# THE OSPREY

*The International Journal of Salmon and Steelhead Conservation*

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# Lower Columbia River Pound Nets

## Adapting fish traps to reduce bycatch mortality

## *ALSO IN THIS ISSUE:*

*• GREAT LAKES WILD STEELHEAD RESEARCH • NORTH UMPQUA RIVER: GUARDING STEELHEAD AND A PROBLEMATIC DAM • LETHAL COLUMBIA AND SNAKE RIVER WATER TEMPERATURES*

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Cover Photo Courtesy NASA

**THE OSPREY**



***Letters To The Editor***
*The Osprey* welcomes letters to the editor. Article submissions are welcome but queries in advance are preferred.

The Osprey
69278 Lariat
Sisters, OR 97759
jyusk@bendcable.com
(541) 549-8914

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# Solving the Wild Fish Bycatch Problem

by Jim Yuskavitch

The cover story for this issue of *The Osprey*, "Commercial Fish Traps for Bycatch Mortality Reduction in Salmon Fisheries" by Adrian Tuohy of the Wild Fish Conservancy puts forward a potential solution for addressing the challenge of maintaining commercial salmon fishing in mixed stock fisheries while protecting wild fish — especially stocks listed under the Endangered Species Act.

The idea is to adapt traditional Native American fish traps to commercial fisheries by using them in place of gill nets. The fish are captured live in these "pound nets" that refer to the trap or "pound" in which they are caught. Then, the wild salmon and steelhead can be separated and released unharmed while hatchery salmon are retained for harvest.

The traditional commercial gill net fishery on the lower Columbia River, where the experimental fish trap was operated, has long been controversial since they are non-selective and result in high bycatch mortality. Resentment, especially from recreational Columbia River salmon anglers, has often run high against the gill netters. Over the decades there have been a number of unsuccessful attempts to ban commercial gill nets on the lower Columbia River either legislatively or through ballot measures. A more recent strategy is to develop hatchery-based terminal fisheries specifically intended for gill net harvest.

In the Columbia River, which includes mixed-species runs that are often made up of both hatchery and ESA-listed wild salmon and steelhead, fishing seasons — both recreational and commercial — are largely driven by the incidental catch of protected wild fish.

Each run of wild fish has a maximum incidental catch mortality quota, so when a hatchery run is mixed with a wild fish run, the season is shut down when that incidental take quota is reached.

*Reduced wild fish bycatch mortality means longer recreational and commercial fishing seasons and greater harvest of hatchery fish.*

Commercial fishing typically has a higher rate of incidental bycatch mortality and reaches the quota faster than recreational fishing. Developing practical and cost effective ways to commercially catch fish with a lower wild salmon and steelhead bycatch mortality rate not only allows more wild fish to reach their upriver spawning grounds but also permits longer seasons for both commercial and recreational fishers along with a greater harvest of hatchery fish. It's a win-win situation all around.

Finding ways to reduce bycatch mortality and overall waste of fish will help other river systems besides the Columbia.

On the Fraser River system in British Columbia, for example, First Nations chum salmon gill net fisheries that focus on the harvest of females for roe results in the waste of large numbers of male chum. In addition, bycatch mortality is also a key factor in the decline of wild steelhead in the Fraser River basin, and on the Thompson River in particular.

Eventually developing better commercial fishing methods and putting them into widespread use will go a long ways to protect wild salmon and steelhead in mixed stock fisheries.

# How The Osprey Helps Wild Fish

*The Osprey* has been bringing the latest science, policy, opinion and news stories to its readers supporting wild Pacific salmon and steelhead conservation and management for 31 years. But we are much more than a publication that you subscribe to because of your own interest in wild fish conservation. The funds we receive from our subscribers allows us send *The Osprey* to wild fish conservation decision-makers and influencers including scientists, fisheries managers, politicians and wild fish advocates.

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*Jim Yuskavitch*
*Editor, The Osprey*

# Major Misses in BC and Alaska

By Pete Soverel

When deciding on a regular column to be part of all future issues of *The Osprey*, we settled on Hits & Misses with the understanding that "Hits" would address developments favorable for wild salmon and steelhead, and "Misses" to identify policies, actions and outcomes calamitous to continued persistence of wild salmon and steelhead. Over the two years since the re-launch of *The Osprey* we have sought good news to include in this column. It has been hard to sustain. Excepting isolated glimmers of hope, the rare good news is often counterbalanced by bad news, unwise policies, circumvention of the law and so on that often accompanies the good news just cited — a process assaulting our hopes for a brighter future and confidence in the integrity of persons and institutions. Almost without exception hopeful policies are subverted from the get go by the very agencies entrusted and charged with the responsibility for husbanding our natural resources and heritage. Consider these examples for flavor:

## Elwha and Klamath Dam Removals

### Hit

Fish blocking dams have or will be torn down.

### Misses

Fish recovery plans are hatchery based and doomed to failure, thus squandering billions of dollars in public funding for programs that demonstrably hinder fish recovery. With much ballyhooing the actual or promised appropriation sums of public money for removal of mainstem are staggering — $350 million for the two dams on the Elwha River and $1 billion-plus for the planned removal of three dams on the Klamath. These removals were to result in the restoration of wild steelhead and salmon runs to these storied rivers. Not content to trust the fish to sort out how to best utilized newly opened habitat, massive hatchery interventions were incorporated into "recovery" plans for both river systems

Before implementing a similar, hatchery-based plan for the billion-dollar Klamath project, it seems reasonable to consider how that model has worked out on the Elwha. In short: not so hot. Hatchery "assisted" Chinook salmon and winter steelhead populations have not colonized the pristine habitat upstream of the removed dams, which comprise 97% of the watershed, or have shown any significant increased abundance. Natural origin summer steelhead — all wild with no hatchery overlay — on the other hand, have responded most dramatically, increasing from a zero baseline to current, and still expanding, population of at least 500 to 600 annual returning fish — all naturally adapted to their environment and all for free!

The simple explanation is that senior fisheries managers at the federal, state, local and tribal levels don't trust the fish to know with whom they should breed, how to utilize newly opened habitat and so on. The Klamath recovery plan is a rerun of the unsuccessful hatchery based Elwha recovery plan on a spectacularly expanded scale. Not only will the Klamath continue to be flooded with maladapted hatchery steelhead and Chinook, unlike the Elwha dam removal it won't even remove all the dams. So we are going to spend a billion plus dollars to tear down the dams while agencies continue to contaminate the river with hatchery stocks that will impede recovery of wild populations. In other words, it is a recipe for certain failure of the recovery plan, which is doomed to biological failure. Does it make sense to spend billions and then implement a recovery strategy that has already failed on Elwha?

For example, each spring the Washington Department of Fish and Wildlife releases about five million Chinook salmon smolts, typically in two pulses over a day or two each in May and June coinciding with the big spring tides. Hatchery fish know nothing about changing water flows associated with these big spring tides. As a consequence, many thousands are stranded when the tide goes out. Not surprisingly, thousands of marine creatures such as eagles, seagulls, grebes, murrelets, cormorants, seals, sea lions, otters, raccoons, minks, crabs, and predatory fish have also figured out that the Elwha estuary is a cheap dining spot for a few days each spring. I am skeptical that many of these hatchery releases make it to their high seas nurseries so it should come as no surprise that a vanishingly small percentage ever return as adults.

## Snake River B-Run Steelhead Fisheries

### Hit

Under threat of a lawsuit and in the face of disastrously low wild steelhead returns, Idaho Fish & Game closed amost all wild steelhead fisheries. With dam counts at or near all time lows, the agency appeared to act in a responsible manner.

### Misses

It turns out the IDF&G action was a ruse. Once sufficient numbers of hatchery fish had been captured for broodstock, the fisheries were reopened, including fisheries that would intercept wild B-run steelhead whose total escapement to thousands of miles of excellent to pristine habitat probably totaled less than 500 fish. It is past time to upgrade the Endangered Species Act listing of Idaho steelhead from threatened to endangered, especially B-runs, which are teetering on extinction and exposed to intense recreational fisheries in their natal waters. Washington and Oregon conservation closures remain in effect even though virtually all Idaho steelhead have already swum past. Go figure.

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## Fraser River Interior Steelhead

### Unmitigated Miss (An Insult Really)

As all steelheaders know, Thompson and Chilcoltin steelhead populations are teetering on the brink of extinction, now numbering less than 200 altogether down from around 30,000 or so in the 1950s. In spite of incredibly low returns, which have diminished rapidly towards extirpation, Canadian authorities refuse to list the stocks as threatened. Instead of listing and providing legal protections. The Department of Fisheries and Oceans substituted a pie in the sky recovery plan without any legal teeth. The outcome is predictable — near term extinction.

## Pebble Mine, Alaska

### Galactically Stupid Miss

In the redo of the Environmental Impact Statement for the Pebble Mine at Alaska's Bristol Bay, (recall that the first EIS came back concluding that the mine could not safely be built), the US Army Corps of Engineers confirmed that the environmental review process would not address potential collapse of the retention dams that include 2,800-acre storage lakes despite recent instances of retention dam failures in Brazil and British Columbia. A five-year-old can predict the consequences of such a failure in the headwaters of Bristol Bay salmon streams.

It is mystifying how agencies responsible for safeguarding the public and public interest can simply refuse to do what is right and sensible. This action reminds me of Major General Julian Schley of the US Army Corps of Engineers testimony before Congress that he was not paid to be a nursemaid to fish in response to public objections to the planned construction of Bonneville Dam at the head of tide on the Columbia River.

Wouldn't it be nice if the Pebble Mine permit the Environmental Protection Agency is certain to issue would require its owners to relocate their headquarters and housing just down stream of the retaining dams?

# LETTERS TO THE EDITOR

## Another Side to the Story?

Dear Editor,

Found a copy of your May 2019, Issue #93, of *The Osprey*. In "Hits and Misses—Chair's Corner, BC Misses Big Time, 2018-2019 Ecstall River, British Columbia Fiasco" you roast both fishermen and DFO over limited fishing allowed for Ecstall River Chinook. You refer to the fishermen involved as being "illegal fishers" and being "apprehended" and rounded up in a "helicopter raid" after stating they were using "angling permits" and had received " DFO authorization" to survey Ecstall Chinook. Seems to me there might be another side to the story. In late July, 2000-2010, I, along with several fishing buddies, drove with my sled to Terrace, BC to fish the Skeena river system for the world class Chinook fishing available there (1,248 miles, one way). On two different occasions, during our fishing trips to the area, we took the opportunity to make the 40+ mile trip across the Skeena estuary and up the Ecstall estuary and river for memorable two day fishing adventures. The area is extremely remote and both times we were there the fishing was open to catch and release only. There was an upper deadline with only several miles of river open to fishing. Just below the fishing deadline there were several very basic one room structures on one side of the river and a fishing tent camp on the other side (I believe it belonged to Komoham Lodge). The fishing was good and the fish were gorgeous. On one of the trips we were the only fishermen on the river. There was a DFO employee staying in one of the structures taking samples from Chinook for what he explained were for DNA analysis. He gave us a type of punch that would punch out a small sample of the dorsal fin and deposit the sample in the hollow handle. Before releasing a fish we would take a sample as he instructed us and before we left we returned the punch containing the samples to him. We thought it was great to have a role in the research on these special fish. Isn't it possible that DFO actually wanted some limited research or survey done on the fish in this remote, hard to reach river and Komoham Lodge had the logistics and knowledge to accomplish it with no expense to DFO. I'm guessing the "rich Americans" leave a fair amount of their dollars in the local economy and with DFO for all their non-resident licenses and permits. I know we always did.

Bob Spelbrink
Siletz, OR

*Pete Soverel, Chair, The Osprey Management Committee, replies:*

*Dear Mr. Spelbrink,*

*Thank you for your comments on my report (*The Osprey, *"Hits & Misses") of illegal Chinook fishing on the Ecstall River by high profile, wealthy American anglers hosted by Komoham Lodge. Let's be clear: your angling on the Ecstall occurred during an open season for Chinook. The operation I reported on occurred during a closed season (emergency closure due to low Chinook returns). The program was conducted in secret. DFO stonewalled/dissembled when queried on this highly unusual program: refused to provide copies of permits; justifications, names of officials who purportedly authorized the program; data collected; supervision by DFO and so on. Local reaction was outrage with the Skeena and tributaries closed to recreational angling while a group of rich Americans, arriving in a squadron of private jets, fished the closed Ecstall while Canadians sat on the shore. Local DFO officials kept the program secret. When locals raised pointed questions about the program, DFO dispatched an enforcement team which closed the program down. DFO has refused to provide any response/justification for the program, identification of officials who purportedly authorized the program, provide copies of any data collected/analyzed, made no effort to enlist support from local Canadian conservation organizations (Steelhead Society of BC, Skeena Wild, Sport Fishing Advisory Group, local tribal groups, etc.).*

# Commercial Fish Traps for Bycatch Mortality Reduction in Salmon Fisheries

By Adrian Tuohy

Wild Pacific salmonid decline south of Alaska has been driven in large part by poor harvest and hatchery management since the late 1800s, which has mostly failed to recognize the ecological (or 'place-based') needs of unique salmonid populations (read more from Gayeski et al. 2018 at https://doi.org/10.1002/fsh.10062). Prior to the arrival of Europeans to the region and the industrial revolution, First Nation cultures effectively managed wild salmon harvest by waiting for the fish to return to natal rivers and streams and harvesting in moderation, thereby ensuring appropriate escapement of genetically distinct populations. Salmon were often harvested in or near rivers of origin with passive gears such as fish traps, weirs, or reef nets, enabling selective harvest of robust populations and successful release of non-target stocks. Since the 20th century, salmon management has become increasingly reliant on hatchery production and has allowed for intensive harvest farther from rivers origin with non-selective gear-types. Consequently, this has reduced genetic diversity and enhanced mixed-stock harvest and bycatch mortality to indiscriminate wild populations—many of which are now listed under the U.S. Endangered Species Act (ESA).

As climate change accelerates and other anthropogenic threats (such as habitat loss and dams) continue to threaten the diversity and abundance of wild Pacific salmonids, there is a growing need to reconsider the conventional fisheries management paradigm of hatchery production and non-selective mixed-stock harvest if wild populations and constrained coastal fisheries are to be restored. Our recent paper titled "Survival of Salmonids from an Experimental Commercial Fish Trap" (available for download at: https://doi.org/10.1002/fsh.10292) demonstrates the viability of modified fish traps for in-river selective harvest of hatchery-origin salmon (or other robust wild stocks) and reduction of bycatch mortality. Through paired mark-recapture, we estimated the post-release survival effect from an experimental fish trap over a 400-km migration in the lower Columbia River, WA. Relative survival ranged from 0.944 (($\widehat{SE}$) = 0.046) for steelhead (*Oncorhynchus mykiss*) to 0.995 (($\widehat{SE}$) = 0.078) for Chinook salmon (*O. tshawytscha*). These published results and findings from our most recent research season on the lower Columbia River (currently in-preparation for peer-review) support use of fish traps for selective harvest and a return to the placed-based management approach historically exemplified by Pacific Northwest First Nation cultures. Ultimately, use of passive fishing techniques and placed-based management strategies may prove to be a win-win situation for fishers, threatened salmonid stocks, management, and the environment.

> *Use of passive fishing techniques and placed-based management strategies may be a win-win for fishers, threatened salmonid stocks, management, and the environment.*

**What is a Fish Trap?**

The fish trap was a historically effective indigenous and commercial gear used in Pacific salmon fisheries. First Nations constructed traps of wood and stone in rivers and streams, harvesting salmon sustainably for thousands of years. Europeans adapted the First Nation salmon trapping technique, incorporating innovations from other regions including the Great Lakes and Scandinavia. Demonstrating considerable efficiency in lower Columbia River salmon fisheries in the 1880s, commercial fish trapping rapidly expanded to salmon fisheries on the Washington coast, Puget Sound, and Alaska where the tool became favored by large salmon canning corporations. The fishing method was eventually banned in Washington State and Oregon in 1934 and 1948 respectively, primarily due to political reasons and the gear's perceived contribution to salmon decline in unregulated fisheries. Contrary to the specified intent of the ban, resource management agencies (putting their faith in the unproven potential of hatchery production) failed to reduce total mixed-stock fishing effort and meet biologically acceptable escapement goals. Shortly after the elimination of fish traps, Columbia River and Puget Sound salmon fisheries collapsed.

Consisting of a series of pilings, stakes, or anchors and attached web fences that extend from the high-water mark to the riverbed, fish traps passively funnel returning adult salmon from the shoreline 'lead' (positioned perpendicular to shore) to a maze of walls and compartments. Adult salmonids swim against the current, entering progressively smaller compartments of a fish trap ('heart', 'spiller', and 'live well' respectively). The final compartment has dimensions appropriate for operators to sort the catch for harvest or passive release with little to no air exposure and handling. Salmonids remain free-swimming within a fish trap and selected mesh dimensions minimize or prevent entanglement altogether.

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## Objectives

The purpose of our research was to design, construct, and evaluate the performance of a modified commercial fish trap for selective in-river harvest and reduction of wild salmonid bycatch mortality (for more information, see the full-length publication at https://doi.org/10.1002/fsh.10292). Specifically, objectives were to estimate and compare immediate and post-release mortality of wild Chinook salmon and steelhead from an experimental fish trap relative to commercial gears that were previously evaluated in the lower Columbia River through paired mark–recapture. Given precise and unbiased estimates of catch composition and bycatch mortality for a fish trap, it is our hope that resource management agencies may consider implementing alternative commercial gear and returning to a placed-based management approach for wild salmonids. Along with hatchery reform and habitat protection/restoration, we believe responsible harvest reform will contribute to wild salmon recovery and revitalization of coastal fisheries.

**Columbia River fishermen harvesting salmon from a trap in the early 20th Century. Photo courtesy Wild Fish Conservancy**

## Methods

Partnered with a long-time lower Columbia River commercial fisherman, the Wild Fish Conservancy constructed Washington State's first commercial fish trap since 1934 in the Cathlamet Channel of the lower Columbia River, WA (rkm 67). The trap consisted of a lead (~90 m), jigger, heart, tunnel, and spiller; the dimensions and designs were inspired by blueprints contained within the legal deeds of traps that had been constructed in the same location a century ago. Mesh dimensions and materials were carefully selected to minimize entanglement of fish and drag within the water column. All fine-mesh nets were secured to untreated wood pilings from the riverbed to roughly 1 m above the high-water mark. An aluminum marine mammal deterrent gate was installed at the entrance to the heart to prevent entry of large mammals to the trap while enabling fish passage.

*Along with hatchery reform and habitat protection/restoration, we believe responsible harvest reform will contribute to wild salmon recovery and revitalization of coastal fisheries.*

The spiller and tunnel were engineered for deployment and retrieval to and from the riverbed with line and pulley. Weights at each corner of the compartment enabled gravity to draw the mesh flush to the riverbed during each soak period. A solar-powered electric winch was designed, built, and installed to haul the bottom mesh of the spiller upward through the water column to the shallows at the completion of a set, allowing captured fishes to be accessed swiftly from the depths of the river with minimal stress. We constructed a pontoon dock equipped with a live well adjacent to the spiller, enabling fish transferred from the spiller compartment with line and pulley to be sorted by fishers or biologists. Within the live well, all fish remained free-swimming and submerged within continuously circulating river water. With the completion of a set, a door to the live well was opened, allowing captured fishes to be released with minimal handling (view a short video on the fish trapping process at https://vimeo.com/310697782).

WFC operated the gear daily from August 26 through September 27, 2017. We counted, measured, and identified all fish by species and origin (hatchery or wild, as determined by the absence or presence of the adipose fin). All Chinook salmon and steelhead were scanned for Passive Integrated Transponder tags. If PIT tags were detected, codes were recorded. In the absence of an existing PIT tag, adult Chinook salmon and steelhead were PIT tagged in the peritoneal cavity. In addition, non-lethal genetic samples were taken from Chinook salmon and steelhead to analyze stock-composition. All fish were then passively released from the live-well, and the next set was initiated.

We used the statistical approach of paired mark–release–recapture to estimate relative post-release survival of Chinook salmon and steelhead from the fish trap to upriver detection points. Similar to prior alternative gear studies in the lower Columbia River, control and treatment groups of Chinook salmon and steelhead were PIT-tagged and released for detection at mainstem dam PIT tag arrays. This was done to control for handling and PIT-tagging ef-

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fects on adult salmonid survival, thereby isolating the commercial treatment effect in analysis. The treatment group consisted of Chinook salmon and steelhead that were lifted through the water en masse by the winch and spilled from the pound-net spiller to the live well. This process of capture mirrored how the gear would be operated in a commercial setting (as designed in 2017). The control group was unexposed to potentially damaging commercial capture procedures, and free-swimming fish were sourced one at a time with a rubberized dip net at the project site. This control sourcing technique was likely less stressful than procedures used in previous Columbia River commercial gear studies, during which control group fish were trapped at the Bonneville Dam adult fish passage facility, dip netted, PIT-tagged, trucked downriver to the test fishing location (rkm 225), and transferred from a truck into the water to repeat the upriver migration for a second time. Consequently, survival in our study is likely biased lower relative to prior studies.

A pair of Cormack (1964) single release–recapture models was used to estimate post-release survival of treatment Chinook salmon and steelhead relative to controls between the capture and release site (rkm 67) and various upriver detection points to McNary Dam (rkm 470). Essentially, this survival estimation technique (in its most simplistic form) compared detection rates of the treatment group to the control group (i.e., Relative Survival = Streat/Scontrol; see the full-length publication at https://doi.org/10.1002/fsh.10292 for further detail). This mark-recapture methodology was similar to that of prior commercial gear studies conducted in the lower Columbia River; however, it must be noted that capture/release sites differed between studies. The tag-and-release locations for seine and tangle-net studies were between rkm 209 and 233 of the Columbia River. Our experimental trap was located at rkm 67. As a result, survival in our study was measured over a greater distance and duration.

**Experimental commercial fish trap in the lower Columbia River, WA in 2019. Photo courtesy Wild Fish Conservancy**

## Results and Discussion

Analyzing bycatch survival and catch composition, our study demonstrated that the experimental trap effectively targeted hatchery-origin Chinook and coho salmon (*O. kisutch*) while dramatically reducing bycatch mortality rates relative to conventional commercial fishing gears. During the 2017 study, 7,129 salmonids were captured, including 2,670 Chinook salmon (47.9% adipose fin-clipped; 16.3% jack salmon), 3,501 coho salmon (52.4% adipose fin-clipped; 16.4% jack salmon), 921 summer steelhead (80.9% adipose fin-clipped), 29 resident/residualized rainbow trout (*O. mykiss*) (77.8% were adipose fin-clipped), and eight unidentified salmonids *Oncorhynchus spp*. Analyzing Chinook salmon survival to McNary Dam (400 km upriver migration; 13 day median travel duration), the fish trap outperformed all other gears tested on the lower Columbia River, with relative survival estimated at 0.995 (CI (0.924 ≤ (τ cumulative ʃ ≤ 1.071) = 0.95) (Table 1). For steelhead, relative survival from the fish trap to McNary Dam was estimated at 0.944 (CI (0.880 ≤ (τ cumulative ʃ ≤ 1.012) = 0.95). These results were achieved despite a significant tagging location dis-

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| Gear | Chinook Survival | Steelhead Survival |
|---|---|---|
| Gill Net | 0.520 | 0.522 |
| Tangle Net | 0.764 | 0.764 |
| Beach Seine | 0.750 (0.710-0.790) | 0.920 (0.820-1.000 |
| Purse Seine | 0.780 (0.720-0.850) | 0.980 (0.930-1.000) |
| Fish Trap | 0.995 (0.924-1.071) | 0.944 (0.880-1.012) |

Table 1. Relative survival estimates from five commercial gears studied in the lower Columbia River and associated 95% profile (if available, in parenthesis). Table adapted from Tuohy et al. (2019), available at https:/doi.org/10.1002/fsh.10292.

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advantage relative to prior Columbia River gear studies (operations at the trap occurred nearly 150 km downriver of seine and tangle net evaluations).

Although results from our 2017 study were a dramatic improvement over conventional commercial gears, the fish trap (unlike most other existing gears) has great potential to be further modified to improve bycatch survival and capture efficiency. Since the 2017 study, we have made design changes that have achieved 100% survival of released salmonid bycatch. Today, the line and pulley electric winch system from 2017 is no longer necessary for hauling the mesh bottom of the spiller/tunnel complex to the shallows for sorting of the catch. A passive capture design was implemented in 2019 by adding a new upstream tunnel to the existing spiller compartment. This upstream tunnel passively funnels migrating fishes individually from the spiller to the shallows of an attached upstream live well, eliminating minor air exposure, handling, crowding, and net contact associated with the prototype commercial process. Evaluating potential benefits from the modified passive capture design through two separate survival estimation techniques in 2019 (mark-recapture and net-pen holding), the modified trap demonstrated no detectable effect on sockeye (*O. nerka*) and coho salmon release survival and a significant improvement over the 2017 prototype design. These preliminary results provide further evidence that the gear may be effective in addressing wild salmonid bycatch mortality and existing commercial fishery constraints. Further research investigations with the modified passive trap design are now tentatively scheduled in new fluvial locations in Oregon and British Columbia for 2020-2021.

***If regulated and managed appropriately, a transition from conventional gill nets to modified fish traps has the potential to benefit wild salmon, orcas, and fisheries.***

If regulated and managed appropriately to meet the biological needs of unique salmonid populations, a transition from conventional gill nets to modified fish traps (and other selective gears including reef nets, fish wheels, and shallow seines) has potential to benefit wild salmonid recovery, orca whale recovery, and First Nation, commercial, and recreational fisheries. Use of passive, selective gear in or near rivers of origin can help to reduce wild salmonid bycatch mortality in mixed-stock fisheries, maintain age and size structure of harvested fish populations, alleviate fishery constraints, and improve the quality and marketability of seafood products. Commercial fishing operations could be paired with low-impact data collection by resource management agencies using fish traps to better understand fish run timing, abundance, behavior, and ecology. Although further research is necessary for the gear (i.e., new river locations, new designs, marine mammal interactions), results of our work show that modified fish traps have potential to nearly eliminate salmonid bycatch mortality for the benefit of the environment, fisheries management, and coastal fishing communities.

**Fish traps allow hatchery fish to be retained while wild fish can be released unharmed. Photo by Jim Yuskavitch**

*Adrian Tuohy is a biologist and project manager at Duvall, Washington-based Wild Fish Conservancy. To learn more about selective gear research for salmonid recovery, please visit Wild Fish Conservancy's website at www.wildfishconservancy.org and read the full-length publication in the journal of Fisheries:*

Tuohy, A.M., Skalski, J.R., and N.J. Gayeski. 2019. Survival of salmonids from an experimental commercial fish trap. Fisheries. 44(6): https://doi.org/10.1002/fsh.10292.

# Response of a Heavily Exploited Great Lakes Steelhead Population to Reduced Harvest

By Brian Morrison

Steelhead (*Oncorhynchus mykiss*) display a broad range of life history strategies, which enable the species to tolerate transfer into unoccupied but suitable habitats (O'Connell et al. 1997). Although steelhead are an important species for recreational angling in the Laurentian Great Lakes, relatively little ecological or evolutionary research has been done on this species in Ontario. Since this species has been present in Lake Superior for over a century, it provides an excellent system in which to study responses to transplantation. The initial stocking program in Lake Superior commenced in 1883 and likely utilized California's McCloud River stock (Sacramento River Drainage) (MacCrimmon and Gots 1972). Subsequent stocking events consisted of stocks originating from Redwood Creek (California), the Willamette and Rouge drainages in Oregon as well as drainages from the Olympic Peninsula and the Columbia River in Washington (Krueger et al. 1994; Crawford 2001). By 1905, it was believed that nearly all tributary streams flowing into the North Shore of Lake Superior had spawning populations of steelhead (Crawford 2001). Along much of the Canadian shoreline of Lake Superior, steelhead populations were allowed to thrive and adapt with relatively little disturbance. This is virtually the only large area in the Great Lakes where steelhead have been allowed to adapt to local environmental conditions free from any anthropogenic impacts (e.g. supplemental stocking) (George 2001) as highlighted in the May 2001 (Number 39) issue of The Osprey (http://ospreysteelhead.org/archives/TheOsprey Issue39.pdf).

Lake Superior steelhead have the ability to spawn multiple times, a characteristic that appears to be a prerequisite for optimal recruitment (George 2001). Most healthy populations have repeat spawning levels between 50 and 70 percent for both sexes (Swanson 1985; Clarkson and Jones 1997). Males tend to have higher natural mortality and therefore lower repeat spawning, probably due to multiple spawning events within one season and the period of time spent in spawning streams (George 2001). Males are capable of spawning three or four times in successive years while females commonly have four to six spawning migrations in healthy populations, a trait also exhibited only in wild Kamchatka steelhead populations (Kuzishchin et al. 2002). Low repeat spawning rates suggests high rates of angler exploitation (Clarkson and Jones 1997). Additionally, life history diversity is believed to increase the likelihood of population persistence by spreading risk across life histories (Schindler et al. 2010). Increased population stability via high life history has been demonstrated for steelhead (Moore et al. 2014), along with various populations of Pacific Salmon (Schindler et al. 2010, Braun et al. 2016).

*Along much of the Canadian shoreline of Lake Superior, steelhead were allowed to thrive and adapt with little human interference.*

In the late 1980s, north shore Lake Superior anglers expressed concern that increased angling pressure was causing declining steelhead numbers and that the average size of angler caught fish was smaller (George and Bozak 2007). The steelhead fishery in Lake Superior is primarily focused on the annual spring migration of mature adults to their natal streams for spawning, where adults become more vulnerable to angler harvest. Prior to 1995, a daily bag limit of five steelhead/rainbow trout of any size was in place for Lake Superior and its tributaries (MNRF Unpublished data). Reduction of bag limits to a single steelhead occurred in 1995 on most tributaries with additional size restrictions imposed on urban fisheries located in the city of Thunder Bay, Ontario.

The overall goal of this project is to describe the response (population dynamics and life history diversity) of a heavily exploited steelhead populations when angler harvest is removed or significantly reduced. This includes examining what dynamics drive unexploited or reference naturalized steelhead populations in the Great Lakes, and the underlying importance of life history diversity and repeat spawning levels.

Portage Creek is a 7,600 ha (60km2) watershed that lies on the Sibley Peninsula located on the north shore of Lake Superior draining into Black Bay, approximately 50 km east of the City of Thunder Bay. Portage Creek is considered a moderate-sized stream, with a length of 16 kilometers and an average gradient of 4.5 meters/kilometer.

Starting in the spring of 1994, public access was controlled when the land exchanged between landowners, which meant that angling pressure was nonexistent and therefore minimal exploitation was occurring. This newly restricted access created a tremendous opportunity to study in detail the population dynamics of a steelhead stock in one of the most northerly (and extreme) locations in the Great Lakes. Monitoring is done in partnership with the Ontario Ministry of Natural Resources and Forestry (OMNRF) and the North Shore Steelhead Association.

Data was collected by anglers who worked with OMNRF biologists through a scientific collectors permit, with all angled fish having length, sex, scale sample, fin clip (unique fin each sampling season to validate for tag

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loss), and tagged. A repeat spawning index is used to determine population health for Great Lakes steelhead, with a target of at least 50% of the population being a repeat spawner for the population to be considered healthy (Swanson 1985, Clarkson and Jones 1997). The purpose of this tool is to assess total mortality/survival rates on the adult component of the population. Additionally, this program also demonstrates the value of angler-gathered data and partnerships in fisheries management.

Following the removal of angler harvest from the population, the population rose from an estimated 855 individuals in 1995 to a peak of 2,059 by 2004 (Figure 1). Population size prior to 1995 was estimated based on life history (repeat spawning rates), while the population after 1995 was estimated using Peterson mark-recapture information. It took about one steelhead generation (5 years) before the population really started to grow. From 2002-2008 the population remained above 1,500 individuals. In addition to the increased population size, the repeat spawning rate also increased over time, and remained above 50% all years except two since 2002 (Figure 2). This delay of a generation before the population began to grow suggests that repeat spawners are an important component to help steelhead populations increase in size. Total adult survival in a given year has been documented to be as high as 88% , and individuals spawning up to 10 times in their life, and living up to 12 years old! Based on erosion patterns on the scales, the life history of older fish can generally only be validated through the use of concurrent tagging information. The repeat spawning levels observed are similar or exceeding those documented for wild healthy populations in western Kamchatka. Starting in 2008, the population size started to decline, and this did not correlate with the adult survival rates as expressed in the repeat spawning index. A similar monitoring program on the McIntyre River, which flows into Lake Superior in the city of Thunder Bay showed population increases over the same time period. Sampling was with an electronic counter 1999-2004, and angling (mark-recapture) since 2005 (https://northshoresteelhead.com/project). This introduced a problem to biologists trying to figure out how an unexploited population with exceptionally high adult survival rates could crash, while an adjacent population could be growing.

It was realized that Black Bay is a warmer water bay within Lake Superior that originally contained an extensive population of Percid species — walleye (*Sander vitreus*) and yellow perch (*Perca flavescens*). Following extensive commercial exploitation, a moratorium was placed on commercial harvest of walleye within the bay in 1969 and yellow perch in 2003. This moratorium was extended to recreational anglers in 2008 in the northern waters of Black Bay and tributaries. Concurrently, walleye were stocked into the bay starting in 2003, with index netting showing increases in walleye abundance starting in 2008 and remaining high. The prevailing thought is it's this increase in walleye population that's either predating upon steelhead smolts as they leave Portage Creek and other tributaries draining into Black Bay, or out-competing for food resources as post-smolts. Additionally, there has been a shift in smolt age that does survive to adulthood, with age-1 smolt age comprising approximately 80% of first time (maiden) spawners until 2008, when age-2 smolts increased in proportion, with 100% of the maiden spawning population being age-2 smolts in 2018.

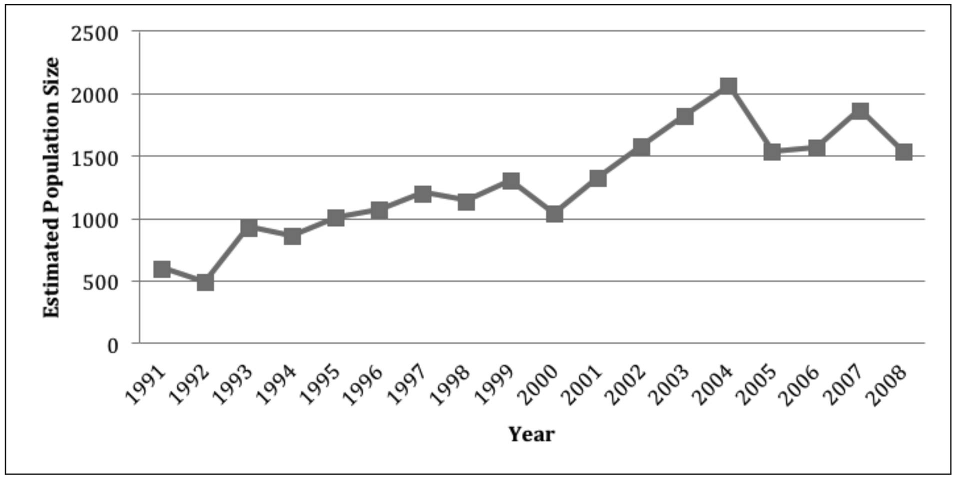


Figure 1. Estimated Population size for Portage Creek steelhead, 1994-2008.

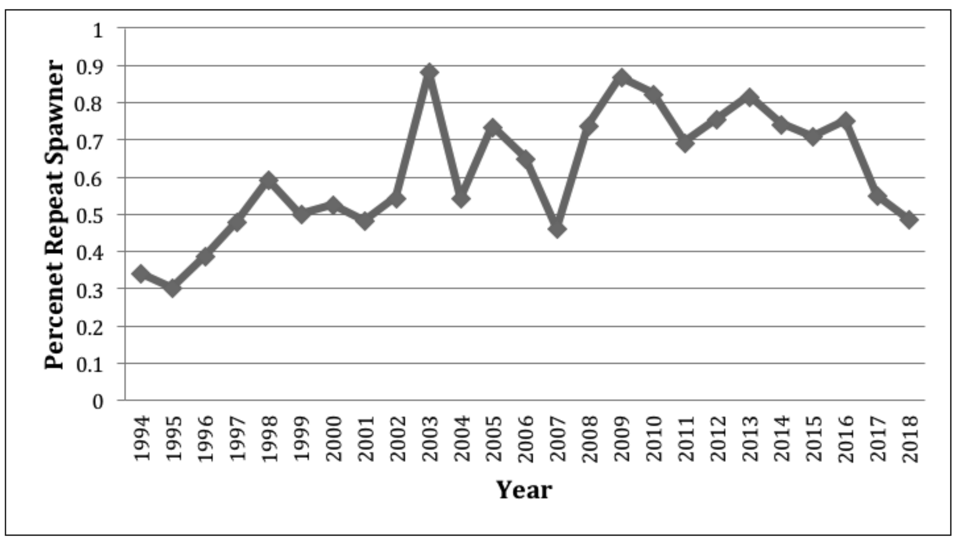


Figure 2. Repeat spawning rate for Portage Creek steelhead, 1994-2018.

The Portage Creek study shows the importance of long-term datasets for monitoring population health. As the population recovered following the removal of angling exploitation, many agencies may have stopped monitoring

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assuming the population was healthy. This shows that unexpected changes within the ecosystem, or with other species can have effects on wild steelhead populations within Lake Superior, and long-term monitoring is critical to be able to determine these changes. Additionally, this study also demonstrates the value of having multiple lines of evidence beyond just population size to help elucidate what changes are occurring, or what life stage they may be occurring at.

Anglers overseen by OMNRF biologists collect all of the data for this study. This form of data collection helps anglers understand the science that is being collected, and they can help understand and champion forward more restrictive regulations to protect populations when required. Furthermore, when anglers are catching tagged steelhead, they also understand how vulnerable they are to angling, both in a single day, in a season, and across seasons. One instance, which is not unique, was when an individual was caught for the first time, sampled (length, scale sample, tagged, and a fin cut off), released, and then caught on the very next cast. Based on data across the dataset, approximately 31% of the population is caught by anglers any given year, and upwards of 50% of the population on high years (Figure 4). This is based on approximately two anglers fishing each day during the spawning migration (~30 days). It's not hard to believe on rivers with high angler effort, much of a steelhead population may be hooked or caught by anglers.

*Brian Morrison is a free-lance fisheries biologist previously working at several Conservation Authorities in Ontario since 2001 in a range of roles and capacities, and has had the fortune to study naturalized and wild salmonids across the Great Lakes.*

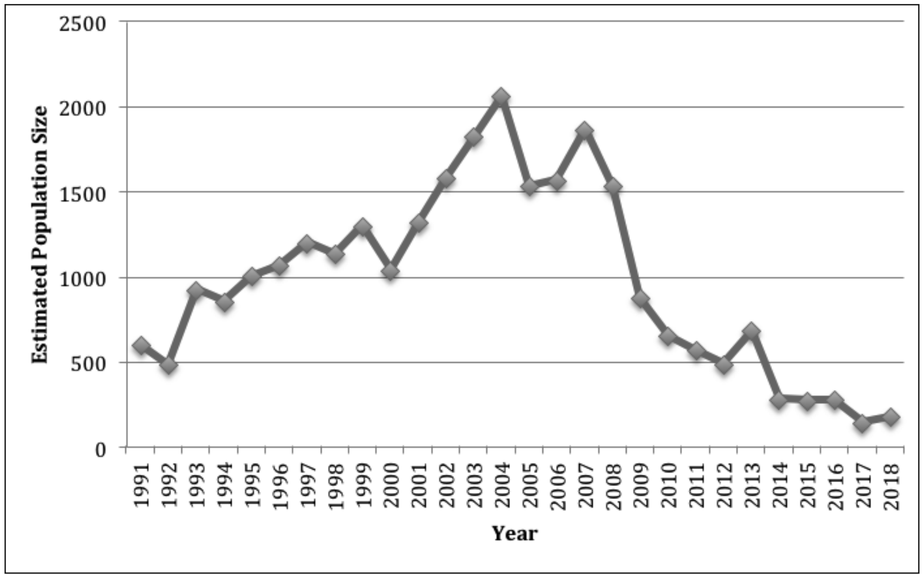


Figure 3. Estimated Population size for Portage Creek steelhead, 1994-2018

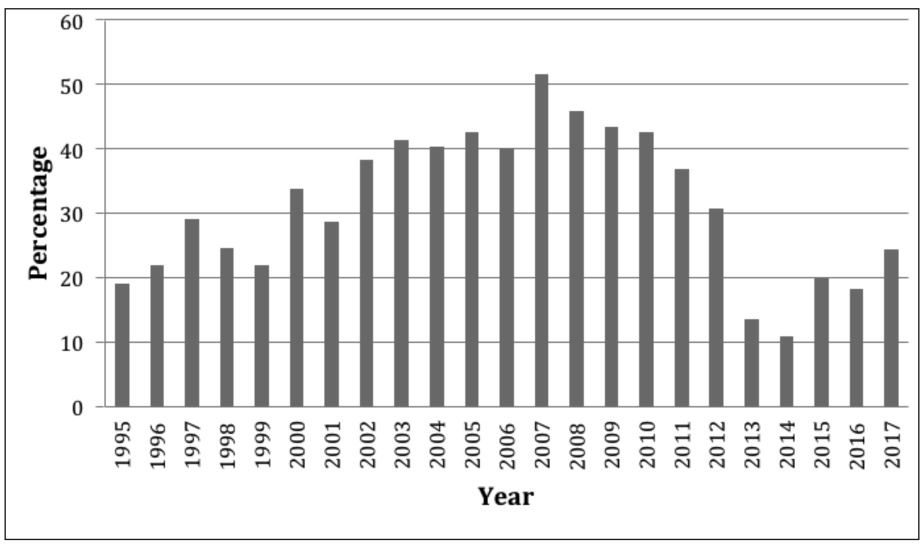


Figure 4. Estimated proportion of population caught by anglers 1995-2017.

# Diversity of a Small Lake Ontario Wild Steelhead Population

By Brian Morrison

The overall goal of this project was to gather quantitative information on the population dynamics and life history strategies of rainbow trout within Wesleyville Creek. This information will be used to help serve as a reference for describing an unexploited small stream rainbow trout population in the Lake Ontario basin.

Wesleyville Creek is a 9.5 $km^2$ watershed located west of the Municipality of Port Hope. It is considered a coldwater watercourse, draining from the Lake Iroquois Shoreline physiographic region. It is also considered one of the healthiest small watersheds on the northshore of Lake Ontario, a unique feature in southern Ontario. Wesleyville Creek historically contained a diverse fish assemblage, dominated by brook trout. Brook trout are still present within the watershed, and have been prioritized for maintaining the native gene pool within this population. Wesleyville Creek also has a lake run population of rainbow trout (*Oncorhynchus mykiss*), coho salmon (*Oncorhynchus kisutch*) as well as a lake run population of white sucker (*Catostomus commersonii*). The entire watershed is in private ownership, which precludes access to anglers. Its small size is also a deterrent for anglers. The stream is frequently cut off from Lake Ontario due to natural processes at the shingle beach at the mouth of the watershed, and is usually only accessible following larger rain events that allows the watercourse to punch through the rocky beach and create fish access (through 10 years of monitoring, I have yet to see a fish actually swim across this shingle beach)

Adult rainbow trout were captured by electrofishing and dip netting. Captured rainbow trout were sampled for fork length, and checked for existing tags/fin clips, sex. Scale samples (N=10) and tissue sample (5 mm circle of fin tissue, dry preserved) were taken from all fish for age and genetic analysis. Various life history traits can be determined from scales, including stream age, lake age, total age and number of times the individual has spawned. The majority of smolts left after two years in the stream, while most adults returned after two years in Lake Ontario to spawn for the first time, which is a common pattern for wild steelhead in the Great Lakes. A maximum of three spawning events have been documented within this watershed. The highest sample size for any year between 2010 and 2017 was 80 individuals, and averaged 39 individuals, while the highest estimated population size

**A shingle beach cuts off steelhead access to Lake Ontario. Photo by Brian Morrison**

through the study period was in 2013, with 520 ± 235 individuals. The run timing is predominantly during the spring, although the odd individual migrates as early as the fall or winter.

Through this monitoring program, several interesting anecdotes were observed while working this steelhead population. This watershed is not stocked, with hatchery plantings occurring in other Lake Ontario watersheds, but the same adult male with an adipose clip was captured within the stream two consecutive years. This is the first time I had observed non-stocking site fidelity, but fidelity to a non-natal stream. Through all years of sampling, one resident male was captured during this study, and was captured the same day a mature male parr was also captured, while both were courting a migratory female. It was the only time either life history pathway was observed within this watershed highlighting the diversity that can develop even within small populations.

There is no angling within this watershed due to private ownership, however approximately 10% of returning adults showed indications of being caught or encountered by anglers, likely the trolling/downrigger fishery in Lake Ontario with torn or missing maxillary. Life history information also indicate poor adult survival, with approximately 56% average mortality across the 2010 – 2017 monitoring period, likely largely the result of this fishery in Lake Ontario (this contrasts to Portage Creek, which averages 70-80% adult survival). This highlights that even if spawning streams are protected, anglers can still have impacts on adult populations when there is high angling pressure outside spawning/rearing watersheds.

There is evidence that size at first maturation within Lake Ontario tributaries is dictated by watershed size. For example, Wesleyville Creek is the smallest watershed with life history information, and it has the smallest size adults maturing (age-4, -5), in contrast, the Credit River is the largest, and had the largest fish maturing at the same ages. Other watersheds are intermediate in size and steelhead matured at sizes in between these two watersheds (Figure 2). Mean summer discharge was used as a proxy for watershed size in this figure. The presence of larger fish at older ages in Wesleyville Creek indicate that these large fish (which tend to be repeat spawning individuals) are able to access the watershed, but there are selective forces that promote smaller age at first maturity. Much of this adaptation across all these watersheds would have occurred largely since the 1970s (approximately 45 years, or 9 steelhead generations) when naturalized steelhead in Lake Ontario would have colonized most watersheds.

# The Steelhead Guardian

## Protecting wild North Umpqua summer steelhead from poachers

By Lee Spencer

*This is a brief and generalized history of the Fish Watch Program and the Steamboat Creek Basin, a subdrainage of the North Umpqua River in southern Oregon. My dog, Maggie, and I are camped next to a pool located some miles up this creek and as I write this, I am very close to being done with the 2019 eight-month season protecting the wild summer steelhead that make use of a pool that serves them as a thermal refuge. We are protecting the steelhead that hold here from human poaching and harassment. I do not protect the fish from otters or other undomesticated creatures.*

The prehistory of the thermal refuge Big Bend Pool on Steamboat Creek — a critically important tributary of the North Umpqua River for wild salmon and steelhead — goes back for at least four thousand years based on two obsidian projectile points found at the site. A Clovis style point that has been dated to approximately 15,000 years ago, was recovered within thirty miles of the pool. Except in the most generalized of terms, the prehistoric period is mostly a mystery.

Undoubtedly, the event of greatest significance during the time cited above — when European-Americans were unknown on this continent — was the creation of Crater Lake when the top of the volcano Mount Mazama blew, resulting in the now water-filled caldera that forms the lake. There are layers of volcanic tephra from this event that are more than fifty feet thick in the Umpqua Basin. With the exception of one other thing, this eruption must have been the most disastrous event to occur to wild Pacific salmon populations during the last 10,000 years.

The exception, of course, is the hatchery-caused disruption to wild Pacific salmon and steelhead populations, which has undermined their evolutionary relationships from southern California to Alaska and beyond. It may be argued that the Mount Mazama eruption undermined no fish population's evolutionary relations, though some may have become attenuated for a while. Hatchery fish introductions on the other hand, have had disastrous evolutionary affects on every wild population they have interbred with.

It was the discovery of the Bohemia Gold Strike in 1858, and later perhaps the manning of local fire lookouts, that are responsible for the first significant use by European-Americans of the middle and the upper parts of the Steamboat Creek Basin. A historic but now defunct trail joins Steamboat Falls—located around forty-six miles from the town of Roseburg—with the Bohemia mines. I have been told that the people who brought supplies to the fire lookouts now and then caught steelhead from Big Bend Pool on Steamboat Creek and smoked them for the persons manning the lookouts.

> *The value of Fish Watch is that it protects the wild summer steelhead of Steamboat Creek. This is of paramount importance.*

In the late 1950s, decisions were made on local, state, and federal levels to decimate all the Steamboat Creek old growth timber they could get at by hook or by crook. This decision led directly to the construction of a system of dirt and gravel roads in the middle and the upper portions of the Steamboat Creek Basin. This road system brought dynamite into the picture both to assist in building the roads and, now and then, to gather wild steelhead that collected in Big Bend Pool every year.

The use of the internal combustion engine also helped to kill Steamboat Creek's ancient forests along with opening them up to poaching on an industrial scale. This industrial poaching earned the pool the name The Dynamite Hole because poachers would toss dynamite into the pool to kill steelhead that sought the thermal refuge of its cool waters in large numbers. Over the last few seasons, hatchery steelhead have made up less the 1% of the fish holding in the pool. This is still too many, but it allows me to say that the fish being protected are for the most part wild and also to point out if poachers took only hatchery fish I, for one, would thank them.

It was still called the Dynamite Hole when I began my solitary seasons at the pool. For now, I believe the name of the pool has become Big Bend Pool. Some folks do continue to call the pool by its previous name, which—if nothing else—is a good reminder of the big trees which are pretty much gone along with the original large numbers of wild steelhead.

Coeval with the removal of the ancient forests and the not-at-all-as-ancient road systems in the upper basin, the Oregon Department of Fish and Wildlife constructed a ladder at Steamboat Creek Falls. These falls are located four miles down creek from he pool.

It is only fair to say here that the ODFW and I do not see eye to eye on anything at all. I have been lied to so many times and with such vigor by this agency that I would not give a single pinch of volcanic tephra for their belief or opinion about anything. When this state agency is mentioned in this article it is so that I can discount them, not to cite them as an information source. I believe that this to be one of the most fundamental truths contained in this article.

To show how stupidly awry the plans

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of the local state hatchery fish agency can be, here is a history of this ladder. In 1957, at approximately the same time as the construction of the road system in the Steamboat Creek Basin, ODFW had the main falls on Steamboat Creek laddered to mitigate for damage that blasting in the are did to the natural fish passage route.

Prior to that, the wild steelhead were able to surmount the falls. The jump that was necessary to get past the falls was a leap of ten feet that originally had a wonderful plunge pool below it to assist the leaper. To show how well thought out this ladder at Steamboat Creek Falls was, it has broken down and had to be reconstructed at least five times during the now seven decades of its existence. It is also unclear how long the ladder blocked fish passage each time it failed due to debris blocking it. Each blockage could have lasted longer than a year given how poorly the wild Pacific salmon are managed now and to all intents and purposes have been since management commenced in the basin of the Umpqua River.

At nearly the same time, spring Chinook and summer steelhead began to become that terrible entity, hatchery fish. As we become more aware, it is now a well-known fact that hatcheries may be the gravest danger by far to sustaining wild fish populations. For what it is worth, I believe the evidence is now incontrovertible that there is no upside to either hatchery fish or hatchery people.

Other factors that were coming into play at about this time where the construction of main-stem dams on the North Umpqua, spinning reels, single-egg hooks, and designation of the fly-fishing only zone on thirty miles of the river that is the primary rearing area for juvenile salmonids.

Complexities have mounted more and more since we—yes, us—began to give thought to improving the circumstances of wild Pacific salmon and, as near as I can tell, we have failed in our every effort to do so.

I am hazy about how the Fish Watch Program got started other than to say that it did and it was a protective response to poaching. It is worth noting here that the entire Steamboat Creek basin was closed to all angling in the 1930s. I think the Fish Watch Program began in 1992 when what is thought to be the last dynamiting of the pool occurred. At this time, many people, including various state and local agencies, corporations, and great-hearted individuals got together and proposed a reward of $15,000.00. No one has collected this reward yet.

Also at this time, piecemeal, individuals began to hide out at the pool with the idea of catching some the poachers and some poachers were caught. I was not involved in these initial adventurous days at Big Bend Pool, not becoming one of the volunteers until 1996. My own involvement with Fish Watch occurred because of an outreach by Dave Hall, Joe Ferguson, and Steve Evens of the Steamboaters, the local advocacy organization for North Umpqua wild steelhead.

I believe it was around 1996 that The North Umpqua Foundation began to offer a per diem of $30.00 to be given to anyone who spent twelve of twenty-four hours at the pool and this time was to incorporate the night time. The per diem has now been increased to $45.00 a day.

It shortly became apparent that it was very difficult to get volunteers for given twelve-hour periods and an effort was made to find someone who could spend more or all of the time at the pool when the adult—but still-maturing—summer steelhead were using it as a refuge from summer temperatures. I became aware of this search and volunteered for the spring, summer, and autumn of 1999. I did this because it seemed to me that staying a full season at Big Bend Pool was the right thing to do . . . it still does. My friend, Jim Van Loan — long-time North Umpqua wild steelhead conservationist and former owner of the famous Steamboat Inn — was the person who specifically asked me if I could stay at Big Bend Pool for a full eight-month season.

**Critical spawning habitat, about 100,000 acres of the Steamboat Creek basin was recently designated a Wild Steelhead Special Management Area. Photo by Jim Yuskavitch**

By the end of that first year, not too much to my surprise, I had a very interesting time protecting the summer steelhead populations that use the pool. I was, as well, fascinated watching the Western Cascades portion of the Pacific Northwest's season cycle around me. By the end of that first season, I was quite ready volunteer for another . . . as I am doing as I write this.

The Fish Watch Program is straightforward: a person spends at least twelve of every twenty-four hours—including the night—keeping an ear out and an eye on the refuge pool and the fish.

Mostly, I am in plain view down at the pool reading a book, talking to Maggie, documenting natural history observations, and answering the questions of visitors. During my first ten seasons, my good dog, Sis, was with me and now my good dog, Maggie, is my companion. That said, it is important to keep dogs and people out of the water within at

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least a quarter mile upstream from the refuge. Even contact for brief seconds, seriously spooks the fish once the scent has entered the pool and been captured by one of the pool's eddies.

As I mentioned above, a large and very interesting part of my time at the pool is documenting the behavior of wild steelhead and other creatures. I keep a notebook next to me for this purpose when down at my perch. Truth be told, I watch the vegetation, the weather, and I document stories people tell me, and jokes too if they make me laugh. Right now, these notes amount to more than six million words.

I call these notebooks my natural history notes. These notes are archived by The North Umpqua Foundation and are available free to the public at: *http://northumpqua.org/lees-steelhead-notes/*. The actual natural history notes make up the first 20% of a season's notes. The remainder of the notes are comparisons with the notes from previous seasons. As an example of what can be found in these natural history notes, Appendix 4 of the most recent notes documents 2,800-plus approaches — or rises if you prefer — by the pool steelhead to leaves, twigs, lichens, some insects, and a variety of other things. The discussion of each approach includes the text as documented in the relevant volume of natural history notes.

The value of Fish Watch is that it protects the wild summer steelhead of the upper and middle part of the Steamboat Creek Basin. This is of paramount importance. A very much secondary value is that of seeing the summer steelhead and answering questions about them. I say secondary because the wild summer steelhead are aware of everyone and potentially spooked by everyone who visits the pool. It took me years to learn about this awareness by the steelhead. Were it possible, I would try to keep even myself away from these fish, however, the watcher does need to maintain a modicum of awareness about what is going on in the place they protect.

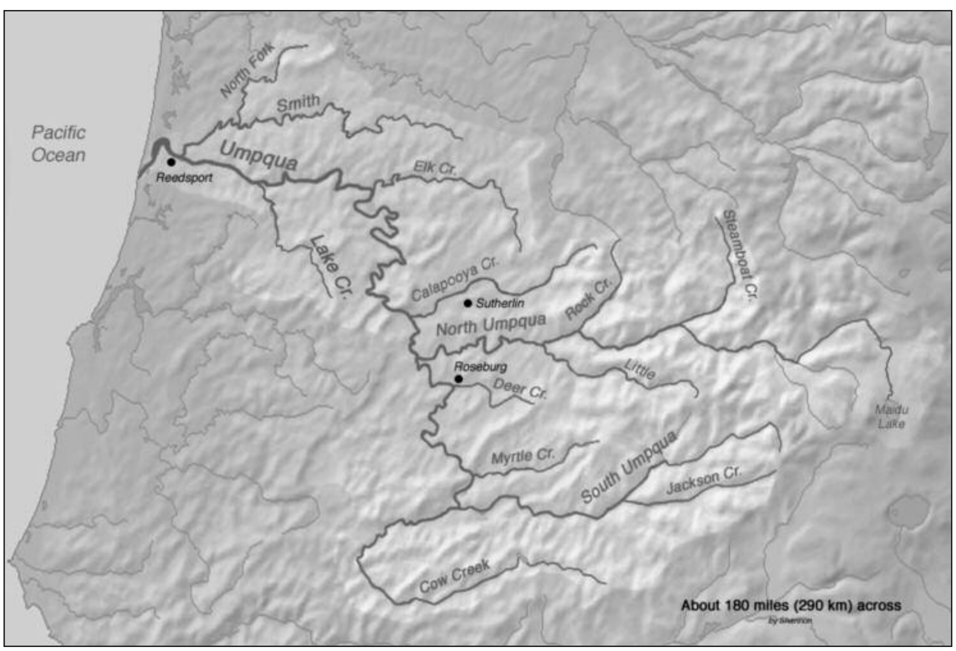
***By the end of that first year, I had a very interesting time protecting the summer steelhead. By the end of the first season I was ready to volunteer for another.***

It sounds brutal I know, but people should stay away from the pool, as stated above. This, however, will never happen. The next best thing that could happen is that all the interpretive signage should be removed from the flat above the pool. Yes, there is an Airstream trailer, commodes, and a 125-gallon propane tank. My twenty years at the pool suggests strongly that, in the absence of informational signs and kiosks, nearly a third of the visitors would not visit the pool—thinking it was a strange private camp of some kind.

I was off the pool all of last year as I looked after my Mom and so was unable to argue against a huge and very, very heavy and bright and colorful metal kiosk that has been placed less than a stone's throw from the pool and in plain view from the road along Steamboat Creek. Just because something is possible does not mean that it should happen.

My observations over the course of this past season clearly show that this kiosk attracts attention and, necessarily therefore, increases the number of visitors to the pool and, also necessarily, increases the spooking of the wild summer steelhead seeking refuge to the pool.

The poacher memory in the case of the Dynamite Hole will be long. No pool that holds hundreds of wild summer steelhead will be easily forgotten. Actually, I am reasonably sure that, even if there is no more poaching or harassment here, this refuge pool will be remembered as a locus of poaching for human generations. And, sorry, but these things will be especially true if informational signage remains plainly visible at this poaching site.




**Within the Umpqua River watershed, the North Umpqua offers world famous summer steelhead fishing, and includes a 32-mile fly-fishing only reach. Map by Shannon1. Published under the Creative Commons 4.0 International License. Converted to black and white.**

*Lee Spencer has been guarding the wild summer steelhead in the Steamboat Creek basin for more than two decades. His book about his experiences, A* Temporary Refuge: Fourteen Seasons with Wild Steelhead *was published by Patagonia Books in 2017. It was reviewed in the September 2017 issue of* The Osprey.

*Lee also publishes his* Steelhead Notes *on the North Umpqua Foundation website detailing his many observations over the years. You can read them at: http://northumpqua.org/lees-steelhead-notes/*

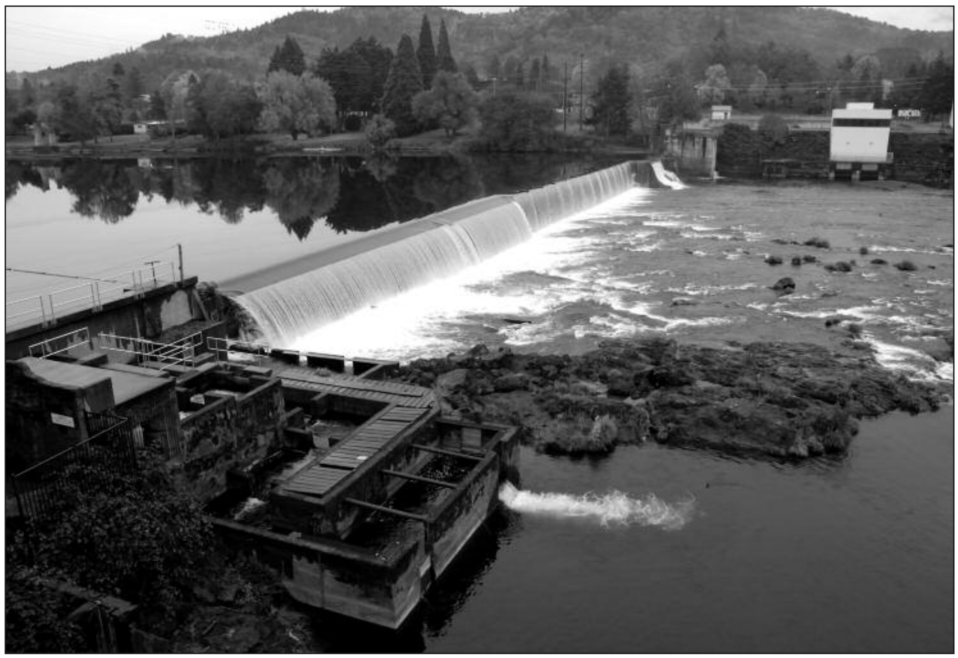
# Bringing the Rule of Law to Winchester Dam on the North Umpqua River

By Jim McCarthy

A coalition of twenty fishing, conservation, and whitewater groups has formed to push state and federal authorities to enforce state and federal laws at Winchester Dam on the North Umpqua River near Roseburg, Oregon to protect fish runs, water quality, and public safety. One of the coalition's priorities is to ensure the dam's owner, Winchester Water Control District, is held responsible for violations resulting from a recent unpermitted major repair effort at the dam in October 2018, which included a pollution spill and fish kill in the North Umpqua River that was extensively documented by the Oregon Department of Fish and Wildlife as well as the Oregon Water Resources Department. During an attempted repair of the south abutment, Winchester Water Control District did not seek required permits, did not hire a qualified engineer experienced with dams or in-water work, and did not follow ODFW's written recommendations to protect aquatic resources during the repair. This resulted in a pollution plume and fish kill when green concrete contaminated the river during the adult migration of federally-listed Oregon Coast coho salmon. According to ODFW, the pollution plume extended a third of a mile downstream and killed juvenile Chinook salmon and steelhead, as well as Pacific Lamprey ammocoetes and mussels.

Fortunately, in the wake of this needless damage to the North Umpqua, the coalition has seen some welcome progress. On August 12th, 2019, the Oregon Department of Environmental Quality issued a Pre-Enforcement Notice regarding violations of state law during these repairs. On October 16th, 2019, OWRD downgraded the dam's condition rating from "fair" to "poor" with a warning that it could be downgraded further if the dam's known safety issues are not addressed in a timely manner. Unfortunately, going on one year after a spill and fish kill there still has not been substantive action by the U.S. Army Corps of Engineers.

Serious problems at this dam extend beyond the slipshod 2018 repair process, pollution spill, and fish kill. The troubling history of Winchester Dam further demonstrates the pressing need for authorities to step up and protect the incredible North Umpqua River from the longstanding problems at this dam. The facts of the dam's history include:



**Winchester Dam has a history of poor maintenance and repair that impacts the river's salmon and steelhead runs. Photo by Jim Yuskavitch**

*The troubling history of Winchester Dam demonstrates the need to protect the North Umpqua from its longstanding problems.*

Dating back to the turn of the previous century, Winchester Dam is an obsolete and deteriorating structure providing no flood control, hydropower, or water supply function. It inflicts significant harm on salmon, steelhead, and water quality in one of Oregon's most famed and valuable rivers. Due to these fisheries impacts, this dam is listed by ODFW as among the state's highest priorities for improving fish passage. The dam also lies entirely within state designated Essential Salmonid Habitat and impounds waters listed by Oregon as impaired under Clean Water Act Section 303(d).

Winchester Dam is categorized as a "high hazard" dam by the Oregon Department of Water Resources (OWRD), primarily due to potential loss of life in the case of dam failure among the large number of boaters, swimmers, fishermen, and other river recreationists who

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frequent the banks, waters, public park, and boat ramp immediately downstream of the dam. Besides potential loss of life, other documented OWRD concerns include potential damage to the water intake structure owned by the City of Roseburg and possible damage to two highway bridges and one railroad bridge, also immediately downstream. Despite these risks, the dam owners have rebuffed repeated written requests by OWRD to update their emergency action plan, which dates to 1987.

Past concerns regarding this structure have been so significant that OWRD issued a Dam Safety Order on March 13, 1986 finding the dam "structurally unsound and in danger of failure" with "structural deficiencies" of "dynamic and long-standing nature" and ordered professional engineering plans drawn up for its replacement or removal. This order was modified on March 3, 1988 after extensive inspection — including testing of steel tie rods and underwater inspection — and repairs overseen by a qualified engineer. The modified order allowed for continued dam operation on the condition that a certified engineer hired by the dam owners undertake a state-approved oversight regime of regular inspections, monitoring, testing, and repair, and to periodically submit "safe life expectancy evaluations" to OWRD. OWRD files contain little evidence that the dam owners have attempted to comply with this order. The coalition has found no evidence that WWCD has benefitted from the services of a qualified engineer since 2006, when files show a WWCD-hired engineer submitted a cursory 2-page "Winchester Dam Repair Narrative" which briefly outlines a 12-day-long drawdown and repair effort but lacks substantive plans, data, methodology, and analysis. OWRD files indicate WWCD has not submitted repair narratives of any kind since 2006. For in-water repairs of a designated high hazard dam since 2006, WWCD has apparently been relying almost completely on Basco Logging, and more recently, on a building foundation contractor who has attempted to patch the dam face and fish ladder with conveyor belt material.

Disregard for permits and lack of accountability for the Winchester Dam owners has seemingly been the rule in regards to dam repairs since Pacific Power & Light gave away the structure to WWCD in 1969, after the then-hydropower dam was heavily damaged by the infamous 1964 Flood. Public records indicate that Winchester Dam has been repaired at least 17 times since 1964 – or an average of once every 3 years – but the coalition has been unable to discover any instances of enforcement of permitting requirements to protect Umpqua Basin fisheries, water quality, and public safety. It is reasonable to expect the dam's well-documented dynamic and long-standing structural deficiencies will require even more frequent repairs in the future. We have found records of several extended drawdowns and repair efforts in recent decades, including years 1991, 1997, 1999, 2006, 2009, and 2013. But just as in 2018, relevant agency files do not show permits for these activities, nor do they contain records of fines or other consequences for WWCD. Records do show that the extensive unpermitted in-water work noted above involved fish salvage, removal-fill, blockage of fish migration, and significant sediment releases in one of Oregon's finest salmon and steelhead streams.

*Disregard for permits and lack of accountability from Winchester Dam owners regarding repairs seemingly has been the rule.*

Drawdown for dam repair releases significant volumes of sediment accumulated within the reservoir pool, depositing it onto Essential Salmonid Habitat and into the water intake of the City of Roseburg immediately downstream. A newspaper account of the 1991 repair drawdown states "silt gushed" after the raising of the dam's roller gates. Flow through these two gates is forceful enough to stop all upstream fish migration. It is reasonable to assume this flow velocity scours out and mobilizes large volumes of sediment and turbidity.

According to ODFW and press accounts, the temporary drawdown of the reservoir pool behind Winchester Dam to allow structure repair, which directs all river flow through the dam's two roller gates, results in a total upstream passage barrier for migratory fish due to flow velocity. Judging from public records, in recent decades Winchester Dam repairs completely stopped the upstream migration of fish for a minimum of 16 days in 1991, 13 days in 1997, 12 days in 1999, 12 days in 2006, and 17

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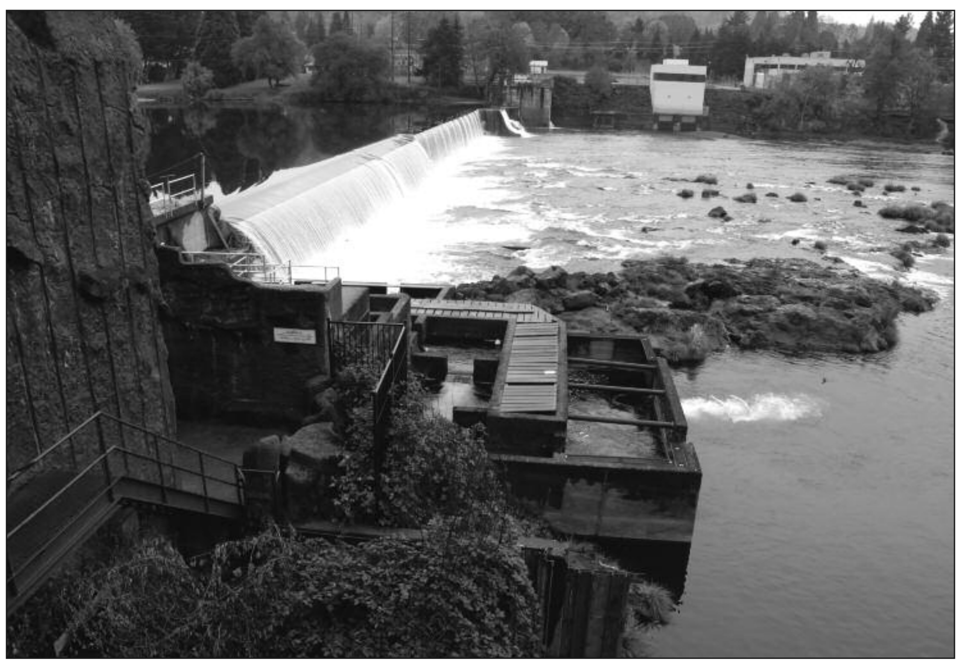

**Winchester Dam is listed by the Oregon Department of Fish and Wildlife as a high priority for improving fish passage. Photo by Jim Yuskavitch**

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days in 2013. Some of these repair periods overlap the adult migration period of the North Umpqua's ESA-listed Oregon Coast coho and likely resulted in the delay of their migration. Reservoir drawdown causes mass mortality of designated Species of Concern Pacific lamprey ammocoetes in reservoir pool sediments. A 2013 press account with ODFW staff commentary describes thousands of reservoir pool area ammocoetes dying or being consumed by birds during repairs, despite apparently ad-hoc mitigation and salvage efforts. Roughly half of the 2,000 ODFW-salvaged ammocoetes were estimated to have died in the process. In addition, a November 4, 2013 ODFW memorandum of a post-repair interagency meeting indicates drawdown may impact ammocoetes in sediments as much as 2 miles upstream of the dam and that some gasoline-powered pumps used in the reservoir area during the repairs "were refueled without any kind of spill containment." A February 4, 2014 ODFW memo characterized the 2013 manual ammocoete salvage efforts at the dam as "futile."

**The fish counting station at Winchester Dam. Photo by Jim Yuskavitch**

Winchester Dam's concrete south abutment lies partially on sediment and debris, not bedrock, and therefore is perpetually undermined by flowing water, at times creating cave-like holes large enough for human divers to explore. The dam's aged, 367-foot-wide, cobble-filled wooden crib structure also regularly produces large holes across its face, creating entrainment/false attraction flows consistently described in engineering reports over the decades as encompassing up to half of the river's flow in summer. The record shows that these long-standing structural deficiencies necessitate regular, natural resources-impactful repairs to temporarily reduce significant public safety risks and/or fish passage problems. Judging from public records, repairs to these problem areas have been undertaken since the late 1980s without the benefit of prior professional engineering surveys, written engineering plans, permitting, or meaningful evaluation of repair effectiveness. Instead, the record of repair as a whole shows these repeated efforts produce ephemeral improvements before reversion to the harmful and/or hazardous status quo ante. Allowing repeated, unpermitted, and essentially futile repairs to Winchester Dam has compounded the considerable harm this structure has inflicted upon the North Umpqua River's resources.

Given this history of significant and repeated natural resources impacts during dam repairs, as well as longstanding public safety concerns, to allow further repairs to this structure without the benefit of agency required permitting and oversight from a certified engineer would represent a reckless disregard for the fisheries, water quality, and people of the Umpqua Basin.

Unfortunately, there has not been as much progress on other priority areas of concern at the dam. For example, ODFW currently lacks a substantive written system or analysis for maximizing fish passage efficiency at Winchester Dam at different flows. ODFW maintains and operates the fish ladder through an easement providing access, but recently declined the coalition's written offer to provide an aquatic engineer at no cost to ODFW to independently analyze the ladder and create a comprehensive system for maximizing ladder efficiency at different flows. To make matters worse, one of Winchester Dam's most obvious and chronic problems is a hole in the dam's crib face flowing directly into the fish ladder, creating a false attraction flow inside the ladder itself. The record shows this problem persists for years between dam repairs.

Because the problems at the outlaw Winchester Dam are so acute, longstanding, and costly to address, re-establishing the rule of law to satisfactorily protect the North Umpqua's resources will likely require dam removal. If so, the coalition will work to support a removal solution which benefits the North Umpqua's irreplaceable natural resources as well as the people, communities, and economies dependent upon the health of this remarkable river.

*Jim McCarthy is Southern Oregon Program Director for WaterWatch of Oregon. To learn more about their work visit them at:www.waterwatch.org*

**Basco Logging Fined for Violating Water Quality Standards**

In late January, the Oregon Department of Environmental Quality fined Basco Logging $53,378 for violating state water quality standards that caused pollution killing fish during repairs on Winchester Dam in fall 2018. The state concluded that it issued the penalty "because the North Umpqua River is important habitat for threatened Oregon Coast coho salmon and several other sensitive species, and your activities resulted in the discharge of sediment and wet ( or "green") concrete to the river, degrading aquatic habitat and killing numerous fish. These incidents also negatively affected the quality of the primary drinking water source for two community water systems - City of Roseburg and Umpqua Basin Water Association, serving approximately 37,700 people (28,800 and 8,900, respectively).

"Your dam repair activities were conducted without following all established in-water work best management practices, despite receiving information in advance from state and federal agencies on how to protect water quality and resident aquatic species."

# Columbia and Snake River Water Temperatures Becoming Increasingly Lethal for Salmon

By a coalition of 55 fisheries and natural resource scientists

*Last October a group of 55 fisheries and natural resources scientists signed and sent a letter to Pacific Northwest policymakers, governors and members of Congress describing increasingly lethal water temperatures for salmon and steelhead on the Columbia and Snake rivers due to the hydroelectric dams and climate change. They emphasized that science-based solutions will need to be applied to correct this serious situation. Signers of the letter included scientific advisors to* The Osprey *Rick Williams, Jack Stanford and Jim Lichatowich. Here is the complete letter:*

In recent decades, adult salmon and steelhead migrating upriver to spawning grounds in the Columbia Basin have suffered decreased survival. This is in part due to dangerously warm water in the mainstem Snake and Columbia Rivers, caused by hydro-electric development that created slackwater reservoirs and a changing climate. Excessively high water temperatures, above 20°C/68°F, are now normal for extended periods in July, August, and September.

The four lower Snake River reservoirs have a significant impact on these in-river temperatures. Based on modeling, EPA states that an un-impounded river could, on average, be 3.5°C/6.3°F cooler in late summer and early fall when measured at the site-potential for John Day Dam. EPA modeling also shows that, when considered collectively, the four lower Snake Dams can affect temperatures up to a potential maximum of 6.8°C/12.2°F (EPA, 2003). This water temperature issue remains unmitigated and will worsen as the climate continues to warm. With limited resources in the existing hydrosystem to cool the river, the restoration of the lower Snake River by breaching its four dams is the only action available that can substantially cool mainstem water temperatures on a long-term basis.

## Key Findings

The Federal Columbia River Power System (FCRPS) reservoirs on the lower Snake River increasingly warm the river above critical levels from July to mid- September, significantly reducing salmon reproduction and survival. This problem was first recognized in the 1990s, and still remains largely unmitigated today. All available information to date about the court-ordered National Environmental Policy Act (NEPA) review now being conducted indicates that federal agencies will propose no plan to adequately address this critical issue.

> *Breaching the four lower Snake River dams is the only action available to substantially cool mainstem water temperatures.*

Cold-water resources to protect migrating salmonids in the existing hydrosystem are extremely limited; there are no additional resources available that can significantly cool the river. Restoring the lower Snake River by removing its four federal dams will significantly reduce mainstem water temperatures on a long-term basis, and is likely the only action that can do so, substantially lowering the risk of extinction for salmon and steelhead here.

## The Details

Late summer and early fall water temperatures in the mainstem lower Snake and lower Columbia Rivers have risen to critical levels in recent years, due in large part to the presence of Federal Columbia River Power System (FCRPS) dams and reservoirs. Reservoir heating is exacerbated today by a warming climate. Historically, construction of FCRPS dams and reservoirs increased slackwater surface area and decreased water velocity compared to a free-flowing river; increased slackwater surface area now serves as a collector of solar energy, and the slow-moving water allows more time for heat to accumulate, compared to free- flowing conditions (Yearsley et al. 2001, EPA 2003, FPC 2015).

The U.S. Environmental Protection Agency (EPA) has modeled impacts of the presence of dams and reservoirs on water temperature to develop a Total Maximum Daily Load (TMDL) for temperature in the Columbia and Snake Rivers. Based on this modeling, EPA stated that an un-impounded river could, on average, be 3.5°C/6.3°F cooler in late summer and early fall when measured at the site- potential for John Day Dam. EPA modeling also showed that, when considered collectively, the four lower Snake Dams could affect temperatures up to a potential maximum of 6.8°C/12.2°F (EPA, 2003). The impact of additional heating in lower Snake River reservoirs is clear, and it can drive water temperatures above 68°F for extended periods in late summer and early fall – dangerous for salmon and steelhead.

In summer 2015, 96% of endangered adult Snake River sockeye salmon died during their upriver migration through the lower Columbia and Snake Rivers, due to the combined effects of very hot air and water temperatures, low flows, and the presence of mainstem dams and their associated reservoirs (FPC 2015). The extreme conditions faced by migrating adult salmon in 2015 will become more frequent as the climate continues to warm.

Although the poor success of the adult migration documented in 2015 for Snake River sockeye is an extreme example, reduced migration success due to high water temperatures has been observed for sockeye in other years, and for other Snake River salmon species generally (Crozier et al. 2014, McCann et al. 2018). These studies indicate that all Snake River salmon species (sockeye, spring/summer Chi-

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nook, fall Chinook and steelhead) experience reduced survival at elevated water temperatures above 18°C (64°F), which is, notably, 2°C cooler than the established water quality standard of 20°C (68°F). The proportion of adults of each species or run-type that experience temperatures in excess of 18°C depends on the timing of their upriver migration; steelhead, fall Chinook and sockeye have a greater exposure to high temperatures than adult spring/summer Chinook (McCann et al. 2018), because they migrate later in the summer, when temperatures are hottest. In addition, adults that were transported (barged) as juveniles exhibit impaired homing ability, which results in slower migration speed, lower upstream survival, and higher stray rates.

Temperature tolerance or intolerance in salmon and steelhead (and fish generally) has been well documented in the scientific literature, and local adaptation can play a role in thermal limits for different populations of the same species. Effects of high temperature on adult salmon migration include direct mortality, migration delay, and may also include depletion of energy reserves through delay and increased respiration, reduced gamete viability, and increased rates of disease (e.g., McCullough et al. 2001). It is well established that water at higher temperature carries less dissolved oxygen, while cooler water carries more and benefits all salmon species.

In the Snake/Columbia mainstem, impounded by FCRPS dams, fish ladders often expose adult salmon to elevated temperatures due to the warm surface water used to provide ladder flows (Keefer and Caudill 2015). High water temperatures can result in fish repeatedly entering and exiting these ladders, reducing survival rates. Ladders that have a high temperature gradient from warm surface waters in the forebay to cooler tailwaters can also delay migration of adult salmon through the ladders, reducing survival. The migration delays typically result in delayed migration to spawning grounds, increased total thermal exposure, and decreased migration success (Caudill et al. 2013, Keefer and Caudill 2015).

Elevated water temperature in the Columbia and Snake Rivers is a long-recognized problem that to date remains largely unmitigated (NMFS 1995; EPA 2001, FPC 2015). The inability to meet a temperature water quality standard of 20°C (68°F) in summer and the issue of elevated fish ladder temperatures are long-standing problems, both recognized in the 1995 FCRPS Biological Opinion (NMFS 1995). In general, the temperature exceedance problem has been more severe in the Snake River than in the Columbia River (FPC 2015). In 2015, temperatures exceeded the 20°C standard for 35% to 46% of the April-August passage season at all FCRPS projects except Lower Granite Dam (LGR; FPC 2015).

Current FCRPS strategies to cool overheated mainstem water in the Snake River rely primarily on the release of cold water from Dworshak Reservoir (on the North Fork Clearwater River) to help cool a portion of the lower Snake River from July into September, to protect migrating juvenile and adult salmonids. Dworshak's cold water releases have generally kept temperatures from exceeding the 20°C standard to Lower Granite Dam's tailwater, but the 20°C standard is routinely exceeded downstream (http://www.fpc.org). Cold water volumes from Dworshak are limited and must be used judiciously during the July-September period. Efforts to cool the adult fish ladders with auxiliary pumps at Lower Granite and Little Goose Dams have shown some potential to reduce migration delay at those dams (FPC 2015), but do not mitigate the larger problem of warm summer water temperatures in the entire lower Snake River and in the lower Columbia.

Climate change is exacerbating existing elevated temperature problems, and the severe problems faced in 2015 will increase in frequency. Snake River sockeye have been identified as extremely vulnerable to climate change due in part to their long migration through exceptionally warm reaches of the Snake River (Crozier et al. 2019). Data from recent years confirm that current strategies to cool the mainstem are insufficient, and the alternatives currently under evaluation by the Federal Action Agencies in the NEPA review process appear to inadequately address this problem. (http://crso.info).

Schultz and Johnson (2017) used the EPA temperature model (RBM-10) to simulate water temperatures in the lower Snake River throughout the summer of 2015, assuming that its four dams and reservoirs in eastern Washington did not exist; the simulations also assumed that cold water releases as in 2015 from Dworshak would continue. Their simulations indicated that a free-flowing lower Snake River would have remained cool enough for salmon to migrate successfully in 2015 (i.e., met the 20°C standard, except for brief periods after which temperatures quickly returned to a safe level), despite that summer's record-breaking air/water temperatures and low flows. For comparison, most parts of the impounded lower Snake River during July and August of 2015 were dangerously warm, becoming lethal for salmon and steelhead. Although not evaluated specifically, the modeled temperatures at Ice Harbor Dam suggest that the cooling effect of dam removal (with cold water releases from Dworshak) would have extended downstream at least to the confluence of the lower Snake and Columbia rivers. Shultz and Johnson (2017) concluded that "a free-flowing Lower Snake River could remain viable salmon habitat—at least from a water temperature perspective—despite some degree of climate change."

In the current NEPA review process, in which FCRPS alternatives are being studied by federal Action Agencies to restore ESA-listed salmon populations, strategies to reduce overall mainstem water temperatures do not appear to be sufficiently addressed. This serious flaw, if uncorrected, will mean that hot mainstem water will remain unmitigated and salmon and steelhead losses will continue and worsen over time, especially for Snake River stocks.

The option of breaching lower Snake River dams, combined with existing or modified cold water releases, has enormous potential to alleviate the very serious problem of elevated summer temperatures in the lower Snake River, and increase the survival rate from outmigrating smolts to returning adults (smolt-to-adult return; SAR) for all salmon species (Marmorek et al. 1998, Peters and Marmorek 2001, McCann et al. 2017). It would also significantly increase available spawning and rearing habitat for imperiled Snake River Fall Chinook.

No other action or actions can significantly lower summer water temperatures in the lower Snake River on a long-term basis, while also providing additional cooling in the lower Columbia.

# FISH WATCH — WILD FISH NEWS, ISSUES AND INITIATIVES

## Cryptobia Parasite Kills Hundreds of Fall Chinook on Oregon North Coast Rivers

In response to a fall Chinook salmon die-off due to an outbreak of the parasite cryptobia made worse by low water conditions, the Oregon Department of Fish and Wildlife closed salmon angling in more than a dozen North Coast waters to protect the spawning run.

In early December, ODFW counted about 200 dead Chinook in the Wilson river, although because many of the carcasses had been scavenged the actual mortality was probably considerably higher. The River was then closed to salmon fishing from December 7 through December 31.

However, later in the month excessive pre-spawner fall Chinook mortality was documented in other North Coast rivers. In response the Necanicum River basin, Nehalem Bay and River, North Fork Nehalem, Tillamook Bay, Tillamook River, Trask River, Kilchis River and Miami River, Nestucca Bay and River, Three Rivers and Liittle Nestucca River and were also closed to salmon fishing for the remainder of the month. No cryptobia-caused salmon mortalities were found outside the North Coast river systems.

Cryptobia is a naturally-occurring parasite and is not normally considered a major threat to fish. However, during low water periods salmon will tend to congregate in larger numbers in search of cold water refugia and may become more susceptible to mass infection and die-offs.

**The North Fork Nehalem was one of the streams on Oregon's North Coast closed to salmon fishing last December due to a cryptobia outbreak. Photo by Jim Yuskavitch**

## Cooke Aquaculture Will Pay $2.75 Million to Settle 2017 Net Pen Collapse Lawsuit

Last November, just days before having to go to court to defend itself against a Clean Water Act Violation lawsuit brought by the Wild Fish Conservancy resulting from a collapse of one of its Atlantic Salmon net pens in Puget Sound, Cooke Aquaculture agreed to settle for $2.75 million. The funds will go to the Rose Foundation for Communities and the Environment in a series of annual payments and will be dedicated for environmental projects that protect wild salmon and orcas in Puget Sound. Funds will also be used to reimburse the Wild Fish Conservancy's litigation expenses.

In August 2017, a net pen off Cypress Island operated by Cooke Aquaculture collapsed, releasing 300,000 disease-infected Atlantic salmon into Puget Sound. A previous court ruling found that the company failed to conduct required inspections of nets and anchors, and accurately monitor and report the number of Atlantic salmon escaping from its pens. The court also found that the company did not develop plans that included procedures for inspecting cages, storing chemicals, disposing of harvest blood and tracking the number of fish it was holding in the pens.

Cooke Aquaculture was eventually fined $332,000 for the escape. Since then, the Washington State Legislature passed legislation phasing out Atlantic salmon net pen operations off the Washington coast.

## WDFW Grants Cooke Aquaculture Permit to Farm Steelhead in Puget Sound

Despite the company's disasterous net pen breach in 2017, and that Washington State is in the process of phasing out Atlantic salmon farming in Puget Sound, in January the Washington Department of Fish and Wildlife granted Cooke Aquaculture a five-year permit to farm steelhead in its existing facilities.

Key to receiving the permit is that it is for steelhead, which will be mostly females and sterile. While the Washington State legislature voted to phase out fish farming in its waters as current permits expire, it only targets farming non-native fish. Since steelhead are a native fish, switching to that species may allow fish farms to continue operating in Puget Sound.

However, there are still a number of steps Cooke Aquaculture needs to complete before it can begin its steelhead farming operation. The company still needs to be granted a water quality permit from the Washington Department of Ecology. And WDFW is requiring a number of conditions that the company must meet. These include allowing net inspections two times each year, developing a fish escape prevention and response plan, testing for disease and genetic analysis.

It will also be required to go through a public review and comment process that will take a few months.

## Orca Task Force Releases Second Report and Conservation Recommendations

The Southern Resident Orca Task Force released its second and final report and recommendations in November for the conservation of Puget Sound orcas and Chinook salmon — their primary food source. Some of the recommendations

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specific to Chinook salmon include:

1. Significantly increase investment in restoration and acquisition of habitat in areas where Chinook stocks most benefit Southern Resident orcas.

2. Immediately fund acquisition and restoration of nearshore habitat to increase abundance of forage fish for salmon sustenance.

3. Significantly increase hatchery production and programs to benefit Southern resident orcas consistent with sustainable fisheries and stock management, available habitat recovery plans and the Endangered Species Act.

4. Prepare an implementation strategy to reestablish salmon runs above existing dams, increasing prey availability for Southern Resident orcas.

5. Increase spill to benefit Chinook for Southern Residents by adjusting total dissolved gas allowances at the Snake and Columbia River dams.

6. Establish a stakeholder process to discuss potential breaching or removal of the lower Snake River Dams for the benefit of Southern Resident orcas.

7. Support full implementation and funding of the 2019-2028 Pacific Salmon Treaty.

8. Reduce Chinook bycatch in West Coast commercial fisheries.

9. Support authorization and other actions to more effectively manage pinniped predation of salmon in the Columbia River.

10. Reduce populations of nonnative predatory fish species that prey upon or compete with Chinook.

11. Monitor forage fish populations to inform decisions on harvest and management actions that provide for sufficient feedstocks to support increased abundance of Chinook.

12. Support the Puget Sound zooplankton sampling program as a Chinook and forage fish management tool.

The complete report can be found at:

https://www.governor.wa.gov/sites/default/files/OrcaTaskForce_FinalReportandRecommendations_11.07.19.pdf

## Umatilla Tribe Breaks Ground on New Chinook Salmon Spawning Facility

In January, the Confederated Tribes of the Umatilla Indian Reservation broke ground on a new spring Chinook salmon spawning facility near Milton-Freewater, Oregon. The facility, which will be located at the existing South Fork Walla Walla Chinook salmon spawning facility, is intended to restore spring Chinook salmon runs to Walla Walla basin streams including the South Fork Walla Walla River, Touchet River and Mill Creek, where they have been absent from the basin for about a century. The goal is to return 2,000 spring Chinook salmon back to the basin by 2025 and perhaps eventually as many as 5,000 annually.

The $20 million-plus project is funded through the Bonneville Power Administration's hydropower mitigation program. The incubation and spawning facility is scheduled to open in spring 2021.

***THE OSPREY***

***Fly Fishers International***
***5237 US Hwy 89 South, Suite 11***
***Livingston, MT  59047-9176***