similar RS compared to natural by natural crosses."

Anyone who has lived around the Clearwater River for a generation can attest to the success of their programs. In my youth, my family lived in Orofino and Kooskia, the fishing for salmon and steelhead was hardly worth the effort. Now it can only be described as amazing if you are a sport fisherman. It is now one of the premier fishing locations in the Northwest. Are they wrong?

In science, if there are conflicting opinions on a subject matter, the issue is not settled until the differences are fully vetted. That meant more work needed to be done, but here policy was not waiting. The ODFW Native Fish Conservation Policy took precedence over anything related to anadromous fish. Hatcheries and hatchery fish were quickly defined as the problem. I was told by ODFW management that papers coming out of Idaho have serious flaws in the research

design that were ignored. No one that I know wants to see the demise of natural origin fish in Oregon and habitat restoration is constantly seen as the best opportunity for the future of these fish. I would whole heartedly agree. But the native fish policy continues to trump the needs of commercial and sport fishermen. Here is the conflict, hatchery fish are a valuable Oregon resource to those of us that fish. We pay the bill, but do not have equal standing with protectionists who do not want to see any human influence on our rivers.

The original legislators who passed the bill creating the OHRC specifically stated in their bill that they wanted the differences in hatchery fish investigated *while maintaining current levels*. That has not happened. Current levels have not been maintained and solutions to the hatchery-native origin issue remain unresolved. This, despite the OHRC has spent nearly fifteen million in taxpayer dollars in construction and maintenance.

Currently there are three key research projects under way at OHRC that were approved by the board:

"Differences caused by hatchery rearing." This study looks at performance of various fish families and the hatchery environmental conditions.

"Imprinting and Homing." This study on the Elk River is exploring the use of additives to hatchery water to improve the return of fish to the hatchery rather than straying and spawning in river.

"Mate Selection." It is believed that salmon do not select their mate at random in the wild. This study looks to discover and attempt this natural type selection in hatcheries.

The paper on mating choices of Chinook salmon suggested that the larger males were dominant in spawning and may spawn with more than one female. The immediate question, should hatchery practices change to reflect the findings in this study? Perhaps we should utilize the largest males to fertilize the eggs of multiple females instead of utilizing all the males regardless of size. So far, I have not seen this change take place at the local hatcheries despite the notion that hatchery fish are often accused of being smaller than their in-river counterparts. Why do the study if state government is going to ignore the results?

The Elk River study was a result of too many hatchery fish reportedly spawning in the river instead of returning to the hatchery. The first response by ODFW was to reduce the number of hatchery fish produced by the Elk River Hatchery. In the development of the Comprehensive Management Plan for the south coast, the local anglers requested that the problem be studied instead. ODFW

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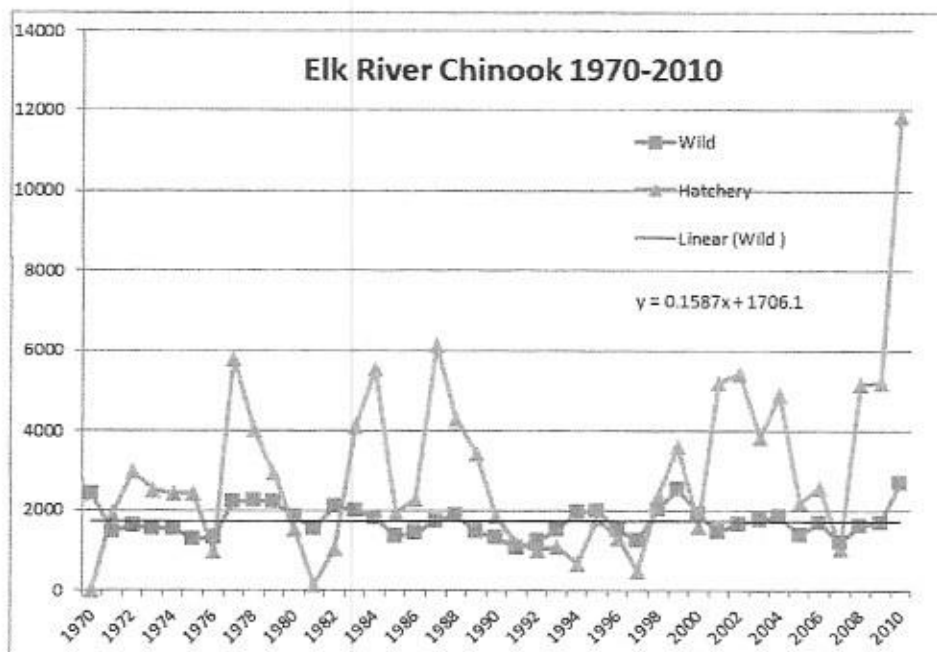
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agreed to a limited reduction in hatchery smolts and let OHRC take a look at the problem. The study found that the river water passing through the hatchery was not sufficiently unique to bring fish back to the hatchery. The research continues and a possible additive may be placed in the hatchery intake water to create a homing signal for the fish. An approach that benefits the fishermen.

The chart below demonstrates the number of HO carcasses recovered compared to NO carcasses for several years on Elk river. As an aside, you might also note that the native fish numbers have remained constant for 40 years despite the fluctuations in hatchery numbers.

When examined on its face value, some years do have large numbers of hatchery fish spawning in the river. At a glance, common sense might lead one to believe the hatchery fish numbers did not make any difference in the amount of NO fish returning. Years depicting high numbers of hatchery fish were also low water years on the south coast.

Differences in hatchery rearing studies are the continual searches to find why hatchery fish are different from natural origin fish. When will this end and solutions through integration become the priority?

These studies can span 3 salmon life cycles up to 12-15 years and will cost up to \$15 million. Funding comes from us fisherman who under HB 3012 Jan 1, 2016 pay a fishing license surcharge of \$1.00 resident and commercial additional \$.04 / pound ad valorem.

The anticipation was that results from these studies would provide implementable improvements in hatchery operations that would minimize risk to natural origin fish.

Unfortunately, ODFW seems quite content to wait 15 years if needed for final results while doing absolutely nothing in the interim to "maintain consumptive harvest levels" as dictated in HB 3441, April 2013. There is an apparent bias with no concern for harvest abundance in decisions by ODFW management staff. Despite the fisherman footing the bill.

Recently, ODFW in cooperation with the OHRC gave a presentation at Port Orford, Oregon, on the results of the Elk River study. The excessive number of hatchery fish spawning in the river was discussed as well as statements on the harmful effects this was having on the natural origin population. Keep in mind, this has been going on for forty years. Pushing the numbers with no regard to location, an ODFW statistician assumed a .5 hatchery influence in spawning (one HO to one NO) in the river and utilized the Population Viability Analysis (PVA) formula for some surprising results. He stated that because of all the negative effects of the hatchery fish on the NO fish, **all the salmon would be gone in less than 100 years.** A profound and dangerous statement for the general public to digest. People not familiar with the formula would immediately have concern. I suspect that was the plan. Go back and look at the blue line on the chart above. Despite the presence of hatchery fish spawning in the river, the amount of NO fish has remained constant. If the formula was correct, nearly half the NO fish should have been gone by 2010. PVA has been a useful tool for scientists looking at species that may be in danger of extinction. It only works when the input conditions are expected to be relatively constant for the future and designed to compare different species protection models to determine which model

might be more effective based on similar data input. Several authors have stated that the use of this formula as a stand-alone extinction predictor is unreliable and this use may also be unethical. After all, who can predict the conditions effecting a river next year? Looking out one hundred years and assume conditions to be constant? Give me a break. Also disturbing was the presence of OHRC researchers who did understand the use of the formula listened to the presentation and said nothing.

Concerned about what I heard, I asked for and received the carcass surveys for the past several years and received data for years 2011 through 2017. The data demonstrated the identity of each carcass and the location in terms of the reach of the river where it was found. It is well known that when hatchery fish cannot return to the hatchery, they will usually spawn in the river near the hatchery. A study of this location data proved this was true for Elk River as well. There were also unclipped carcasses found in this location assumed to be native origin (NO) fish. Could some of these unclipped fish be hatchery origin fish? Or hatchery offspring? As one can tell from the chart, hatchery fish spawning in the river has been going on for a long time. Consider that the fish for the hatchery originated from the two streams located across from the hatchery. Long before the hatchery, in low water years, these fish probably spawned in the mainstem whenever they could not reach their spawning grounds in the tributaries. Now these fish are artificially spawned, offspring returned to the river, and genetics controls what they do when they return. The official response was that hatchery numbers were abnormally high and unacceptable. Or was it a genetic response from the last one thousand years?

Above the hatchery up to the falls on the North Fork, the hatchery carcasses identified only accounted for 10.5% of the total carcasses in the years 2011-2017. Ten percent is normally considered acceptable for hatchery fish spawning with natural origin fish. This short study into the details of the carcass surveys alone makes the PVA formula irrelevant. One can only question the official motive.

I have attended several meetings of the OHRC, and it is apparent that the needs of sportsmen do not draw consideration in the research. Anglers in Oregon cannot keep an unclipped fish in many rivers and are limited to catching hatchery fish. Millions of dollars for licenses and tags go into the state funds to have that opportunity. One would think there would be some focus on improving the quality of hatchery fish. The purpose of the OHRC as stated on their website reads as

follows:

The goal of the Oregon Hatchery Research Center (OHRC) is to answer scientific questions related to fish recovery and hatchery programs, including the differences that may exist between wild and hatchery fish, and how to better manage those differences.

Information gained at the Research Center will help answer questions vital to the success of the Oregon Plan for Salmon and Watersheds and implementation of the Native Fish Conservation Policy.

After fourteen years, the center continues to look for differences and not solutions. ODFW finds its own solutions by cutting the number of hatchery fish or fishing opportunity available for anglers based on these differences.

In looking at the hatchery problem, the original source of the anti-hatchery sentiment was the OSU fisheries department. They were among the first to raise the hatchery issues and continue to look for faults in hatchery fish through their publications. These are the same people we sportsmen are hoping will work at the OHRC to improve the quality of hatchery fish so the numbers could be increased, not decreased. How does a biologist erase his anti-hatchery bias and work to improve the quality of hatchery fish? At every meeting, the absence of hatchery fish advocacy is readily apparent. It reminds me of a quarterback on a football team going through the motions but hoping the other team will win.

Consider the policy goals of the ODFW Hatchery Management Plan:

Policy Goals: Foster and sustain opportunities for sport, commercial and tribal fishers consistent with the conservation of naturally produced native fish.

Contribute toward the sustainability of naturally produced native fish populations through the responsible use of hatcheries and hatchery-produced fish.

Maintain genetic resources of native fish populations spawned or reared in captivity.

Minimize adverse ecological impacts to watersheds caused by hatchery facilities and operations.

The policy goals are all about native fish, the policy is not about promoting hatchery fish. It is all about the other team.

At a recent meeting at the OHRC, one board member advocated for the center to do a pilot study with newly designed hatch boxes. He would provide the hatch boxes if the department could provide the eggs. He was asking for only an assessment, for the OHRC to just take a look at it. An ODFW manager immediately responded with a flat no, "There will be no hatchery fish in the

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Alsea." This is a board member making a request, if he cannot initiate research questions, what is the value of the board?

In that meeting, another board member out of frustration posed that question, "What is the role of this board?" An ODFW manager stated that any proposals must first pass the scrutiny of the OHRC director, then go to ODFW for review. Then, if passed, goes on to the board. The role of the board is strictly some minor form of oversight. I seriously doubt that this is what the legislature had in mind. Here is part of what is stated in ORS 498.827:

Establish strategic directions and operational objectives for the Oregon Hatchery Research Center located on Fall Creek, near Alsea, consistent with ORS 496.275 (Salmon resource protection and restoration).

Review and prioritize all research proposals submitted to the Oregon Hatchery Research Center before research takes place and prioritize the research according to whether the research is consistent with the strategic directions and operational objectives specified in subsection (1) of this section and with the activities of the Oregon Hatchery Research Center specified in ORS 498.831 (Oregon Hatchery Research Center).

The ODFW is against any form of hatch boxes. The argument is against placing hatchery eggs into upper tributaries where natural origin fish spawn. In a recent paper, that theory may be flawed, since problems with hatchery fish may be associated with the feed or crowding in rearing ponds. In the hatchery, it is thought that the smolts develop sexual maturity too soon due to the high lipid content of the feed. These issues would be moot when the fry swim away from the hatch box.

Let us consider this hatch box concept for a moment. A family buys one of these hatch boxes and wants to put it in some stream close to where they live. They work with an ODFW representative who helps them and provides the fertilized eggs for the boxes. The department has a chance to work with families on a local project that educates all members of the family about the outdoors, the plight of the anadromous fish and habitat. Doesn't this outweigh the limited influence, if at all, on the natural origin fish? This introduction to the fishery and the department could be a life-long positive memory for the participants. It is ironic that the Native Fish Policy states that when NO fish populations are down, it is ok to supplement with hatchery fish. If there was a potential for great harm, why would it make that statement?

In the absence of advocacy for the improvement of hatchery fish for the sports and commercial fishing industry, combined with

the recent explanation of the board's role, the future of our fishing looks bleak. Already, a group is lobbying the commission to approve only catch and release for natural origin steelhead and no hatchery fish on south coast rivers and streams. Where does that leave the sports and commercial fishermen who are footing the bill for the department?

Hatcheries are allocated a defined number of eggs for fish production each year. Much fewer than in years past. So, what to do when more fish return than needed? Kill them all is the plan. Here on the south coast, when the steelhead egg allocation has been reached, ODFW goes to the hatchery and kills all the remaining fish by directive. These are fish that can return again as much larger fish a year later. Here are your trophy fish that you want to catch and keep. Local biologists are on their own on this, since most of the local volunteers refuse to cooperate in the killing and waste. Another question, do repeat spawners carry an advantageous gene that made this opportunity possible? Does this outweigh the hatchery origin issue?

Recently, when ODFW wanted to kill all the remaining fall Chinook at a local hatchery instead of turning them loose or spawning them, volunteers at that hatchery blocked the path of the biologist. From there, it downgraded into an altercation. The public is upset. Raising these fish was paid for with taxpayer dollars. **These fish have value.** We buy licenses and tags to catch them and random killing by the state is not acceptable. In addition, most hatcheries are dependent on volunteers, this policy threatens to drive them away.

I write this article not out of dislike for ODFW or the OHRC, but out of concern that the direction of both are not in sync with the expectations of the communities who pay for the opportunity to fish. No one wants to see problems with the natural origin fish or the continued reduction in hatchery stocks. Perhaps it is time to look for solutions based on the individual quality of hatchery fish. Currently there is no measurement for the reproductive fitness of a hatchery fish versus a natural spawning fish from the same watershed. So, there is no baseline in which to start a recovery process. In Oregon, not all is equal from hatchery to hatchery, for example, some use brood stock, some do not. The fitness of hatchery fish needs to be compared to the fitness of the natural spawning stock within the same watershed, as the origin or quality of the natural origin fish may be better in some watersheds than in others. Once a system is developed, then improvements can be measured. Is it possible to have a hatchery fish that is as fit as the natural spawning fish in the same watershed? How

would you know if there is no system of measurement? Again, where are we now in the river near you? It is the hope of all anglers to have quality fish aplenty and be secure in knowing the future for our children catching a salmon or steelhead is a certainty. That includes taking a fish home to show mom. But without a system of measures, there is no way of knowing how to achieve that goal. As it stands now, the direction seems to be through politics leading to elimination of all hatchery fish. Is it time to take a new look at the purpose and structure of the OHRC? If I were to rewrite the purpose of the OHRC, it might in part look something like this:

The goal of the hatchery research center (OHRC) is to answer questions related to hatchery fish and the improvement of hatchery programs.

Demonstrate advocacy for hatchery fish as a valuable resource to Oregonians.

Define baseline assessments for each watershed.

Assist ODFW in setting goals for hatchery fish improvement based on those clearly identifiable measurements.

Conduct research to set goals for individual hatchery production based on 1-3.

Participate in statewide hatchery production and identify the research problems as they become evident from hatchery managers, staff and volunteers.

Research and advocate the positive relationship of the hatchery fish with the native origin fish to ensure the quality and maximum productivity of both.

Determine the point when the quality of a hatchery fish is equivalent to the native fish from the same watershed.

How to proceed is not rocket science. Identify in writing all the differences between hatchery and natural origin fish as related to reproductive fitness. Determine a baseline of differences for the hatchery fish and natural origin fish within each river system. Initiate a plan based on performance measures. Through performance measurement, identify when the goals of the plan have been achieved. In other words, when the differences between the hatchery origin fish and the native origin fish no longer matter.

Hatcheries and hatchery fish have been a part of Oregon history for 150 years. Oregon is never going back to the natural habitat that existed when the human population numbered in the thousands. That does not mean that we do not continue to make this state a better place for fish and families alike. Is it time for a paradigm shift in thinking? A time to embrace this important resource and its value to those of us (sport, commercial or tribal) who fish, have fished or hope for a future of fishing?

