UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
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Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

April 11, 2016

William W. Stelle, Jr.
Regional Administrator
NMFS West Coast Region
7600 Sand Point Way NE, Building 1
Seattle, WA 98115

Dear Mr. Stelle:

The U.S. Environmental Protection Agency has reviewed the National Marine Fisheries Service March 2016 Final Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed 4(d) Determination under Limit 6 for Five Early Winter Steelhead Hatchery Programs in Puget Sound. (EPA Region 10 Project Number: 15-0045-NOA).

Project summary
The FEIS evaluates five Hatchery and Genetic Management Plans (HGMPs) for steelhead in Puget Sound. The HGMPs specify the propagation of early-returning ("early") winter steelhead in the Dungeness, Nooksack, Stillaguamish, Skykomish, and Snoqualmie River watersheds in Washington State. The HGMPs were provided by the Washington Department of Fish and Wildlife (WDFW), with the Jamestown S'Klallam Tribe, the Lummi Nation, the Nooksack Tribe, the Stillaguamish Tribes, and the Tulalip Tribes for NMFS's evaluation and determination under Limit 6 of the Endangered Species Act (ESA) 4(d) Rule for listed salmon and steelhead.

Responsiveness to EPA's DEIS comments
Our December, 2015 DEIS comments stated our concern regarding the hatchery programs' potential negative effects on natural-origin steelhead and salmon from genetic risks, competition and predation, hatchery facility effects, incidental fishing effects, and disease transfer. We also stated our concern that the Proposed Action and Reduced Production alternatives provide no possibility for viability benefits to natural-origin steelhead.

Given our concerns, we are pleased to see that the FEIS's new alternative, Alternative 5, the Preferred Alternative, includes a revised HGMP for the Skykomish early winter steelhead hatchery program. Under Alternative 5, 88,400 fewer steelhead would be released into the Skykomish River basin and this would result in, according to the FEIS, "...corresponding decreases in low gene flow, competition and predation risk, and incidental fishing effects..."[1]

Also, by identifying and providing rationale in support of Alternative 4 (Native Broodstock) as the potential environmentally preferable alternative, NMFS is being directly responsive to our recommendation for the FEIS to include clarifying information on how NMFS' intends to identify the environmentally preferable alternative. We agree that transitioning to native broodstock programs would

[1] FEIS, p. 119

likely be environmentally preferable because native broodstock programs have the potential to benefit conservation and recovery of listed Puget Sound steelhead, while further reducing environmental effects and contributing to cultural resources associated primarily with recreational and tribal fishing interests.

In addition, to reiterate the factors listed in our DEIS comments, we believe the alternative which best facilitates adaptation - both for fish and people - to habitat loss, changes in oceanic conditions, impacts from dams and diversion, direct predation and climate change would likely be environmentally preferable.

Thank you for this opportunity to comment and if you have any questions please contact me at (206) 553-1601or by electronic mail at littleton.christine@epa.gov, or you may contact Erik Peterson of my staff at (206) 553-6382 or by electronic mail at peterson.erik@epa.gov.

Sincerely,

Christine B. Littleton, Manager
Environmental Review and Sediment Management Unit

Wild Fish Conservancy
NORTHWEST
SCIENCE EDUCATION ADVOCACY

April 11, 2016

Via Email
William W. Stelle, Jr.
Regional Administrator
National Marine Fisheries Service, West Coast Region
National Oceanic and Atmospheric Administration
7600 Sand Point Way N.E., Building 1
Seattle, Washington 98115-0070
Email: EWShatcheriesEIS.wcr@noaa.gov

Re: Final Environmental Impact Statement to Analyze Impacts of a NOAA's National Marine Fisheries Service Proposed 4(d) Determination under Limit 6 for Five Early Winter Steelhead Hatchery Programs in Puget Sound

Dear Honorable Civil Servants:

Please accept these comments submitted on behalf of the Wild Fish Conservancy on the Final Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed 4(d) Determination under Limit 6 for Five Early Winter Steelhead Hatchery Programs in Puget Sound (Nov. 2015) ("Chambers Creek DEIS"), dated March 2016.

Very truly yours,

Kurt Beardslee
Executive Director
Wild Fish Conservancy

The FEIS differs little in substance from the November 2015 DEIS on which we have provided numerous substantive comments. We reiterate those comments and related documents herein. We confine our comments to brief responses to some of NMFS responses to our Comments on the DEIS.

Response #11. Lack of a quantitative probabilistic risk assessment. NMFS' responds that the results of such a risk assessment "are often imprecise and may rely on considerable uncertainty and inherent assumptions", and cites to NRC 2013. We were unable to find the document this citation (NRC 2013) refers to, but we assume it is the following document that we cited in our comments on the withdrawn Draft Environmental Impact Statement on Two Joint Resource Management Plans for Puget Sound Salmon and Steelhead Hatchery Programs, NOAA Fisheries, July 2014:

Committee on Ecological Risk Assessment under FIFRA and ESA; Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council. Assessing Risks to Endangered and Threatened Species from Pesticides, National Academy Press 2013.

NMFS' response is both misleading and inaccurate. NMFS response implies that the quantitative probabilistic risk assessment approach to which our comments refer is less precise than NMFS' vague assurances that NMFS application of the VSP criteria to potential hatchery program impacts on ESA-listed wild salmonids "provide a necessarily broad scope of analysis, providing the public and the NMFS decision-maker information with which to better understand the risks and benefits of each alternative." First of all, a quantitative probabilistic risk assessment is the only kind of risk analysis that properly incorporates scientific uncertainty in the analysis and reflects that uncertainty in the resulting risk assessment. Any such uncertainty is part of the risk, so failure to explicitly incorporate it in the analysis fails altogether to adequately account for all of the risk. NMFS statement that such a risk analysis often relies on "considerable uncertainty and inherent assumptions" significantly misunderstands and mischaracterizes the critical importance of objectively incorporating all scientific uncertainties in a risk assessment. The need to incorporate uncertainty in a risk analysis is the reason that the risk assessment must be both quantitative and probabilistic. NMFS' proposed alternative to rely on vague, unspecified application of the VSP criteria to "provide a necessarily broad scope of analysis, providing the public and the NMFS decision-maker information with which to better understand the risks and benefits of each alternative", fails to address the critical fact that such an approach is likely to be largely subjective and hence prone to arbitrary and capricious results. The "broad scope" referred to includes numerous uncertainties that are not explicitly described or accounted for. In any case, NMFS' resulting analyses are neither quantitative, probabilistic, nor objective. VSP criteria are indeed relevant to an objective assessment of the risk that hatchery programs may pose to wild salmon and steelhead populations, but they must be incorporated into a quantitative probabilistic assessment framework if they are to be appropriately objective.

Global response 4a and b regarding assumptions about overlap between stray hatchery and wild spawners. We reiterate our comments on the DEIS regarding this issue. We did not overlook Appendix B of the DEIS and NMFS revised analyses of the Scott-Gill method and its application to data pertaining to Puget Sound winter steelhead affected by the hatchery programs at issue. We re-iterate the concerns with NMFS acceptance of Washington Department of Fish and Wildlife's assumptions regarding the differences between wild and hatchery winter-run steelhead in time of spawning in the wild and in the likely degree of overlap on the spawning grounds. We reiterate our contention that WDFW's assumption of a minimal temporal overlap represents a policy decision unsupported by current field research and data. This renders the dismissal of the data provided by Mr. Bill McMillan and others highly questionable. The data is dismissed in large part because of the limited spatial extent of McMillan's sampling relative to the entire Skagit River basins. The further suggestion that McMillan mis-identified coho salmon red is in January and February as steelhead redds is not credible given McMillan's extensive field experience (decades) surveying spawning salmon, steelhead, and trout in watersheds throughout Puget Sound and the Pacific Northwest. In short, NMFS makes every effort to construe the field data provided in a manner favorable to WDFWs policy-laden assumption to favor its Early Winter Hatchery programs and continue to place the risk of these kinds of uncertainties on the wild fish resource. Again, the failure to embed these analyses in a quantitative probabilistic risk assessment framework provides NMFS with broad scope for arbitrarily dismissing such data.

In summary, we still find NMFS reasoning on the genetic risks the proposed Early Winter Steelhead hatchery programs may pose to ESA-listed Puget Sound steelhead unconvincing. The analyses and response to comments raising a variety of concerns about the possible and actual adverse impacts err largely on the side of minimizing the potential risks and favoring approval of the proposed programs, unconvincingly so for the most part.

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

EWS Hatcheries FEIS

1 message

Brent Knight (ISS) <bknight@intuitivesafetysolutions.com> Fri, Mar 4, 2016 at 12:27 PM
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

Please save our hatchery programs. Washington would not be the same without Steelhead and wild run fish cannot survive long-term without the hatchery programs.

As an avid angler and conservationist, I am willing to make sacrifices to protect the species and maintain our steelhead and salmon populations. We cannot do this without the support from NOAA and WDFW.

Warmest Regards,

Brent Knight, CSP

Brent Knight, CSP | President
Intuitive Safety Solutions, Inc. | www.intuitivesafetysolutions.com

Email: bknight@intuitivesafetysolutions.com | bknight@iss-safe.com | Phone: 425.361.1216 | Fax: 425.775.1116 | Mobile: 206.755.1059 | CLICK HERE TO GET TO KNOW ISS AND WHY WE'RE DIFFERENT!

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EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

EWS Hatcheries FEIS

1 message

Brian L <doublespey@hotmail.com> Sun, Mar 6, 2016 at 7:16 PM
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

To Whom it may concern -

I'm writing to record my support for the EWS Hatcheries FEIS. I support either the Alternative #2 (Proposed Action) or Alternative # (Preferred Alternative).

Hatchery Steelhead are important in that they supplement the wild runs, support recreational/harvest fisheries, and mitigate for lost habitat that has been caused by manmade 'development' (dams, logging, etc) impacting the river system's ability to support self-sustaining wild populations.

Thank you for your efforts.

Sincerely,

Brian J Lencho

Bothell, WA

EWS Hatcheries FEIS

1 message

Dennis Harman <drharman5@gmail.com> Sat, Mar 5, 2016 at 5:24 PM
To: EWShatcheriesEIS.wcr@noaa.gov, director@dfw.wa.gov, The_Reel_News <thereelnews@comcast.net>, "Commission (DFW)" <commission@dfw.wa.gov>, dave hamilton <hamilton.dave@comcast.net>

As a lifelong resident and avid fisherman of Washington. I believe that the advent of hatcheries in Washington State has saved Steelhead from extinction.

We have had hatcheries in this state for so long that I believe that their are no pure blood, all native fish, in the state that need protecting. It is a myth perpetrated by That is why the steelhead are now termed NOR and not native.

The hatcheries of Puget Sound form a vital link in protecting and strengthening the remaining steelhead runs. Without them, Washington States fame for this beautiful creature will dwindle and die.

Without the hatchery systems of northern Puget Sound, excessive pressure will be put on the remaining hatchery producing rivers in Washington.

My home river, the Cowlitz is a world famous producer of steelhead fishing in Washington. It is now becoming inundated from the fisherman that normally fish and live in northern Washington.

The more the hatcheries of this state are closed, the more the HUNDREDS OF THOUSANDS OF STEELHEAD FISHERMAN BECOME PACKED TOGETHER because of fewer rivers and less fish.

If WFC wants get rich from their business of State and Federal grants for habitat restoration, let them do it on a couple of free flowing rivers in each corner of the state so that Wild fish Zealots cane have a place to delude themselves into thinking that their fish are better than Hatchery Steelhead.

Thank God for the foresight of or great grand father for creating hatcheries to save the Steelhead of our nation.

If you really want to save Steelhead in Washington State, BAN GILL (KILL) NETS.

They are the ones that are destroying the fish in Washington State.

Sincerely
Dennis Harman

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

I support fish hatchery programs in Washinfton State.

1 message

Ivankovich, Dominic <dominic.ivankovich@fluke.com> Sat, Mar 5, 2016 at 10:22 PM
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

I would like to affirm my support for hatchery programs in Washington State. The recent reduction in steelhead and salmon programs will result in fewer opportunities to harvest for both sport and food applications. I strongly recommend that we resume full hatchery efforts in the state as soon as possible.

Best regards,

Dominic Ivankovich

Public Comments on the Final Environmental Impact Statement for Early Winter Steelhead Hatchery Programs in Puget Sound

1 message

Gary Clark <Gary_Clark@fsafood.com> Thu, Apr 7, 2016 at 8:22 PM
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

William W. Stelle, Jr.

Regional Administrator

NMFS, West Coast Region

National Oceanic and Atmospheric Administration

7600 Sand Point Way NE

Seattle, WA 98115-0070

Fax (206) 526-6426

EWShatcheriesEIS.wcr@noaa.gov

RE: Solicitation for Comments: Draft Environmental Impact Statement for Early Winter Steelhead Hatchery Programs in Puget Sound

Dear Mr. Stelle:

Please find my comments to "Draft Environmental Impact Statement for Early Winter Steelhead Hatchery Programs in Puget Sound" as follows.

Sincerely,

Gary Clark

COMMENTS TO: Draft Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed 4(d) Determination under Limit 6 for Five Early Winter Steelhead Hatchery Programs in Puget Sound

On full review of the above DEIS, with particular attention to Chapter 4 (Environmental Consequences) and Chapter 5 (Cumulative Effects) as advised at the end of the Summary, I conclude that only Alternative 1 (No Action with elimination of all hatchery plants) provides any probability of achieving what can be considered the recovery of ESA listed Puget Sound steelhead to sustainable levels, or to what is considered as viable levels.

Mr Stelle habitat is not the limiting factor at this time hampering the recovery of wild steelhead and salmon stocks. It is Hatchery practices with Chamber Creek Stock and Harvest that are driving our wild steelhead stocks into extinction!

I present the following examples of why it is not habitat but over harvest and hatcheries that have done significant damage that can only be corrected only when the state and tribal parties agree that they must make drastic changes in how each party continues to do business in the future. If either refuses to change what they have done for the last 40 years the courts will have to be used to mandate changes that are science based and not driven by old school mentality and financial gain.

The people of this states wild fish will be recovered with or without participation form WDFW and Washington Tribes, I find it in both parties interest to make the right choice in Option 1 and give these fish a chance at recovering without continued Harvest by Tribal fisheries and WDFW Hatchery production, both are pushing our Wild steelhead and Salmon Stocks closer to extinction. Again I state that current science points to Hatcheries and over harvest of the Early component of wild fish from November through January as the two key factors in the decline of wild Steehead stocks.

If option #1 is not taken I am 100% certain this will end up in court, and the judge will be forcing protection of wild steelhead against WDFW Hatchery production and Washington Tribes who have had 40 years to make changes to put wild fish first and have refused to use the best science available.

Please submit the following information to support Option 1

> Toutle River Example
>
> The single most rapid and extensive negative salmon and steelhead habitat alteration that has occurred in modern history was a natural event, not anthropogenic. This was the major eruption of Mt. St. Helens in its effects on the Toutle River watershed on May 18, 1981. The response of the Toutle River steelhead after the Mt. St. Helens eruption in 1980 clearly demonstrates that despite the massive impact that then occurred to the Toutle River basin, within 5-7 years after the eruption, with habitat still greatly altered, wild winter steelhead returned at levels well above escapement goals and at numbers exceeding nearby streams that were not impacted by the eruption (Appendix C, Figures 1-5; Lucas 1985; 1986; Lucas and Pointer 1987). In other words, the Dungeness, Nooksack, Stillaguamish, Skykomish, and Snoqualmie rivers have steelhead habitat today that is far less impacted than what the Toutle River basin was in the first 10 years after the Mt. St. Helens eruption and must be considered to have at least as great of habitat capacity for wild steelhead in proportion to each of their basin sizes.
>
> The subsequent history of the Toutle River is also depicted (Appendix C, Figures 1-5) with wild winter-run steelhead at the Toutle basin going into steady decline after hatchery plants of summer-run steelhead occurred, and after the sediment retention dam was put in by the Army Corps of Engineers. The more complete history is as follows:

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28 years ago, it was reported by Lucas (1985) in the monitoring of the after effects of Mt. St. Helens on the Toutle River that in the SF Toutle at Johnson Creek salmonid densities had dramatically increased: *"The most dramatic change in salmonid density from the initial 1981 survey to 1984 was for juvenile steelhead (Table 3). Parr and older steelhead increased ten-fold from 0.01/m2 in 1981 to 0.10/m2 in 1984. This compares favorably to densities found in other Washington streams; e.g., the Sauk and Skagit rivers (1977-1980) ... the 75 percent tributary spawning in the South Fork is comparable to the 65-80 percent range found by Phillips et al. (1981) on the Skagit system."* As wild steelhead returned to the Toutle system in growing numbers, however, management altered: *"In 1983, the Toutle from the mouth to the confluence of the North Fork and South Fork was reopened* (to angling) *from May 29, 1983 to January 31, 1984. The limit was one fish over 20 inches. This allowed fishing during a time period when predominantly hatchery stocks of summer and winter steelhead pass through the river* (from prior plants to the eruption). *Due to turbid water conditions, however, very few fish were creeled. Portions of the North Fork, South fork, Green River, and main Toutle were open from June 15 to November 30, 1984 for catch-and-release fishing primarily on hatchery summer runs. Since few smolts were released into these streams from 1981-1983, only a limited number of adults are expected through 1985. The first substantial returns of summer run steelhead* (hatchery) *should be in 1986, a result of 1984 plants in excess of 20,000 smolts in both the Green River and South Fork.* The concluding pages of the 1985 report are noteworthy: *"Fish populations of the Toutle Basin have made remarkable adjustments since the eruption. Darwin could not have devised a more ingenious test for 'the survival of the fittest.' ... Many fish died in their struggle to return ...Fish corpses, still full of eggs and milt, littered the streambanks, especially the first year after the eruption ... the strongest prevailed ... Observing and studying the recovery of the Toutle River has been a unique and fascinating experience ... the overriding constant through this relatively short period of time has been the uncanny ability of nature to recoup her losses ... steelhead are flourishing in many streams of the Toutle Drainage ... instead of ruling the land, we are temporary, and often powerless, tenants ... even more dramatic ... is the chance to watch nature heal herself."*

26 years ago, Lucas and Pointer (1987) 1,650 wild steelhead were estimated to have escaped into the SF Toutle River and increased spawning was found in the mainstem as compared to a domination of tributary spawning there in 1985 and 1986. Steelhead fishing during the experimental January 1 to April 15 season (limited to 2 days per week with a one steelhead possession limit) resulted in an estimated harvest of 285 steelhead. The January catch was 40% of the total and estimated to be primarily that of hatchery summer-runs. It was the first legal harvest of wild winter steelhead since the Mt. St. Helens eruption in 1980. Escapement into the SF Toutle was well above the maximum sustained harvest (MSH) management goal at the time of 1,058 wild winter steelhead. This contrasted with a minimum estimated wild winter steelhead spawning escapement into the EF Lewis 748 fish and included 14% of the spawning above Sunset Falls; 729 escaping wild winter steelhead into the Coweeman River; and only 248 wild winter steelhead in the mainstem Kalama River as estimated at that time.

24 years ago, in 1989, a 184 foot high sediment retention dam was completed on the NF Toutle River. It was designed to retain sediment until 2035 but the reservoir behind had filled to sediment capacity by 2012 (Denlinger 2012). Although comparative measures of sediment levels in the NF Toutle downstream of the sediment retention dam prior to and after its construction were not found, it is assumed that sediment levels in the NF and Mainstem Toutle downstream of the dam after 1989 were considerably reduced. If so, it would encourage straying of hatchery steelhead from the Cowlitz River to make entry into the formerly more inhospitable Toutle basin with increased potential for hatchery/wild spawning interactions. The SF Toutle and Green rivers had the least sediment levels occurring by that time (Lucas 1985; 1986; and Lucas and Pointer 1987). Presumably they would have been particular targets for stray hatchery spawning in the Toutle basin.

The Toutle River subbasin of the Cowlitz has had continuing habitat recovery from the 1980 eruption of Mount St. Helens, and yet the wild winter steelhead populations of the Green and the South Fork of the Toutle basin have declined, not increased, since startlingly rapid-paced recoveries by the mid to latter 1980s (no data available for the North Fork Toutle population could be found). While Green River wild winter steelhead, since a low in the 1990s, have made some recovery, as would be anticipated with habitat recovery progress since 1980 (but remains well below the 1985 level), the South Fork Toutle, which made such rapid and steady recovery until 1989, has gone into a great decline ever since (excepting for 2003 and 2004). The declines from the mid 1980s of wild winter steelhead in these Toutle tributaries have paralleled introductions of hatchery summer-run steelhead of Skamania stock (1984) into both rivers (Appendix C, Figures 1 and 2).

The evidence from the upper Clackamas River basin of the Willamette has clearly indicated that introduction of Skamania stock hatchery summer steelhead plants there led to wild winter steelhead declines with a subsequent competing summer steelhead population developing that competed with the wild winter population (Kostow et al. 2003; Kostow and Zhou 2006). This could well be the case with the South Fork Toutle as well (and potentially elsewhere in the Toutle basin) as evidenced by creel surveys on the South Fork Toutle in 2012 that documented apparent wild summer steelhead being caught without adipose clips in June, July, August, September, and October (Appendix C, Figure 6) that would correlate with Skamania hatchery stock summer steelhead run-timing. Some in June and July could be late wild winter steelhead, but the peak in that time period suggests otherwise when wild winter steelhead would be diminishing and few in number. This correlates with the Clackamas River findings in which the competing natural spawning population of Skamania origin hatchery summer steelhead diminishes the ability of available habitat to be productive for wild winter steelhead, and when the summer steelhead hatchery plants ceased the wild winter steelhead trend reversed from decline toward an increase (Kostow and Zhou 2006). This has been further documented since with updated graphs provided by Kostow in 2015 demonstrating the continued Clackamas River wild steelhead recovery since cessation of the summer steelhead hatchery plants (pers. comm. Bill Bakke of the Native Fish Society and as provided by him) as shown in Appendix D, Figures 1-3.

Also, completion of the North Fork Toutle sediment reduction dam in 1989 coincides with the halt to South Fork Toutle wild winter steelhead recovery progress and resulting reversal into long decline. One potential cause is that with less sediment in the Toutle outflow to the Cowlitz River it has since attracted more straying from the large numbers of hatchery winter and summer steelhead planted into the Cowlitz annually. It is apparent from the 2012 creel surveys that there are hatchery winter steelhead straying into the South Fork Toutle in December and January, probably from the Cowlitz River as the nearest source. These would further diminish the ability of South Fork Toutle habitat to be productive for wild winter steelhead.

Clackamas River of Oregon Example

The Clackamas River (of the lower Willamette basin), Kostow et al. 2003 indicated that introduction of Skamania origin hatchery summer steelhead had led to wild winter steelhead population decline in otherwise good natural habitat: *"Our data support a conclusion that hatchery summer steelhead adults and their offspring contribute to wild steelhead population declines through competition for spawning and rearing habitats. We conclude that even though naturally spawning hatchery steelhead may experience poor reproductive success, they and their juvenile progeny may be abundant enough to occupy substantial portions of spawning and rearing habitat to the detriment of wild fish populations. Therefore, the large numbers of introduced summer steelhead would have competed heavily with wild winter steelhead for habitat resources, and this may have contributed to their decline. In the Clackamas basin, smolt offspring of hatchery fish appear to have wasted the production from natural habitat because very few to return as adults."*

Hatchery fish are taking up space needed for wild fish production and wasting habitat on man-made freaks that don't reproduce well at all ..

Kostow and Zhou in 2006 further indicate that Skamania origin hatchery summer steelhead resulted in wild winter steelhead decline: *"In the Clackamas River basin, the summer steelhead hatchery adults had poor reproductive success; fewer smolts were produced per parent than in the wild population, and almost no offspring of hatchery fish survived to adulthood (Kostow et al. 2003). The hatchery program was meant to provide a sport fishery, and the production of adult offspring was not intended. If successful hatchery reproduction had occurred, at least the offspring could have contributed to fisheries. Instead, the hatchery fish wasted basin capacity by occupying habitat and depressing wild production while producing nothing useful themselves. It is not unusual for hatchery adults to have poor reproductive success when they spawn naturally (other examples are provided by Reisenbichler and Rubin 1999, Kostow 2004, and McLean et al. 2004). The combined effect of poor hatchery fish fitness and depressed wild fish production due to competition with the hatchery fish poses a double jeopardy that could quickly erode natural production in any system."*

Hatchery fish certainly have eroded natural production without a doubt in all our systems that have had interactions with Chambers creek steelhead.

> Habitat Capacity Estimates
>
> Nowhere does the DEIS quantify or actually evaluate the remaining steelhead habitat capacity for the five Puget Sound basins being evaluated other than the viable abundance

McMillan is a biologist and he states that these 5 river basins have the habitat capabilities of producing much more steelhead then they currently are.. What other limiting factors are there, harvest ,and Hatcheries.

These examples of what other Countries are doing with Atlantic Salmon recovery issues show that we are not making the correct decisions.

Wales of Great Britain Example

Regarding habitat protection and recovery potentials, it is tightly linked to the limitations in fishery funding available as compromised by the high investments in hatcheries. This is increasingly being recognized in the diminishment and eliminations of hatcheries at an international level. For instance, Wales of Great Britain recently eliminated its Atlantic salmon hatchery programs (Gaugh 2014). This was based in part on the findings that the highly degraded River Tyne's Atlantic salmon recovery was less linked to hatchery investments than to habitat recovery investments (Milner et al. 2004). The future of Atlantic salmon management in Wales has been identified as being a shift from hatchery investments to habitat investments instead (Gough 2014). A quotation from this is revealing regarding the Wales decision:

"We are passionate about making sure that Wales has a healthy and sustainable salmon population. To do that, we need to use our resources as effectively as possible.

"We've done a lot over the years to improve water quality and, together with our partners, to improve habitats and resolve barriers to migration. We believe the benefits of these are now starting to have effect, and this will improve freshwater conditions for our salmon and other fish.

"Our rivers are an important part of our environment. They provide essential habitats for fish and other wildlife as well as giving people opportunities to enjoy the outdoors through angling and other water-based activities."

"NRW looked at a wide range of scientific evidence from the UK and abroad which suggested there are more effective ways to support salmon in Welsh rivers. A public consultation did not come up with any evidence to the contrary.

"Salmon became extinct on the River Taff during the industrial revolution and stocking played a part in its recovery along with some other previously industrialised rivers.

"A study has now revealed that, after stocking provided that initial boost to restore the population, more salmon would be produced if fish were left in the river to spawn rather than taken for hatchery rearing.

A study – "singular I may add" we have had many yet we still don't do the right thing! A study revealed that stocking provided an initial boost but more salmon would be produced if the fish where left in the river to spawn rather than taken for hatchery rearing..

I totally agree with below comment on Money raised from the sale of Hatcheries will be used to improve habitat!

"Money raised from the sale of the hatcheries will be used to improve fisheries in rivers which have previously been stocked, including work to improve habitats or to open new migratory routes."

The actual review document from which the Welsh press release was based provides the following conclusions and recommendations (Uttley 2014):

"Conclusions

"From the evidence available, the review concludes that on-going mitigation and enhancement salmon stocking deliver relatively poor outcomes for NRW and salmon populations, particularly given the lack of evidence for effectiveness and the evidence for potential impacts to wild salmon population fitness and productivity. These conclusions regarding the effectiveness and potential impacts of salmon stocking are equally applicable to any stocking undertaken by third parties. In addition, stocking delivers fewer additional ecosystem services when compared with other measures we could take and advocate others to take. The review concludes that NRW should focus it's efforts and resources on habitat restoration, particularly removing obstacles to migration and improvements to the quality and extent of spawning and juvenile habitat. Future restoration stocking should not be ruled out should it be required.

"The Recommendations made as a result of this review are:

"NRW should bring all our own on-going mitigation, population re-inforcement and enhancement salmon stocking in Wales to an end, This includes all third party stocking on rivers designated under the Habitats Directive for their wild salmon populations. A further component of this includes the development of a realistic and practical timetable for bringing all other third party salmon stocking in Wales to an end, and a start to the process of working and consulting with stakeholders and co-signatories to relevant agreements to put in place suitable alternative mitigation measures instead of stocking. Future restoration stocking should not be ruled out if needed, however there is currently no identified need for this in Wales.

"In addition, given the benefits to salmon and the wider environment from a range of habitat restoration measures, NRW should work with all interested parties to further develop and focus effort on this approach, in particular on removing barriers to migration and increasing the quality and extent of spawning and juvenile habitat available in our rivers. There is a significant opportunity to develop an approach to mitigation and enhancement that will provide multiple benefits to the Welsh environment and to all those that have a stake in ensuring salmon numbers are increasing or stable..."

British Columbia Example

In British Columbia the recent steelhead management policy framework (MFLNR 2014) describes the great curtailment in hatchery programs and production there based on the

BC went wild fish release in the early 80's and has based all recovery on eliminating harvest where possible (holes exist obviously where ever abundant commercial salmon fisheries are present) … Most of these are centered around the lower mainland and a few on the Island …

" There are currently no known effective methods to rebuild depressed populations of wild Steelehead other than reducing mortality (and in specific circumstances, restore habitat).

Another great example of with an outcome that hatcheries didn't work.

> Montana Example
>
> In 2004, *Montana Outdoors* (MFWP 2004) interviewed Dick Vincent, the biologist whose research in the late 1960s to early 1970s led to the 1974 Montana decision to eliminate stocking of hatchery catchable trout in streams and subsequent investments put into stream habitat. It was initially thought, as indicated below, that habitat was the limiting factor in the diminishing wild trout population, but the research found that it was hatchery plants that were limiting the wild trout population much more than habitat factors were. This is entirely relevant to steelhead whose first 1-4 years are spent rearing in Washington streams under the influences of both hatchery programs and what the habitat can support. Excerpts from the article follow about the results in Montana after 30 years:
>
> *"In 1974, Montana did something that stunned anglers across the state and the nation: It stopped stocking trout in streams and rivers that supported wild trout populations.*
>
> *"The move initially outraged many anglers, fishing businesses, and even some Montana Fish and Game Department staff. For decades, hatcheries had been credited with producing more and better fishing. Without stocking, many Montanans asked, what would happen to the state's famous trout waters and the businesses that relied on legions of anglers arriving from across the country each summer?*
>
> *"The answer, now well known, is that trout fishing improved dramatically. Once stocking was discontinued, wild trout numbers doubled, tripled, and more on many rivers.*
>
> *"On this 30th anniversary of Montana's discontinuation of stocking trout in rivers capable of sustaining wild trout, Montana Outdoors visited with fisheries biologist Dick Vincent,whose research on the Madison River in the late 1960s and early '70s led to that decision...*

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"On this 30th anniversary of Montana's discontinuation of stocking trout in rivers capable of sustaining wild trout, Montana Outdoors visited with fisheries biologist Dick Vincent,whose research on the Madison River in the late 1960s and early '70s led to that decision...

How heavily was Montana into stocking fish at the time?

"That was really the peak of our river stocking program. We were stocking the Big Hole, Yellowstone, Gallatin, Madison—all the best rivers, which already had great trout fisheries—with an average of 2,000 catchable trout per mile. But the department was still getting complaints about how poor the fishing was, that it was getting worse each year. So the solution was to stock even more, and whoever hollered the loudest got the most fish in their favorite stretch of river. The idea then was that the stocked fish were an addition to the wild populations, that two plus two equaled four. But a few of us biologists wondered if maybe two plus two equaled three or even less...

And that caused the agency to rethink its river stocking policy?

"River stocking was already under some criticism because the return to the angler was so low. Within three months of being planted, 95 percent of stocked river trout are dead,

Now that makes total sense that WDFW continued planting Chambers creek stock when the run couldn’t even sustain themselves with a hatchery that had ZERO harvest pressure and went extinct, brilliant!

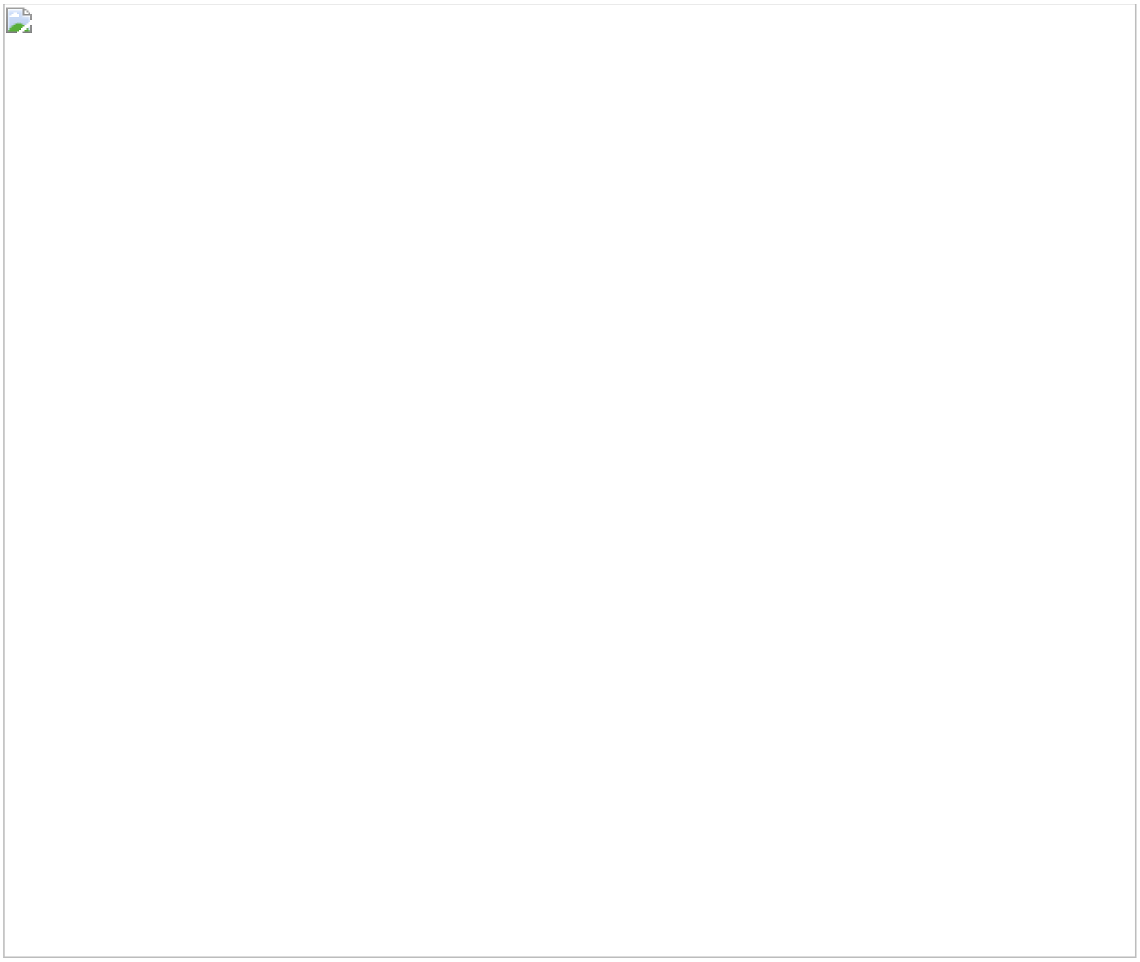
"A major shift to that of Steelhead management based on Alternative 1 provides "the lone means of focusing available fisheries money into habitat accusation, habitat recovery, and habitat protection and enforcement rather than that of perpetuation of continued Experiments with hatchery programs that have already been tried here and elsewhere with poor results".

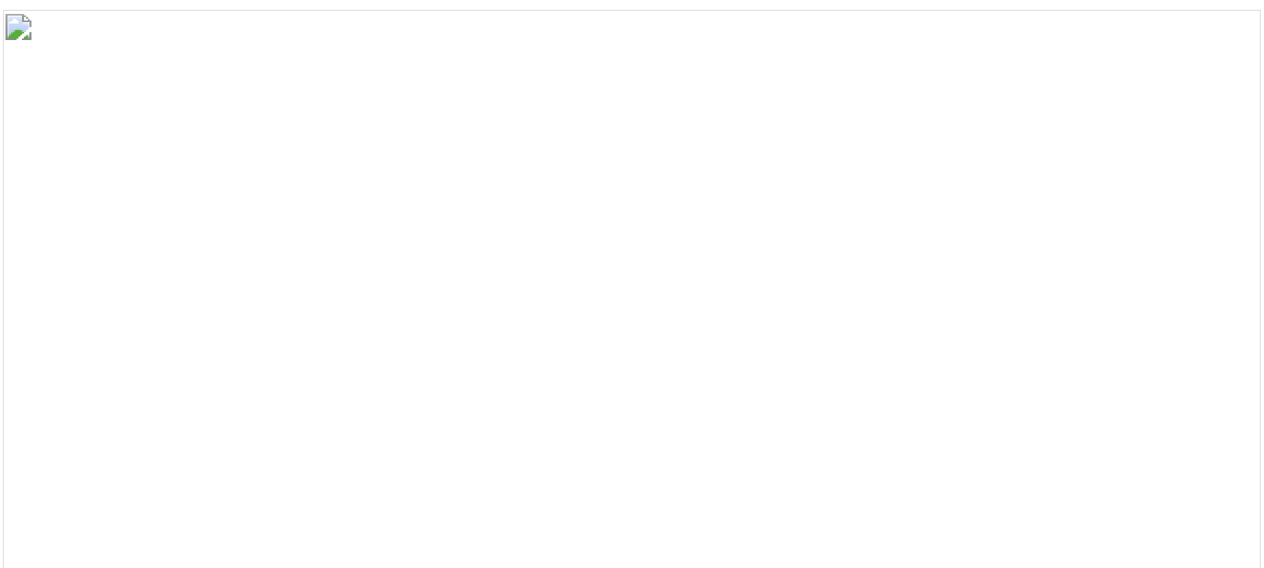
survival problems or otherwise habitat limitations (Pflug et al. 2013). This may well be. However, the very purpose often identified for the Chambers Creek hatchery steelhead programs (now dispersed across Washington from satellite hatchery facilities where this stock remains) are to provide harvest that habitat limitations prevent wild steelhead from providing (as repeated many times in this DEIS). It is very apparent that Chambers Creek origin steelhead have absolutely no ability to counter habitat constraints on productivity as exemplified by the failure at Chambers Creek itself. It is also apparent that as ocean conditions, or other survival limitations in the marine environment, decline with reduced productivity that it is these very hatchery steelhead that are hardest hit with more greatly reduced survival than wild steelhead (McMillan 2012; Pflug et al. 2013) and as depicted in my comments for Ocean Conditions in this DEIS response and in Appendix G (Figures 1 and 2). It is also apparent that these Chambers Creek hatchery origin characteristics have been dispersed broadly into the natural environment as found by their straying in the Skagit basin (Pflug et al. 2013; McMillan 2015a; and 2015b) which can only reduce the ability of the habitat to be productive for steelhead.

A major shift to that of steelhead management based on Alternative 1 provides the lone means of focusing available fisheries money into habitat acquisition, habitat recovery, and habitat protection and enforcement rather than that of perpetuation of continued experiments with hatchery programs that have already been tried here and elsewhere with poor results. It is very clear from the above examples where the worldwide trend has been heading based on the available science – toward habitat protection and recovery, not use of hatcheries as a failed substitute capable of mitigating for lost habitat. This includes use of wild steelhead broodstock hatchery programs that have yet to prove effective for wild population recoveries for Puget Sound steelhead. The latter was clearly indicated by Barry Berejikian in his presentation at a steelhead science workshop hosted by the University of Washington School of Aquatic and Fishery Sciences and sponsored by Trout Unlimited regarding wild broodstock hatchery steelhead programs of which he has been lead scientist as part of the Hood Canal steelhead project (Wild Steelhead United/Trout Unlimited Steelhead Science Workshop for Anglers, May 9, 2015).

For 43 years we/WDFW has known the issues existed and this lag time has occurred with devastating results for Puget sound Steelhead and the fisheries related to them..

This is the opportunity to reverse the long forgone opportunity to alter steelhead management in Puget Sound as the responsibility of the this DEIS process by moving forward with option 1.





Even NOAA has stated the concerns of reliance on Chambers creek stock!

Prior NOAA/NMFS Example

Concerns about Chambers Creek origin hatchery steelhead related to wild steelhead recovery was clearly stated in a letter from NOAA Fisheries to Lower Elwha Klallam Tribe dated April 14, 2010:

What are the risks and benefits to native populations of *O. mykiss* in the Elwha River to the continued use of Chambers Creek steelhead, a non-local stock?
Continued use of Chambers Creek hatchery steelhead in the Elwha River would increase the risk of loss of genetic variation and loss of fitness in native steelhead.

Do Chambers Creek steelhead have a role in the recovery of native Puget Sound steelhead? If so, what is it?
In our opinion as Northwest Fisheries Science Center scientists, Chambers Creek hatchery steelhead have no role in the recovery of native Puget Sound steelhead.

How it is that NOAA/NMFS is continuing to discuss the use of Chambers Creek origin hatchery steelhead in Puget Sound, as evidenced by this DEIS, given the Puget Sound steelhead ESA listing in 2007 and recovery responsibilities is beyond understanding.

Skagit Wild Broodstock Failures Example

The Skagit River basin has had three prior attempts at using wild winter steelhead for wild broodstock hatchery programs between 1980 and 1998. For only one brood year was there any evidence of success. The primary reason indicated from the internal memos between Washington Department of Game, Skagit System Cooperative Tribes, and the Wildcat Steelhead Club (from Wild Fish Conservancy information request from WDFW) is that rearing wild juveniles to adequate smolt size for spring release within one year was mostly difficult to impossible to achieve.

Three tables and brief description of these largely failed attempts follow:

i

The use of wild brood stock has been attempted 3 times with little success on just the Skagit, and has also been tried on the Nooksack and other drainages as well with the same issues, poor results, and discontinued..

It's not the gathering of the wild eggs that's the problem "it's raising them in a hatchery environment" that makes them what they are, agricultural stock critters that "become weak replacements" of their wild parents with poor survival skills. The most critical time for adopting the survival skills needed to survive and prosper is in the first year of existence, boot camp if you will. Survive or die, not Thurston Howell the III on Gilligan's Island, sitting in a cement or natural pond for that matter where there are no predators to speak of and food is provided on a timer 3 times a day. Once set free into the wild it can only be like Normandy beach on D-Day until all but .001% released have died. 150,000 released out of the Nooksack hatchery to get 50-150 back.. We do not need to spending money feeding all the critters of Puget Sound with our $$$$$. 100% wasted funds that could be used for viable recovery options.

Skagit River Wild Broodstock Steelhead Collections: Program Summary of Raw Data Files (1980-1992) Hand Written Notes by Jim Johnston WDW, 3-3-1992 (Likely limited to the Wildcat Steelhead Club collections). These were indicated as monitored releases and returns but there was no subsequent evidence found of any adult returns related to these plants or the impact on wild juveniles in those tributaries where fry were released.

brood yr adults collected	# female	# male	total adults	# eggs	plant date	# planted	size planted	plant site
1980	4	5	9	20,000	5/15/1981	6,346	8.9/lb	Skagit
1981	3	8	11	18,000	5/10/1982	1,769	7.1-9.3/lb	Skagit
1982	15	20	35	101,325	12/30/1982	14,958	23.2/lb	Barnaby
					4/26/1983	10,958	9.5/lb	Skagit
1983	19	19	38	144,489	5/4/1984	51,360	32/lb	Barnaby
					6/13/1984	21,700	10/lb	Skagit
1984	16	24	40	47,084	3/21/1985	7,254	62/lb	Barnaby
					5/22/1985	13,131	9/lb	Skagit
1985	18	18	36	88,000	10/20/1985	55,043	172/lb	Alder Ck
1986	10	14	24	52,000	10/4/1986	43,900	145/lb	Skagit
1987	11	17	28	69,496	9/15/1987	62,606	140/lb	Skagit
1988	20	15	35	70,985	11/19/1988	8,448	128/lb	Jones Ck
					11/19/1988	38,144	128/lb	O'Toole Ck
1989	9	14	23	52,000	11/25/1989	7,956	306/lb	Jones Ck
					11/25/1989	3,978	306/lb	O'Toole Ck
1990	11	18	29	73,000	11/3/1990	8,370	93/lb	Jones Ck
					11/3/1990	29,226	93/lb	O'Toole Ck
					11/3/1990	6,300	93/lb	Skagit
1991	12	17	29	74,930	11/18/1991	8,304	346/lb	Jones Ck
					11/23/1991	12,802	346/lb	O'Toole Ck
					11/23/1991	2,422	346/lb	Brickyard Ck
1992 low returns with no collections								
Totals	148	189	337	811,309		414,975		

Available data found for wild broodstock hatchery steelhead program through Skagit System Cooperative, WDG, and Puget Power mitigation agreement in 1985 that was reported in a Puget Sound Energy relicensing document of 2002 to have been a total of 611,000 total smolts to be reared at Lake Shannon on the Baker River. The data found were a combination from varied records of Skagit System Cooperative. There was one year of smolt plants that had a documented return.

smolt year	wild brood smolts (confirmed)	total adult return 2 & 3 years later	comments
1986	unk		collected & reared Wildcat Steelhead Club; smolts not released at Baker
1987	9061		
1988	16224	652 & at least 54	only adult return yrs found assessed 1990 & 1991
1989	0		all died prior to smolts
1990	0		all died prior to smolts
1991	9000		all that remained after ICH outbreak killed others
1992			
1993	0		no wild broodstock collected 1992 due to low return
1994	862		
1995	500		
1996			
1997			

1998			
Total	35647		the reported 611,000 total smolts released over the entire period by PSE 2002 may have included Chambers Ck substitutions which may have been 575,353 of the missing

Sauk River wild broodstock females were caught between 4/3/1982 & 4/21/1982 with all fish individually tagged with fish held and spawned at Arlington Hatchery. Data from Washington Dept. of Fish and Wildlife older records. There may have been another year or two of Sauk River wild broodstock collections but these were the only confirmed data found for number of females taken. No record was found of what the resulting number of smolts was, or the subsequent adult return. That it was discontinued would indicate a lack of probable success for the program.

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date capture	date spawned	days between capture & spawn	date capture	date spawned	days between capture & spawn
3-Apr	15-Apr	12	13-Apr	29-Apr	16
7-Apr	15-Apr	8	10-Apr	29-Apr	19
18-Apr	22-Apr	4	17-Apr	6-May	19
14-Apr	22-Apr	8	18-Apr	6-May	18
17-Apr	22-Apr	5	7-Apr	6-May	29
18-Apr	29-Apr	11	16-Apr	6-May	20
21-Apr	29-Apr	8	10-Apr	6-May	26
16-Apr	29-Apr	13	18-Apr	6-May	18
7-Apr	29-Apr	22	18-Apr	13-May	25
14-Apr	29-Apr	15	17-Apr	13-May	26
3-Apr	29-Apr	26	17-Apr	13-May	26
21-Apr	29-Apr	8	5-Apr	13-May	39
			Total 24 females		**Avg 17.54 days**

These prior failed attempts for use of wild broodstock in the Skagit basin do not provide a background from which to expect further success in what was apparently a primary goal at the time to provide an alternative hatchery means to provide better sport and tribal harvest opportunities than the Chamber Creek origin hatchery steelhead were providing. On request by NOAA, the information these data came from will gladly be made available. It is otherwise too large to conveniently provide in the limitations to this DEIS. Earlier reference to the Skagit System Cooperative wild broodstock program was briefly indicated in McMillan (2012), but at that time data for the other programs was unknown to exist and the Skagit System Cooperative data was incomplete, and still likely remains so to some extent.

The Canadians have experimented with Wild Broodstock and the living gene bank … Both projects have been discontinued!

Keogh River Wild Broodstock and Living Gene Bank Examples

As previously commented under Ocean Conditions, at the Keogh River of northeast Vancouver Island in British Columbia, two well monitored hatchery experiments were tried with one using wild broodstock as conventionally used in British Columbia in numerous stream locations, as well as what was called a living gene bank (LGB) attempt at taking wild smolts and keeping them captive for subsequent egg taking. Both programs have been abandoned as failures to succeed at enhancing the wild steelhead population and in failures to provide increased fishing opportunity. In fact, the long-term result has been greater declines in both (Appendix G, Figure 7). Importantly, BC has used wild steelhead broodstock hatchery programs extensively dating to the 1970s with results also previously described (comments to Habitat Alterations, Figure 1) in the abandonment of the majority of those programs in favor of investments in habitat as their preferred alternative based on costs and benefits (MFLNR 2014).

Hatchery Impact Literature Example

Table 40. Potential mechanisms of hatchery impacts on steelhead populations described in literature.

Potential mechanism	References
Spawning interactions, genetic hybridization	Adults (Reisenbichler and McIntyre 1977; Reisenbichler and Rubin; Seamons et al. 2012) Precocious male parr (McMichael et al. 1999; Tipping et al. 2003; McMillan et al. 2007; McMillan et al. 2011; Christie et al. 2011-a)
Unintended Straying to Natural Spawning Grounds; and Lack of Spawn Time Separation between Wild and Hatchery Steelhead Selected to Be Different	Straying (Shapovalov and Taft 1954; Lirette and Hooton 1988; Schroeder et al. 2001; Jonsson et al. 2003; Keefer and Caudill 2012; Seamons et al. 2007; Seamons et al. 2012) Lack of Spawn Time Separation between Wild and Hatchery Fish Selected to be Different (Mackey et al. 2001; Seamons et al. 2012)
Reduced Fitness and/or Reproductive Success	(Reisenbichler and McIntyre, 1977; Close 1999; Kostow and Zhou 2006; Araki et al. 2007-a; Araki et al. 2007-b; Araki 2008; Araki et al. 2009; Chilcote et al. 1986; Chilcote et al. 2011; Christie et al. 2011; Bernston et al. 2011; McLean et al. 2003; Seamons et al. 2012; Byrne et al. 1992; Byrne and Copeland 2012; Christie et al. 2012)
Reduced or Altered Life Histories	(Jonsson and Jonsson 2006; Zaporozhets and Zaporozhets 2012; Miyakoshi et al. 2012)
Competition/Density Dependence	(Berejikian et al. 1996; McMichael et al. 1999; Kostow and Zhou 2008; Levin et al. 2001; Pearson et al. 2007; Ruggerone et al. 2012; Zhivotovsky et al. 2012) A sub-mechanism in this category is residualization of hatchery smolts (Royal 1972; Cannamela 1992; Viola and Schuck 1995; Tipping et al. 1995; McMichael et al. 1997; McMichael et al. 1999; Washington Trout 2004)

Indirect Predation	The relationship of hatchery releases and predator attraction (Thompson and Tufts 1967; Beamish et al. 1992; Nicholson 2003; Balfry et al. 2011; Collis et al. 1995; Einum and Fleming 2006; Handelmann et al. 1996; Steward and Bjornn 1990)
Overharvest in Mixed Stock Fisheries	(Flagg et al. 1995; Larkin 1977; Wright 1993)

For the Skagit River steelhead study a list (McMillan 2012) and table (Pflug et al. 2013) were developed regarding the identified hatchery-related mechanisms that can impact wild salmon and steelhead and the references related to them (Table 40 above). The full list of references is provided in Appendix F along with Table 1 providing smolt residualism literature found at the time of 2004 when it was created with a list of residualized smolt levels related to hatchery steelhead smolt plants. At the bottom of Table 5 it indicates the hatchery stocks used (including wild broodstock) and whether volitional releases or not if such was described. Some of the highest residualism levels were related to wild broodstock programs including at the Keogh River in BC with percentages of over 40%. My assumption is that Table 40 and its related references will be examined carefully for covering a great breadth of hatchery related impacts and the literature associated with them.

Hood River Example

There is an entire suite of literature on the results of both winter and summer steelhead hatchery programs that have occurred at Hood River and the declining wild steelhead trends (Araki et al. 2007a; Araki et al. 2007b; Araki 2008; Araki and Blouin 2009; Blouin 2003; Christie et al. 2011a; Christie et al. 2011b; Christie et al. 2012; Kostow 2004). In both cases, both more domesticated broodstock and wild broodstock were used with similar resulting declines (Appendix J, Figures 1 and 2).

Forks Creek Example

Several steelhead studies have occurred related to research at Forks Creek on the southwest Washington Coast related to an early winter steelhead hatchery program there that was presumably isolated by return-time, spawn-time, and use of a weir to prevent interactions with wild steelhead. The results have proved very differently. From Seamons et al. 2012:

"Two strategies have been proposed to avoid negative genetic effects of artificially propagated individuals on wild populations: (i) integration of wild and captive populations to minimize domestication selection and (ii) segregation of released individuals from the wild population to minimize interbreeding. We tested the efficacy of the strategy of segregation by divergent life history in a steelhead trout, Oncorhynchus mykiss, system, where hatchery fish were selected to spawn months earlier than the indigenous wild population. The proportion of wild ancestry smolts and adults declined by 10–20% over the three generations since the hatchery program began. Up to 80% of the naturally produced steelhead in any given year were hatchery/wild hybrids. Regression model selection analysis showed that the proportion of hatchery ancestry smolts was lower in years when stream discharge was high, suggesting a negative effect of flow on reproductive success of early-spawning hatchery fish. Furthermore, proportions of hybrid smolts and adults were higher in years when the number of naturally spawning hatchery-produced adults was higher. Divergent life history failed to prevent interbreeding when physical isolation was ineffective, an inadequacy that is likely to prevail in many other situations."

"…The early migration and spawn timing of hatchery fish were believed to effectively prevent them from interbreeding with wild fish. Instead, it appears that significant proportions of the smolts and adults have been hatchery/wild hybrids. Earlier radio-tagging studies showed that there was some temporal overlap in migration and spawning, mainly hatchery-produced males arriving and spawning when wild fish were present (Mackey et al. 2001). There is considerable variation in migration and spawning timing even among wild fish in this and other steelhead populations (Seamons et al. 2007).

"…Even if barriers were completely effective at preventing upstream migration, the hatchery-produced fish might spawn elsewhere in the basin (Quinn 1993; Dittman et al. 2010). Segregation by life history was thought to complement physical segregation, but our study shows that it failed to prevent genetic interactions between hatchery and wild steelhead populations. Thus, managers should also consider other options for minimizing interactions between wild and cultured animals."

Many smaller streams in Puget Sound, and many of the tributaries of the main river basins have similarities to Forks Creek and it can be anticipated what has occurred at Forks Creek has occurred broadly in Puget Sound.

Skagit River Examples

The findings of regular spawning surveys at five Mid Skagit River tributaries from 2010-2014 found significant levels of early wild steelhead spawning along with that of hatchery steelhead spawning (McMillan 2015a; and 2015b). These surveys occurred from October through May to determine the full possible breadth of steelhead spawning. This differed from the spawning surveys by WDFW that typically begin about mid-March in the assumption that wild steelhead do not spawn earlier. Both hatchery and wild steelhead spawning were found in the January to early March period, sometimes together, along with wild resident rainbow males. Some of the more pertinent findings were (McMillan 2015a):

> *"There were 104 total steelhead redds counted in the five years of Mid Skagit tributary surveys (Table 1). Almost half (49%) of the redds were found prior to March 15th, the assumed initiation date of wild steelhead spawning. Over half (53%) of the steelhead were estimated to have spawned prior to March 15th when redd sightings were adjusted for spawn timing (Figure 1). In the five years of surveys a total of 18 O. mykiss (14 steelhead, 2 male residents, and 2 undetermined male steelhead or residents) were observed at 7 active spawning redds between January and June (Table 2). The hatchery proportion of the steelhead in the spawning mix was 40%. If the wild male resident life history was included it decreased to 33% hatchery. Both wild and hatchery origin steelhead were found spawning in the early time period of January to mid March. The hatchery proportion of the steelhead spawning mix prior to March 15th was 67% (Table 3). If the wild male resident life history was included it decreased to 50% hatchery. Although no hatchery steelhead*

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We were sold on the Chambers Creek stock by WDWF that would not spawn with wild fish due to early spawn time vs the later wild component… Well 70% of the wild component used to entered these 5 streams between November and February, so we have had poor survival and "wasted habitat production from remaining wild fish caused by hatchery fish" and we over harvested the largest component of the wild run to extinction.

were found spawning after March 15th the unknown origin steelhead after that date were 20% of the total steelhead observed. Of particular concern, hatchery steelhead were found spawning to the maximum upstream anadromous extent of the smallest tributaries in the Mid Skagit basin.

"The spawning time of steelhead was found to vary between tributaries. Over 50% of the spawning occurred prior to March 15th in three of the tributaries. The two other tributaries had 50% of the spawning occurring after March 15th. Air/water temperature, precipitation, streamflow, and intermittent or perennial hydrology were all examined as potential explanations for the spawn timing differences. Streamflow hydrology best explained the steelhead spawn timing differences. Specifically, whether a tributary's hydrology was intermittent or perennial was found to be a particularly probable driver regarding whether most steelhead spawned prior to March 15th or most thereafter (Figure 3). This was hypothesized to be due to the need for spawning to be early enough for significant numbers of emergent steelhead fry to move either downstream to perennial waters prior to late June to early July when intermittent flows began to disconnect these tributaries from larger downstream water bodies, or upstream if that option were available. Although intermittency is predicted to increase in northward expansion with climate change, and is sometimes perceived as a great limitation on steelhead reproductive success, there are examples of high steelhead productivity that occurs in intermittent streams and where gravel accumulations may actually provide better spawning habitat if steelhead life histories have effectively adapted with early spawning and emergence."

The Mid-Skagit River tributary spawning surveys are not the only evidence of hatchery steelhead straying through much of the Skagit basin in a time period that indicates they will soon spawn or have spawned from March onward, when it is well documented many wild steelhead similarly spawn. The Skagit River study intended to determine what the effects of hatchery steelhead may be on the wild population that occurred from 2008 to 2012 found the following (Pflug et al. 2013):

Staying hatchery fish are a major problem!

"Unspawned and kelt hatchery - origin steelhead captured outside the hatchery after March 1 for each return year are shown in Figure 18. Hatchery steelhead shown in this figure had either spawned outside the hatchery or were captured after the established time frame for spawning at the Marblemount hatchery. Stray hatchery adults, both spawned and un - spawned, have been collected or observed in the mainstem Skagit, Sauk and Cascade rivers as well as in tributaries such as several middle Skagit reach tributaries including Savage, Finney, Mill creeks.

"WDFW scale interpretation information was also used to show evidence of hatchery steelhead repeat spawning from adults captured in a tribal fishery (Figure 19). In most years between 2005 and 2011 there were examples of hatchery steelhead having spawned multiple times based on scale interpretation. Hatchery steelhead that do return to the Marblemount hatchery are spawned a single time and killed preventing repeat spawning. These data provide evidence showing that hatchery - origin steelhead strays are capable of spawning multiple times outside of the hatchery.

"…The capture of both spawned and unspawned hatchery - origin steelhead at a variety of mainstem and tributary locations verified the occurrence of straying throughout the Skagit watershed. This finding confirms that there is opportunity for genetic and ecological interactions with natural - origin steelhead. Furthermore, it was established that a number of stray hatchery adults are returning after February which is far later than desired for the Marblemount segregated hatchery program. These fish overlap with the spawn timing of natural - origin steelhead throughout the basin creating opportunities for reproductive hybridization. This is especially true for earliest spawning natural - origin steelhead typically found in the middle Skagit mainstem and its tributaries.

"Our results as well as findings from other researchers found that late returning hatcheryorigin adults, especially males, on the Skagit were found to stay in fresh water for many months (Leider et al. 1984; Seamons et al. 2004). Both studies found that hatchery males in particular are capable of remaining in fresh water until natural - origin females arrive and mate with wild fish throughout the wild spawning season, thus producing offspring with relatively late return timing. On the Skagit it appears that the largest overlap in spawn timing occurs in the middle Skagit reach, especially in the tributaries where some of the earliest natural-origin spawning takes place.

"Based on scale interpretation, hatchery strays have also been shown to be capable of repeat spawning outside of the hatchery. Multiple reproductive cycles by a number of strays further extends the potential amount of genetic and ecological interaction with their natural-origin counterparts.

"The degree to which hatchery-origin steelhead stray and residualize in the Skagit remains unclear. However, it is likely that it varies annually depending on several factors such as number of smolt released, smolt to adult survival and freshwater flow conditions during adult upstream migration."

1997 Skagit River Findings (Phelps et al. 1997):

"For the past several years, the Washington Department of Fish and Wildlife (WDFW) has been characterizing the genetic diversity of steelhead and rainbow trout (Oncorhynchus mykiss) throughout the state. Electrophoretic analysis has been the primary genetic methodology used in this effort. This work is intended to support both the state's Draft Wild Salmonid Policy and the ongoing status review for steelhead being conducted by the National Marine Fisheries Service …"

"The Nooksack River 1995 collections clustered most closely with summer-run or mixed summer and winter-run collections from northern Puget Sound (Figure 2-A). The closest collections were Deer Creek 1993-1995, Skagit River tributary collections from Cascade and Finney creeks, and the Skykomish Hatchery summer-run strain ...

"Chapter 3. Relationships of summer-run and winter-run types

"Steelhead GDUs that have both summer-run and winter-run steelhead are primarily GDU 8, Northern Puget Sound, and GDU 3, Lower Columbia River ...

"Northern Puget Sound GDU 8

"We divided the collections from Allendorf (1975) in this GDU into four groups: Nooksack River, Skagit River (Sauk), Stillaguamish River summer-run and Stillaguamish River winter-run. All three of the WDFW collections from the Nooksack River had genetic distances that were larger than those from the Allendorf 1975 collection. Only one WDFW collection from the Skagit River, Cascade WR94, had a genetic distance that was smaller than the Sauk River collection from Allendorf (1975). The genetic distances of the three WDFW Deer Creek collections (1993-1995) to CCH93 were about equal to that for the Deer Creek collection from Allendorf (1975). The genetic distances to CCH93 in the winter-run collections from the Stillaguamish River were quite variable. We included WDFW collections from the Skykomish River (GDU 2) also. A few of these distances were smaller than those from the Allendorf collections, but the others were about the same. The mainstem (MS) Skykomish River WR93 had the smallest genetic distance and it had been identified by Phelps et al. (1994) as having a large amount of introgression from CCH. From these comparisons it appears that gene flow from CCH into wild populations in GDU 8has been minor and has not been widespread over the past twenty years.

The Sky has had serious genetic delusion ..

appears to be evidence for distinct gene pools. The amount of gene flow may vary among streams and the amount of genetic differentiation dependent on genetic drift."

"Chapter 7. Examining gene flow between resident and anadromous O. mykiss

"Little is known about the amount of gene flow between resident (freshwater) and anadromous forms of O. mykiss. The resident form of this species is referred to as rainbow trout and the anadromous form as steelhead. Understanding whether these two life-history types represent sympatric forms of O. mykiss or whether residency and anadromy are a polymorphism within O. mykiss populations is important for conserving the genetic diversity of this species. Documenting the amount of interbreeding between these two forms is part of the challenge in defining Genetic Diversity Units and is a major question in defining ESUs. In general it has been thought that where there is more or less unrestricted access to marine waters, the anadromous form of this species would predominate. However, it has been suggested that angling has removed older resident fish and freshwater habitat degradation has not favored long freshwater residency.

"Past work has documented that the resident form of O. mykiss developed from the anadromous form. The evidence for that conclusion was the greater similarity of the two forms within MALs and GDUs than with the same life history types in different locations ...

"Conclusion: The reproductive relationships between anadromous and resident forms of O. mykiss are still unclear. Some of the streams we have characterized show no evidence for reproductive isolation between resident and anadromous forms, while in other streams there

appears to be evidence for distinct gene pools. The amount of gene flow may vary among streams and the amount of genetic differentiation dependent on genetic drift."

2013 Skagit River and Finney Creek Genetic Findings (Pflug et al. 2013):

The genetic findings from DNA of adult steelhead, juvenile steelhead, and resident O. mykiss sampled between 2008 and 2011 from the Skagit basin were assessed using two differing methods at the WDFW genetics lab in Olympia. Older scale samples taken from Skagit basin adult steelhead by hook-and-line and by gill nets from 1980 to 2009 were also included for analysis. Excerpts from Pflug et al. 2013 with descriptions of the collections and the differing findings are provided below:

Initial method findings:

"8.4.4 Genetic Distinction Level Between Adult Collection Groups

"The fishery samples were analyzed using a baseline that was established by aggregating the natural-origin collections, Marblemount Hatchery collections, and the collection from Chilliwack Hatchery into three separate groups...

"The homogeneous genetic makeup of the natural-origin steelhead in the Skagit suggests that there has been significant mixing within the population. Reduced spawning location fidelity is considered to be a logical explanation for this outcome. There appears to be a large enough proportion of the population that does not return to their natal spawning area such that over many generations the genetic makeup of the population has become blended ...

"9.0 Hybrid Density in Juvenile and Adult Steelhead on a Spatial Level

"9.3.1 Natural-Origin Juveniles

"The juvenile collections showed the presence of presumptive hybrids in all collection areas sampled (Figure 21 and Table 27). The hybrid densities from the Skagit collection areas ranged from 6% in the Sauk collection area to 32.7% in Finney Creek. The two collection areas with the highest hybrid percentages were both from middle Skagit River tributaries; Finney and Grandy creeks.

"The homogeneous genetic makeup of the natural-origin steelhead in the Skagit suggests that there has been significant mixing within the population. Reduced spawning location fidelity is considered to be a logical explanation for this outcome. There appears to be a large enough proportion of the population that does not return to their natal spawning area such that over many generations the genetic makeup of the population has become blended ...

"The presence of young-of-the-year juvenile resulting from naturally spawned hatchery parents occurred in six of the eight collection locations. Bacon and Diobsud creeks were the only two locations devoid of juveniles resulting from two hatchery parents. Juvenile densities from the other four collection locations ranged from 1.1-10.6%. The two collection areas with the highest incidence were Finney and Grandy creeks, both middle Skagit tributaries...

"9.3.2 Natural-Origin Adults

"The adult collections also show the presence of presumptive hybrids in all collection areas sampled (Figure 22 and Table 28). The hybrid densities within the Skagit collection areas ranged from 15.4% in the middle Skagit collection area to 35.8% in Finney Creek. In contrast, of the 169 adult hatchery steelhead from the Marblemount hatchery collection, only

a single fish was identified as a putative hybrid. In addition, 3 of the 5 Skagit collection-group areas showed some incidence of natural spawned hatchery adults. The upper Skagit, Sauk and Finney collection areas exhibit low levels of naturally spawning hatchery adults mating together ranging from 1.9-4.9% (Table 28). The middle Skagit and Suiattle rivers on the other hand showed no evidence of hatchery fish naturally spawning with each other at the adult level…"

Second method findings (from Warheit 2013):

"10.3.6 Empirical Analysis of Introgressive Hybridization within Skagit River Basin

"… The proportions of the wild populations assigned as introgressed were more similar between the Marblemount and Bogachiel hatchery analyses for the wild juvenile fish than they were for the wild adult fish, however, there were some exceptions. The proportion of the juvenile fish from Diobsud Creek assigned as introgressed dropped from 0.15 to 0.00 between the Marblemount and Bogachiel hatchery analyses, respectively. In fact, in the Bogachiel Hatchery analysis all of the Diobsud Creek individuals assigned as wild fish. As in the analysis of the adult populations, Finney Creek showed the greatest number of juvenile individuals assigned as introgressed, although juvenile individuals from Goodell Creek, Grandy Creek and Suiattle River had a comparatively moderate number of individuals assigned as introgressed (Table 37 and 38, Figures 36 and 37). Grandy Creek had the highest proportion of individuals assigned as pure hatchery, and in the Bogachiel Hatchery analysis the number of Grandy Creek individuals assigned as pure hatchery was greater than that assigned as introgressed (Table 38). For those populations with individuals assigned as pure hatchery, that number remained unchanged between the Marblemount and Bogachiel hatchery analyses for the lower Cascade River, Grandy Creek, and Sauk and upper Skagit river populations (Tables 37 and 38). Finally, Finney Creek, and especially Grandy Creek have individuals with Q - values >= 0.80 and with relatively small 90% CI ranges (Figure 37).

"10.4 Discussion/Conclusions

"… Part of the reason for the inability to clearly distinguish hybrid from pure fish lies in the fact that wild Skagit River steelhead and Chambers Creek origin steelhead (regardless of the hatchery where they are propagated) share a recent common ancestor and are currently only weakly (but significantly) differentiated (FST ≈ 0.02, Table 19; Kassler and Warheit 2012)…

"For adult populations, Finney Creek stands out as having the strongest introgression signal among the five populations. This is particularly evident in the Bogachiel Hatchery analysis, where the number of individuals assigned as hybrids in Finney Creek greatly outnumbers that in the other four populations. The assignments rates for the wild juvenile populations generally reflect the same patterns as those for the wild adults: (1) higher levels of introgression in the Marblemount Hatchery analysis than in the Bogachiel Hatchery analysis; and (2) higher levels of introgression for the Finney Creek population than the other populations. However, unlike the adult populations, Finney Creek is not alone in showing elevated levels of introgression in juvenile fish. In fact, for both Bogachiel and Marblemount hatchery analyses, all populations (except the Diobsud Creek population in the Bogachiel Hatchery analysis) showed qualitative evidence of introgressed fish. Since I see no

reason to assume that there is a higher proportion of pure wild juveniles that will be assigned as hybrids than that for pure wild adults, higher levels of introgression in juvenile populations compared with adult populations suggests that either hybrid adults are more difficult to find than pure adults due to possible temporal or spatial sorting, or juvenile to adult survival of hybrid fish may be lower than that of pure fish. However, Finney Creek is an exception in that the introgression signal is the same for adult andjuvenile fish.

"It is conceivable and perhaps likely that pure unmarked hatchery - origin fish and fish with pure hatchery ancestry (e.g., offspring of naturally occurring hatchery x hatchery crosses) occur on or near natural spawning areas. This means that unmarked fish assigned as pure hatchery (i.e., Q-value >= 0.80) may indeed be pure hatchery or hatchery-ancestry, and not an introgressed fish with high Q-values. However, in the simulation dataset the Q-value -- 90% CI range joint distributions for correctly assigned hatchery fish and F1 hybrids incorrectly assigned as hatchery fish (Q-values >= 0.80) are nearly identical. Therefore, I do not have statistical support to differentiate pure hatchery and hybrid fish with Q-values > = 0.80, or to identify these fish as either pure hatchery or hybrid fish. That being said, Finney Creek, Sauk River, and upper Skagit River, from the adult populations, and Finney Creek and especially Grandy Creek, from the juvenile populations show Q-value -- 90% CI range joint distribution patterns more extreme than what you may expect from introgressed fish (i.e., very high Q-values and low 90% CI ranges). This suggests that based on these samples pure unmarked hatchery-origin fish or fish with pure hatchery ancestry occur at a greater frequency within these creeks and rivers than other areas within the Skagit Basin.

"Marblemount Hatchery currently releases smolts from the hatchery itself (Cascade River) and at the Baker River trap, downriver from Marblemount Hatchery near the town of Concrete (Figure 23) (Washington Department of Fish and Wildlife 2012). However, historically, smolts of Chambers Creek origin (either from Marblemount Hatchery or Barnaby Slough – downriver from Marblemount Hatchery between the Sauk and Cascade Rivers) were released throughout the middle and upper Skagit River, most notably the mainstem Skagit River, Cascade River, and Grandy Creek. The confluence of the Skagit River and Finney Creek is nearly adjacent to Grandy Creek, and the middle Skagit River adult collection, and the Finney Creek adult and juvenile populations are sandwiched between the Grandy Creek and Baker River trap smolt release sites. The Finney Creek populations stand out as having a high introgression signal, and pure unmarked hatchery or hatchery-ancestry fish are suggested in the Grandy Creek, Finney Creek (adult and juvenile), and to a lesser extent the Sauk (adult) and lower Cascade River populations. Some of these populations are close to historical or current hatchery smolt release sites, but considering the introgression signal in all populations, proximity to these release sites alone is not a sufficient predictor of hatchery introgression in the Skagit River. Finally, both Finney and Grandy creeks have natural-origin steelhead spawning earlier than elsewhere in the Skagit River basin, during a time more consistent with the early-spawning Marblemount Hatchery populations (Brett Barkdull, WDFW pers. comm. through Dave Pflug, SCL 2013). The higher introgression signal and the possible presence of pure unmarked hatchery or hatchery-ancestry fish in these two creeks are consistent with the early-spawning behavior."

March 2014 Skagit and Finney Creek Genetic Findings (from Warheit 2014a):

"We provide the Structure proportions and the category-specific likelihood-adjusted proportions, with their 90% CI, for the Skagit River OUs in Figure 13a, and for the DIPs in Figure 13b. The final adjusted assignments for both the OUs and the DIPs are in Table 6d and effective pHOS and introgression summary statistics are in Table 8d. Unlike the Green, Snohomish, and Stillaguamish Rivers, the Skagit River does not have an ESH program, but we included in the Structure analyses the Snohomish Reiter Pond samples to search for an ESH-lineage genetic signal.

"OU assignments – Finney Creek: We detected two Skagit River Local categories: Nookachamps Local Winter and Finney Creek Local Summer. Based on our phylogenetic analysis the fish assigned to Finney Creek Local Summer are more closely related to Local Summer Deer and Local Summer Canyon fish (Stillaguamish) than to any of the winter categories in the Skagit River, including the Finney Creek winter OU. Nonetheless, most of the individuals from Finney Creek summer (0.57) assigned to the Hybrid: Basin Winter – Finney Creek Local Summer category, as did one-third (0.32) of the Finney Creek winter OU individuals. Furthermore, 0.13 of the Finney Creek winter OU individuals assigned to the Finney Creek Local Summer category, 0.02 to pure EWH, but the majority (0.53) assigned to the Basin Winter category. The only signal for the occurrence of ESH-lineage fish in the Skagit River was in the Finney Creek summer OU, where 0.12 assigned to the Hybrid:ESH – Finney Creek Local Summer category. Taking the Finney Creek winter and summer OUs together, 0.44 of the fish in the Finney Creek basin assigned to the Hybrid:Basin Winter – Finney Creek Local Summer category, 0.22 to Finney Creek Local Summer category, 0.26 to the Basin Winter category, and 0.06 to the Hybrid:ESH – Finney Creek Local Summer category. The Hybrid:Basin Winter – Finney Creek Local Summer category does not appear to be a "false category" that existed because we lacked the power to differentiate the winter and the local summer categories. Although we did not explicitly test the power to differentiate Finney Creek Local Summer from the Basin Winter individuals, the two categories are genetically distinct. First, Structure analyses clearly separated the two categories. Second, the average F_{ST} between the Finney Creek summer OU and the winter OUs in the Skagit River basin was 0.023, including a F_{ST} = 0.028 with the Finney Creek winter OU. Third, the Finney Creek Local Summer category did not cluster with any of the Skagit River winter categories in the principal component analysis (Figure 7).

"OU assignments – Winter: Except for the Cascade River winter OU, all other winter OUs appeared to be completely or nearly completely composed of Basin Winter fish. In the Cascade River winter OU, 0.17 assigned as Hybrid:EWH – Basin Winter and 0.83 assigned to pure Basin Winter. Marblemount Hatchery, the source of EWH fish in the Skagit River is located near the mouth of the Cascade River, so the higher incidence of Hybrid:EWH – Basin Winter fish in the Cascade River was not surprising. In the upper Skagit adult OU, 0.01 assigned to pure EWH category. Finally, the Nookachamps OU was composed equally of Nookachamps Local Winter, and Hybrid:Basin Winter – Nookachamps Local Winter (0.49 each). The remainder of the OU assigned to the Basin Winter category.

"DIP assignments: The Mainstem Skagit R Summer- and Winter-Run DIP was composed of 0.91 Basin Winter, 0.02 Finney Creek Local Summer, 0.05 Hybrid:Basin Winter – Finney Creek Local Summer, and 0.01 pure EWH. By contrast the Sauk R Summer- and Winter-Run DIP was composed entirely of Basin Winter fish.

"Effective pHOS and introgression: The two larger effective pHOS values in the Skagit River belong to the Cascade River winter (0.08, all to the early winter program) and the Finney Creek summer (0.06 all to the early summer program). These two OUs were also the only units to show introgression (0.17 and 0.12, respectively). The only other signal of potential hatchery effects on the wild OUs in the Skagit River is an effective pHOS – early winter = 0.01 for the upper Skagit adult OU."

October 2014 Skagit and Finney Creek Genetic Findings (from Warheit 2014b):

"Skagit River. The Skagit River samples (N = 333) were composed of 15 collections, aggregated into eight OUs and three DIPs. There was one summer-run OU (Finney Creek summers), and all samples, except from the Nookachamps OU, were from adults (Tables 7, S9). Compared with the Snohomish River, natural-origin samples from the Skagit system showed less influence from either the Marblemount EWH program, or an out-of-basin ESH program (Tables 8, S19, S20, Figure 10). Roughly 5% of the Finney Creek summer OU assigned to ESH-lineage, despite the fact that there are no ESH programs in the Skagit River. If ESH-origin fish are getting into the Skagit basin, they are most-likely straying from either the Whitehorse (Stillaguamish) or Reiter Ponds (Snohomish) ESH programs. The Finney Creek summer OU also showed evidence of EWH influence, with 3% assigned to EWH-lineage, and 7% as EWH-wild hybrids. However, the 90% CI range for the likelihood adjustment to the hybrid and wild categories was greater than 0.25, and therefore, I consider these assignment proportions uncertain. By contrast, the Finney Creek winter OU assigned as 98% wild and 2% EWH-lineage.

"Unadjusted proportions from Structure showed that 15% of the Cascade OU was composed of EWH-wild hybrids, but zero contribution from EWH-lineage fish. As with the samples from Finney Creek summer OU, the 90% CI range for the likelihood adjustment to the ESH-Wild category was greater than 0.25, and therefore, I consider these assignment proportions uncertain. However, the point estimate for the adjusted EWH-wild hybrids assignment was 6% (Table S19), which, if correct, would be largest hatchery effect for all OUs in the Skagit. The Finney Creek and Cascade OUs were aggregated with the upper Skagit River OUs forming the Mainstem Skagit R Summer- and Winter-Run DIP. This DIP was composed of 96% wild fish, and 2% EWH- and 1% ESH-lineage fish. Because the samples sizes from the Cascade and Finney Creek summer OUs were small compared with that from the upper Skagit OU (Table S9), and since both OUs are a small component of the total spawning population in the DIP, (Table S12), when aggregated with the upper Skagit OU, the DIP showed no F1 $Hybrid_W$ introgression, but 2% $PEHC_W$ and 1% $PEHC_S$ (Table 8).

"The Sauk R Summer- and Winter-Run DIP (aggregated from Sauk and Suiattle OUs) and Nookachamps River OU/DIP were both composed mostly of wild fish (96% and 98%, respectively), with 4% and 2% of the fish assigned as EWH-lineage, respectively. Neither DIP showed evidence of hybridization, so the $PEHC_W$ value for both DIPs reflected the EWH-lineage proportion only (Table 8).

"In summary, samples from the Skagit River showed evidence of hatchery influence around 2 - 4% $PEHC_W$, with the contribution from both EWH-lineage fish and EWH-wild hybrids. The areas with the largest hatchery influence were Finney Creek (summer population), and Cascade River, the location of the Marblemount EWH program. There was also evidence that ESH-origin fish strayed into Finney Creek and the upper Skagit River. These results are consistent with an earlier analysis of hatchery-wild introgression in the Skagit River (Warheit 2013). The earlier work was conducted with a limited set of microsatellite loci and used unadjusted (and therefore biased) Structure proportions only. In that report's conclusions I state "The SPAN microsatellite loci lack sufficient power to reliably quantify Marblemount Hatchery (Chambers Creek - origin) introgression into the wild Skagit River winter steelhead populations, or reliably identify pure unmarked hatchery or hatchery-ancestry fish using the program STRUCTURE. However, under some reasonable assumptions, the Finney Creek adult and juvenile populations appeared to have a higher level of hatchery-wild introgression than all other wild populations" (Warheit 2013:119). In this earlier study, the Structure analyses did not include samples from an ESH program or from the Finney Creek summer OU."

The Future in Steelhead Genetics:

The methods for determining genetic relationships and hybridization among fish populations have been continuously evolving with increasingly fine levels of determination for steelhead since at least the 1970s (Reisenbichler and McIntyre 1977). It is apparent that over time the methods for genetic determinations have been a moving target with sometimes altering results that may yet remain incapable of actually identifying critical aspects of steelhead diversity that are genetically passed and which will ultimately determine their ability to effectively adapt – both locally and as potential refuge populations on which the broader future of species adaptation may depend. A promising new method is one that uses "restriction site associated DNA" (RAD) tags (Miller et al. 2007). RAD marker DNA can rapidly produce a low-cost microarray genotyping resource that can be used to efficiently identify and type thousands of RAD markers.

A relatively recent paper (Miller et al. 2012) has indicated the following about steelhead and O. mykiss as a whole which is pertinent to Finney Creek and the Skagit basin:

"Within Oncorhynchus, the O. mykiss species encompasses both resident-freshwater and anadromous (ocean-dwelling but freshwater-spawning) forms that are referred to as rainbow trout and steelhead, respectively. O. mykiss are native to the Pacific coast of North America from Baja California to the Alaska Peninsula and the Kamchatka Peninsula of Russia and natural populations contain diverse phenotypic adaptations (Hershberger 1992; Taylor et al. 2011). As with other Oncorhynchus species, O. mykiss are threatened, endangered or extinct throughout much of the native range, and restoration is considered a challenging but crucial priority (Busby et al. 1996; National Research Council 1996; Gustafson et al. 2007). Besides the importance of natural populations, ease of culture and experimental tractability have made O. mykiss an important species for biomedical research and aquaculture, and more is known about the biology and physiology of O. mykiss than about any other fish species (Thorgaard et al. 2002). This unique combination of attributes makes O. mykiss a powerful and tractable system for investigating the genetic architecture of local adaptation in salmonids...

Finney Creek (and the Skagit basin as a whole) has experienced great decline in former abundances of early-return wild winter steelhead (with run-timing from November through February), in early spawning wild winter steelhead (January through early March), and in summer-run steelhead. These all represent the former life history diversity of steelhead that was in Puget Sound as a whole and in numerous other areas of the North Pacific Rim. However, while it is recognized that these life history attributes are commonly, and even generally represented with genetically passed differences, the methods of genetic determinations being made in the Skagit basin and Puget Sound as a whole are lacking in finding a similar level of distinct genetic diversity in steelhead from one major river basin to another and within the major river basins. This is despite the fact that within-basin habitats have differing environmental characteristics in elevations, gradients, water sources, and hydrologies. In the latter 1970s to early 1980s, however, electrophoretic analysis of Skagit basin steelhead found considerable within-basin genetic diversity represented by the steelhead in the smaller tributary streams (Phillips et al. 1981b; Phelps et al. 1994). Yet, today this has not been similarly identified with the present methods being used for genetic analyses. This suggests potential widespread loss of genetic diversity that has already occurred in the Skagit basin, or that present methods used for genetic analyses (or the samples being evaluated) are not providing an accurate indicator of the genetic diversity that remains. Given that considerable breadth of life histories remain within the O. mykiss of Finney Creek and the Skagit basin, albeit some at remnant levels, it suggests that use of finer levels of genetic analyses such as that by RAD marker DNA are a critical need if genetics is to be an effective management guide for wild steelhead recovery.

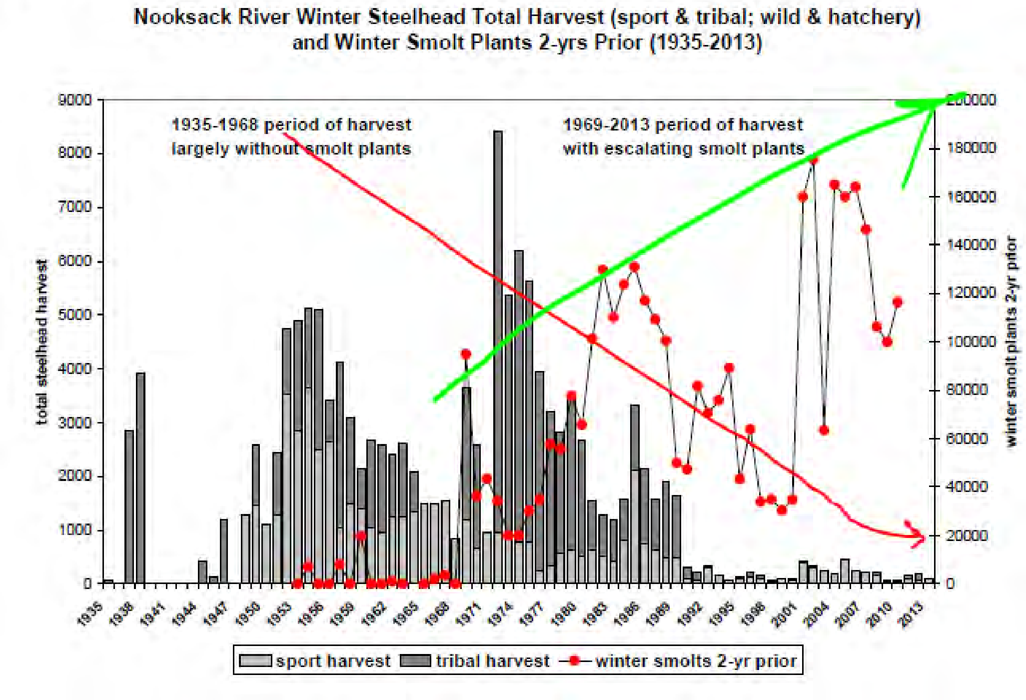
The bottom line in the case of the varied Skagit River steelhead genetic evaluations is that the most recent interpretations developed in 2014 often do not well fit the actual observations that have been documented in the greater Skagit basin relative to the presence of hatchery steelhead found throughout the spawning grounds. There is apparently much that is presently not being detected in the most recent genetic evaluations. The commonly small numbers of wild steelhead spawning in tributary

The impacts of Hatchery fish not being eliminated by harvest or making it back to the Hatchery do only one other thing, spawn and effect the wild population in so many ways…

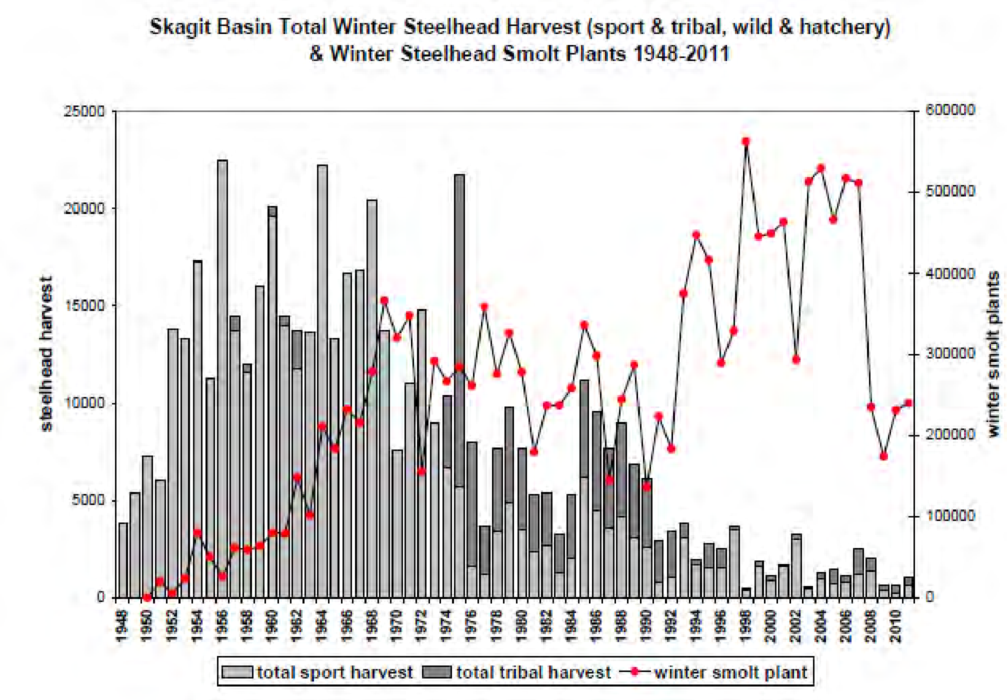
creeks, in particular, results in seemingly small numbers of hatchery steelhead being very significant parts of the spawning population as previously shown in my Hatchery related comments to this DEIS (McMillan 2015a; 2015b).

Look at the Lummi and the Nooksack tribes who harvested 8,000 wild fish in 74 just after Boldt decision. You can see that Hatchery plants and the impacts to wild fish as they increase harvest has fallen off in Red … This simply can't be just habitat - IMOP it is harvest by Tribal nets and Hatcheries that have caused the most damage not loss of habitat, we are currently under seeding available habitat.

Figure 2.



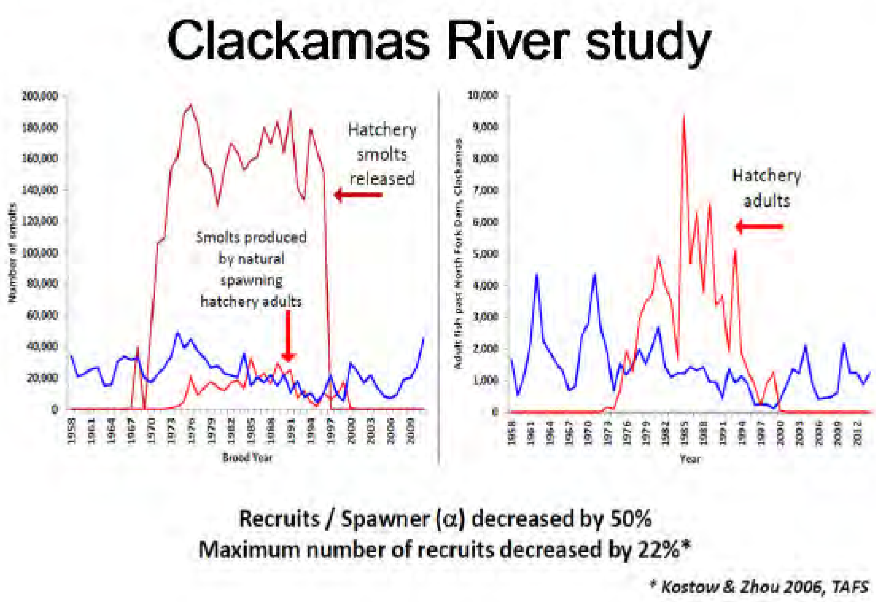
Skagit looks the exact same and certainly has better overall habitat than the Nooksack ..

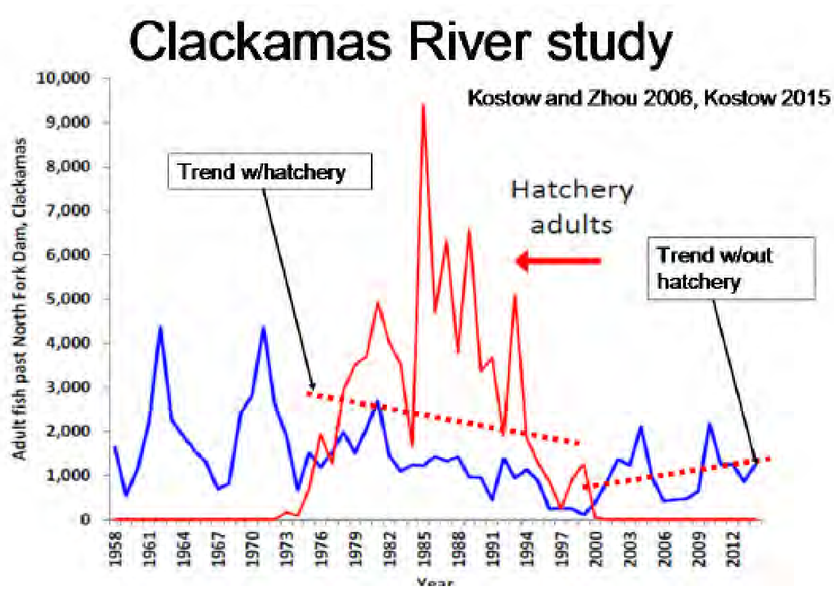


Great study on the Clackamass River and this is a rural Portland stream with a dam and the same habitat issues our suburban streams have in Puget Sound ..

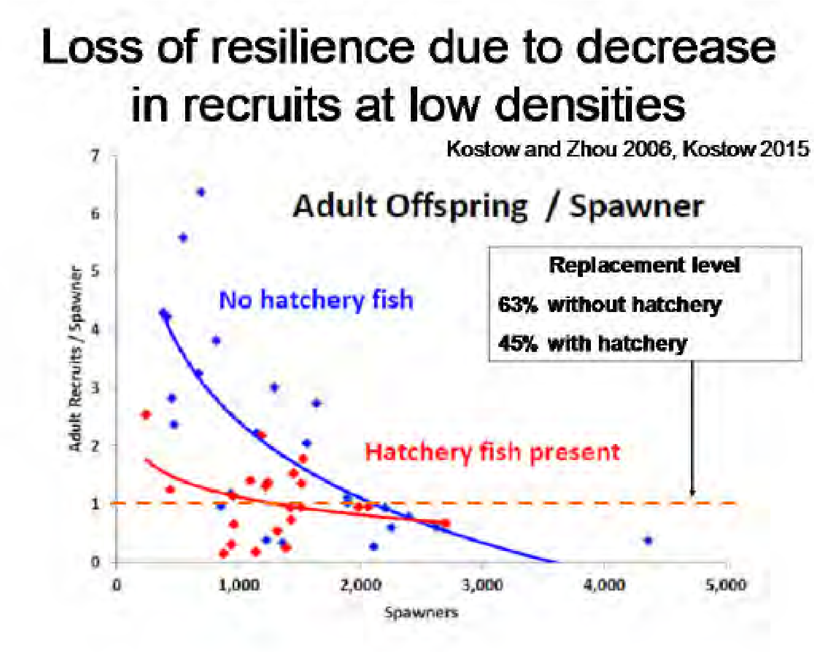
Appendix D

Figure 1. (blue lines represent wild winter steelhead past NF Clackamas dam)

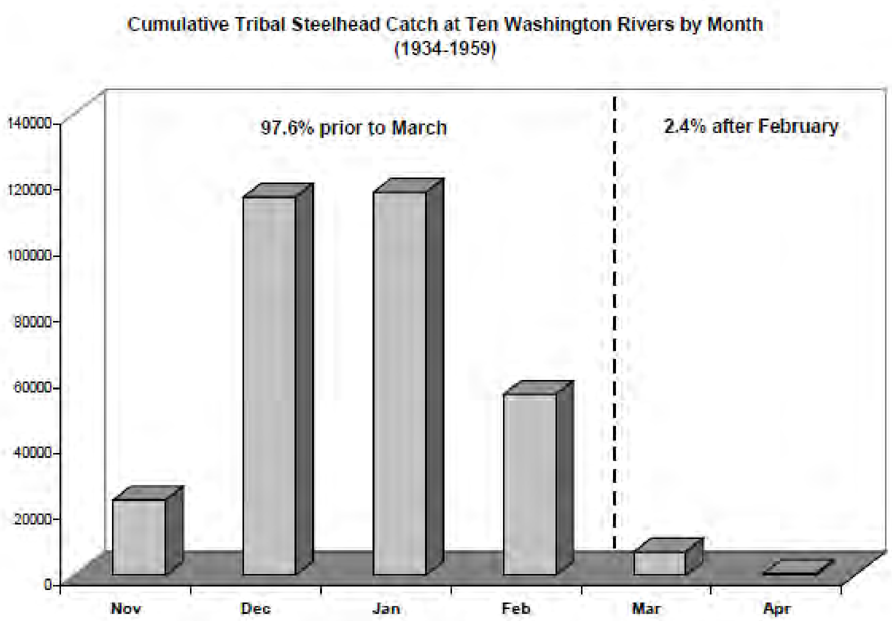




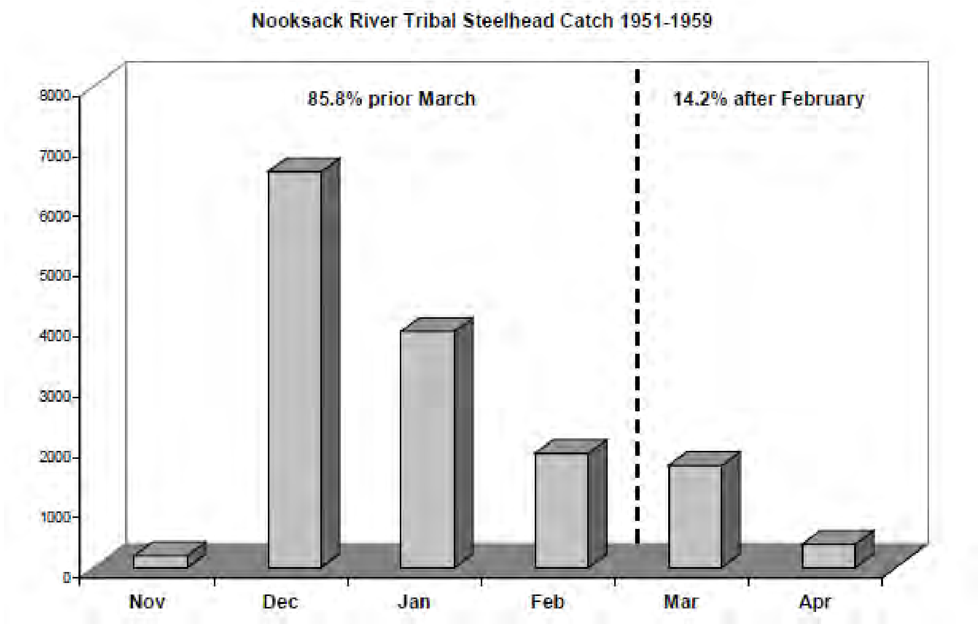
As soon as the Hatchery plants were stopped of Summer run Skamania fish the wild winter run began recovering.



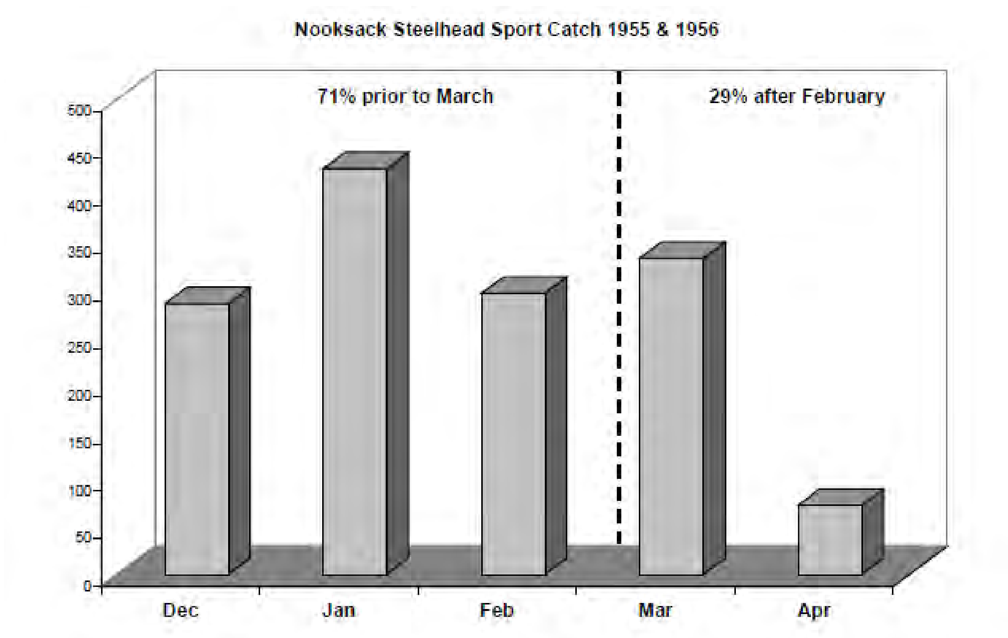
Increase in productivity without hatchery fish on the spawning grounds



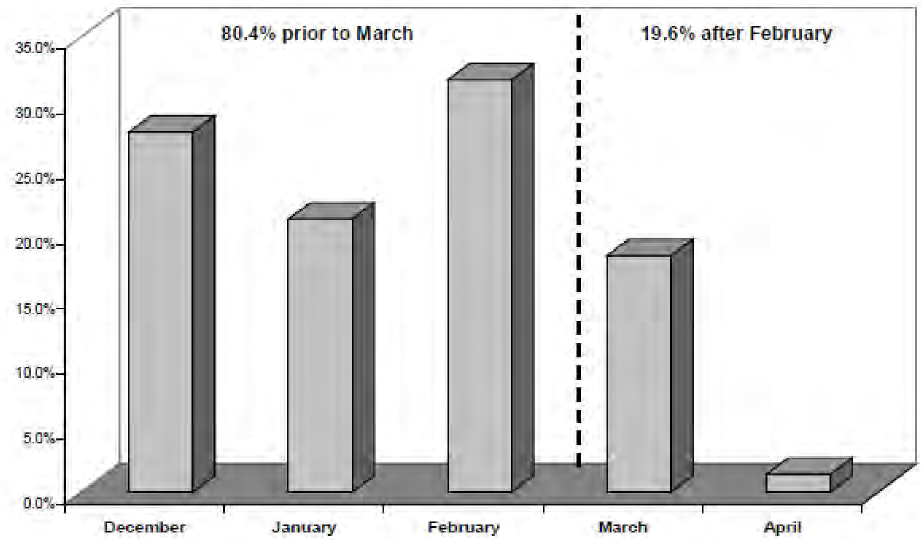
This is where the damaged is as we have lost the early and largest historical part of the run, the early component .. Nov - Jan



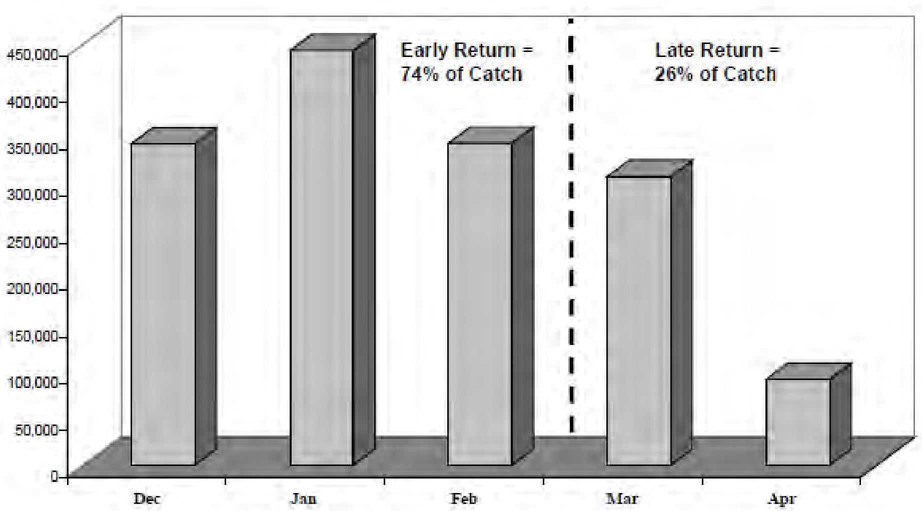
We now just have the late run to help rebuild the early component 70% that was harvest before March 1st in the pre Hatchery Days



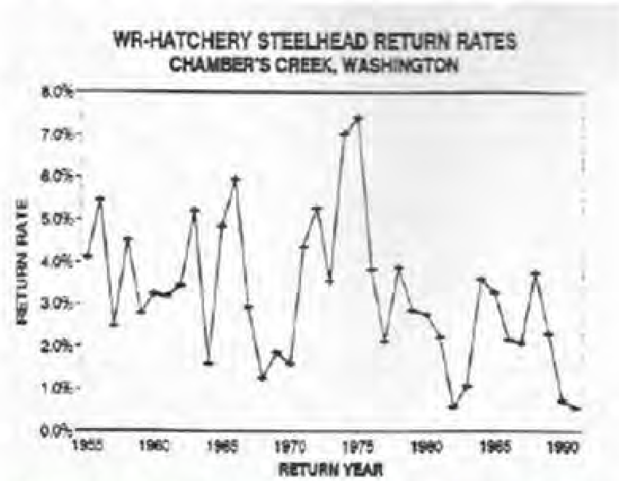
Washington Winter Steelhead Sport Catch
Percent by Month in 1949-1951 (Larson & Ward 1955)



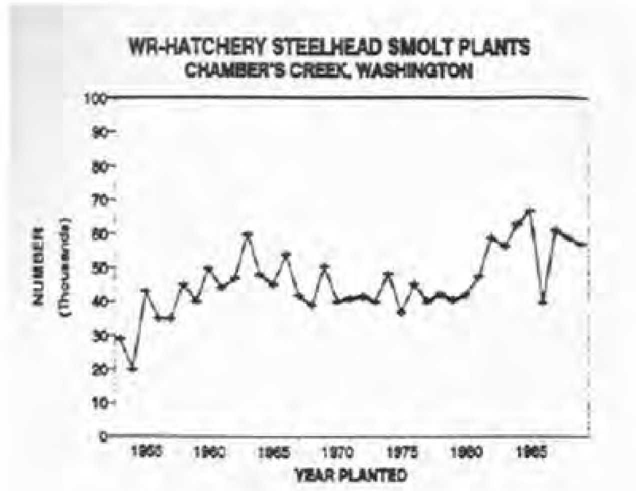
Washington Winter-Run Steelhead Sport Catch per Month
Prior to Large Hatchery Returns (1954-1960)
From Royal 1972



Figures 1 and 2. From Cooper and Johnston (1992)



Chambers Ck continuous return rate decline



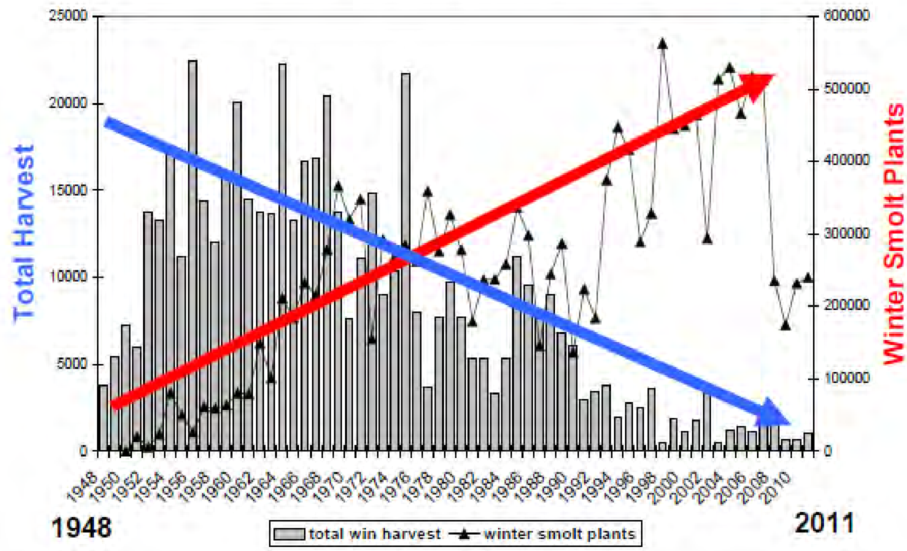
Solution: just plant more

Figure 3. Results: Chambers Creek Steelhead Extinction (Eltrich 2007)

looks fairly simple to me that we should stop harvest and stop hatchery plants and spend all that money on Habitat for a decade and see what happens..

Comparisons of Over 60 Years of Winter Steelhead Trends at Two NW Rivers

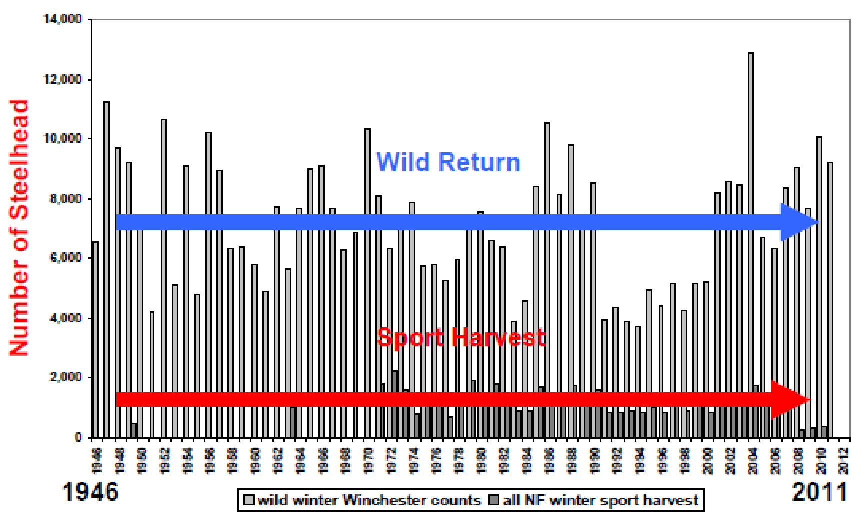
Skagit River Winter-Run Steelhead History of Total Harvest (wild + hatchery; sport + tribal) and Hatchery Winter Steelhead Smolt Plants (1948-2011)



Skagit River steelhead harvests in 1951-60 averaged 15,000, nearly all wild. The 2001-10 combined harvests of wild and hatchery steelhead averaged 1,500. This loss coincides with a 1994-2007 average of 450,000 hatchery steelhead smolts planted annually in the Skagit — 6,235,000 total. At $1 per hatchery smolt, $6.23 million was spent in 14 years with resulting 90 percent loss of harvest once provided by wild steelhead 50 years ago.

Here is how the Umpqua has performed with out hatchery plants for the same period …

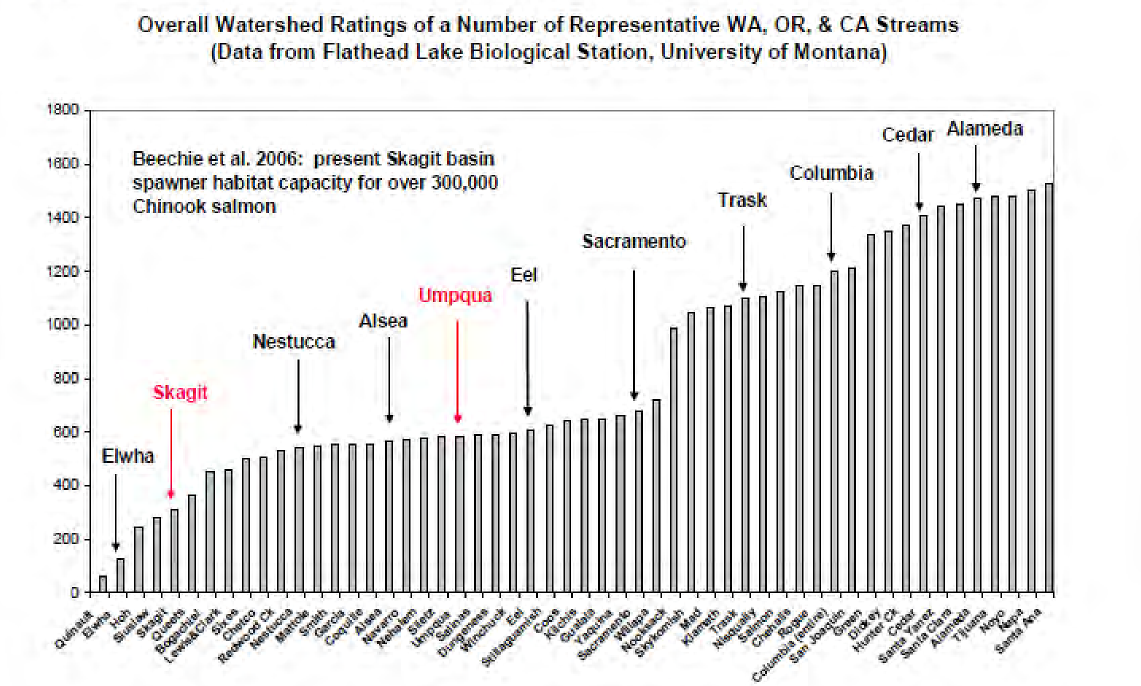
North Umpqua River Wild Winter-Run Steelhead Returns Counted at Winchester Dam & Sport Harvest Without Winter Steelhead Hatchery Plants (1946-2011)



NF Umpqua River wild winter runs of steelhead without hatchery winter steelhead plants have remained stable for 64 years with a return average of 7,150 wild steelhead per year. Steelhead harvest has been similarly stable at 1,200 steelhead per year for 40 years. This record of sustainability has come at no public cost.

Again wild only on the N Umpqua for 64 years has provided stable fish runs at no cost to the general public or the fish…

Figure 1. Skagit watershed ranked 309th (upper 19%) & Umpqua 586th (upper 37%)



The Skagit ranks higher that the Umpqua in available Habitat rankings and should be providing 3 times the returns … The time has come and option #1 is clearly from the scientific data provided by many is the correct choice if recovering anything is our goal…

Is eliminating hatcheries going to do it all, it sure can't and until commercial fisherman and the tribes fish and harvest in a sustainable selective way that doesn't impact wild fish. This will be something that comes to the high court's soon as well I am sure.

If Option # 1 is not taken with all the scientific data available showing the impacts of the EW Chambers creek steelhead have had on our stocks than WFC will be suing both NOAA and WDFW to mandate it.

Sincerely,

Gary Clark

Gary Clark

Chain Account Executive

Food Services Of America / Seattle Group

360-305-3450

360-510-3572 cell ext 2126

www.fsafood.com

www.fsaatyourservice.com

Steve Leider - NOAA Federal <steve.leider@noaa.gov>

RE: Puget Sound early winter steelhead Final EIS available for review

1 message

Jacob B. <JBsteelie@hotmail.com> Fri, Mar 4, 2016 at 10:16 PM
To: "ewshatcherieseis.wcr@noaa.gov" <ewshatcherieseis.wcr@noaa.gov>
Cc: "Steve.Leider@noaa.gov" <Steve.Leider@noaa.gov>

I personally believe that a hatchery management plan for the listed rivers would be absoultly benifical for Washington anglers looking to get a chance at what Washington State fisheries could be. Currently, I see most areas are closed due to miss managment of both tribal and state. I live in Lynden, Wa my closet interest in this is the Skagit River and the Nooksack River, which the Nooksack has 3 Seperate hatcheries, North Fork (Kendall), South fork hatchery, and middle fork hatchery. Why is there not an abundant amount of Hatchery Steelhead available in this stream that has all the necessary resources for getting a strong fishery back for the licensed angler??? Also, such a short season being closed down february 1st for the majority of the river. I see great fisheries in SW washignton this time of year, Oregon has phenomal hatchery steelhead fisheries, as well as in lower British Columbia, Canada...but nothing in the Puget Sound regions??? Not sure what excuses will be as I haven't seen any improvements in ~the last 10 years in the North puget sound region...Seems like the puget sound sport fishing anger is being let down compared to what is available around most anywhere in the state.
From: NOAA Fisheries [ewshatcherieseis.wcr@noaa.gov]
Sent: Friday, March 4, 2016 12:00 PM
To: jbsteelie@hotmail.com
Subject: Puget Sound early winter steelhead Final EIS available for review

[http://files.ctctcdn.com/413fca35301/a82d0fe5-4bcb-41b0-87af-ea446483091d.jpg]

Final Environmental Impact Statement
for Early Winter Steelhead Hatchery Programs
in Puget Sound

A final environmental impact statement (FEIS) for early returning winter ("early winter") steelhead hatchery management plans submitted jointly by the Washington Department of Fish and Wildlife and the Puget Sound treaty tribes has been released. The hatchery plans describe five early winter steelhead hatchery programs, in the Dungeness, Nooksack, Stillaguamish, Skykomish, and Snoqualmie River basins in Puget Sound. A draft EIS was released for public comment on November 13, 2015, and over 2,000 comments were received and considered in preparation of the FEIS.

The FEIS identifies the Preferred Alternative. Under the Preferred Alternative, NMFS would make a determination that the five hatchery plans as revised and submitted jointly by the co-managers, meet requirements of the 4(d) rule.

NOAA Fisheries is not required to respond to public comments on the FEIS in the record of decision. However, public comments on the FEIS received by April 11, 2016, 30-days from the Notice of Availability publication in the Federal Register on March 11, 2016, will be reviewed and considered prior to NOAA Fisheries' record of decision.

Concurrent with this review under the National Environmental Policy Act (NEPA), NOAA Fisheries is reviewing the hatchery programs under the Endangered Species Act (ESA). This NEPA analysis does not indicate whether hatchery programs meet ESA requirements. Rather, this NEPA analysis provides information about the current and anticipated environmental effects of operating the five early winter steelhead hatchery programs under a range of alternatives.

You can access the FEIS and get more information from the NOAA Fisheries West Coast Region website at
http://www.westcoast.fisheries.noaa.gov/hatcheries/salmon_and_steelhead_hatcheries.html

To Comment by April 11:

You may comment by email to EWShatcheriesEIS.wcr@noaa.gov
If you submit comments by email, please include "EWS Hatcheries FEIS" in the subject line.

You may comment in writing or by FAX to:

William W. Stelle, Jr.
Regional Administrator
NMFS, West Coast Region
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE
Seattle, WA 98115-0070
Fax (206) 526-6426

If you have questions, please contact Steve Leider by email to Steve.Leider@noaa.gov, or phone (360) 753-4650.

NOTE: You have received this notice because you previously commented on or expressed an interest in Puget Sound hatchery programs, or steelhead in particular. If you wish to be removed from this list please click "unsubscribe" below. Thank you.

Public Comment

1 message

Jeff French <forrestfrench@gmail.com> Fri, Mar 4, 2016 at 7:23 PM
To: EWShatcheriesEIS.wcr@noaa.gov

Please do whatever it takes to preserve and enhance these iconic creatures of Puget Sound before they become extinct.

Sincerely,

James French
[redacted]
Seattle, WA 98103

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

EWS Hatcheries FEIS

1 message

James Frymire <jamesf@bachbros.com> Thu, Mar 10, 2016 at 5:21 PM
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

To Whom it may concern,

Please make every effort possible to continue Hatchery steelhead programs and do not eliminate or reduce the hatchery programs. The hatchery steelhead program is very important to Washington State in the form of tax revenue, sport fishing opportunity, tribal well being and the general "Health" of the Washington State fishing experience.

Please keep Hatchery Steelhead programs going!

Sincerely,
James Frymire

360-280-4728

Comment on hatcheries

1 message

Jeff Brazda <jeff@brazdasflyfishing.com> Sun, Mar 6, 2016 at 10:44 AM
To: EWShatcheriesEIS.wcr@noaa.gov

To whom it may concern,

Thank you for the opportunity to provide comment upon our steelhead fisheries. I am a long time steelhead and trout guide in Washington state since 1998 exactly. I have lived and fished in the NW for 52 years and have personally experienced the changes in management since the 70's.

It is quite obvious to myself that with commercial/tribal fisheries and loss of habitat and population increase that some streams will need hatchery systems in order to maintain a fishery. It is these fisheries that provide many things, the social awareness and involvement of our youth, the close proximity for urban anglers, protection of our wild based stocks from harvest, just to name a few.

For my business it is "all the above" that is so important, with closures forced upon us by special interest groups the fishing pressure upon sustainable stocks has compounded negatively on the resource. I am sure this backfire in results is not what was I intended or foreseen by such radicle groups attempting to do their business.

I see this as a watershed by watershed approach and a blanket ruling would be less desirable. That said it is imperative that the hatchery operation remain adaptive. I select the brood stock method on rivers that may return to good health and full on chambers creek style hatcheries in those that have little hope in a recovery.

I hope we can someday work better together as division of anglers is what has paralyzed the management teams for many years.

Thank You and fish Always, Jeff Brazda

View at www.brazdasflyfishing.com

Cell 253-307-3210

Visit facebook- Brazdas fly fishing Washington

Sign up for newsletter here.

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

(no subject)

1 message

john nordeen <jngofish@comcast.net> Sun, Mar 6, 2016 at 6:29 PM

To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

I am a avid sports fisherman. I support hatcheries as the path to preserve fishing for future generations.

I feel the anti hatchery groups are ignorant and misinformed .

Thank you.

John Nordeen

Sent from Mail for Windows 10

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

Final Environmental Impact Statement for Early Winter Steelhead Hatchery Programs in Puget Sound

1 message

Josh Hopp <rockchipsolutionswa@gmail.com> Thu, Mar 10, 2016 at 10:50 PM
To: EWShatcheriesEIS.wcr@noaa.gov, Josh Hopp <rockchipsolutionswa@gmail.com>

Hello,

Thank you for providing me with opportunity to share my concern for the Steelhead Hatchery Program in Puget Sound.

For the last two years the River Systems which are at stake here like the Stiliguamish, Skagit, Snohomish, Skykomish, Nooksack, haven't' been planted with early timed winter steelhead. These programs are crucial to the local economy and local well being of many Puget Sound residents and also those whom travel from great distance to catch the harvestable Hatchery raised Steelhead in those watersheds. I grew up fishing the Stilly, Snohomish, Skagit, Pilchuck, and they always had Steelhead to catch and keep. I grew up fishing. My children have become very passionate for the sport of fishing. Along with Baseball, Basketball and Soccer. I am honored to share this great love with them and teach them the responsibilities they have as stewards of this wonderful, renewable resource. Similar to me educating them on gardening as my Mom, and her father taught me how todo so passionately, so goes the way of the fisherman and fisherwoman and fisher-child. This idea of fishing these local rivers where I was born and raised is just another way of life. A way of living and surviving. It is with a lifetime of knowledge and a heart full of passion that I strongly disagree with ending Steelhead Hatchery Programs on these local Watershed systems.

You must ask yourselves would you take a bat from a little leaguer because you failed to teach them how to swing a bat? Would you take the soccer player and tell them they can no longer play soccer because they harming the grass by which they run on? Would you take the hoop in basketball away just because you could, leaving only a court and no hoop to play Basketball with? Well I must say that is exactly what is happening to the Sport of Steelhead Fishing here in Puget Sound. Science shows that Early timed winter hatchery steelhead do not interfere with the breading of Wild Stocks of fish. These methods are used up and down the West Coast from California to Alaska and throughout Canada. Possibly mixing up a Hatchery Brood Stock program like successfully done on many watersheds in Oregon and a few in Washington to the Puget Sound systems would enhance the fishing and the Revenue generated by the Recreation Sport Fishing Industry. Please don't stop the Hatchery Programs. My children love playing basket ball with the hoop. They love to run up and down on the Soccer Field. My Children along with thousands of other Children in the Puget Sound area love to play Baseball with a bat. Give the next generation, the Youth of our land, rivers with abundance. Rivers so full of opportunity that next Female Fly Fisher Girl can go to the Stiliguamish River with her Daddy in December during her Christmas Break and catch a Hatchery Raised local early timed winter Steelhead for Christmas Dinner. Put the bat back in her hands, please. Give the people who pay for and deserve opportunities to catch these amazing fish and continue to have the ability to harvest them. Because, I promise you as my Grandpa did and his before him did this isn't just a mere hobby, this is a true way of life.

You must get your act together and complete what ever it is you need to complete and see that these Steelhead smolts get released on time and into these River Systems. This is just to important for you to not get accomplished. You can always move forward in the right direction by doing the right thing. We can work together and take a new stance on the industry and livelihood of thousand for this great sport. However you can not let this slip though the cracks. The righting is all over the wall, their are a multitude of other ways to get this done the right way so everyone and every species win, especially the protection of Wild Steelhead. This is just completely not the answer.

If you are reading this, which I hope that someone is. As a matter of fact I prey for you all. The sportsman are not the most organized group of people yet I can promise you I will personally make it my vendetta to eradicate this change if not done in the correct way. Ending Hatchery Production is not the answer. Hatcheries are absolutely mandatory to keep the Wild Stocks of fish healthy. 90% of harvestable fish are generated by hatchery systems. You all have the Science, and the facts to support this. Do the right thing and get these Steelhead Planted.

Please feel free to contact me personally with questions or interviews. I have much more to add here, but who am I but a mere fly on the wall.

Thank you, seriously thank you if you did take the time to read what I wrote.

ROCK CHIP Solutions

Josh Hopp
Cell: 425.308.5985
Fax: 360.283.0844
RockChipSolutionsWA@Gmail.com

Inspecting and Repairing Windshields for Your Safety

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

Puget Sound Salmonid Hatcheries:

1 message

Ken j. Mcleod <alpinequest08@yahoo.com> Fri, Mar 4, 2016 at 7:31 PM
Reply-To: "Ken j. Mcleod" <alpinequest08@yahoo.com>
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

Subj: Public Comment Input

It is my firm opinion herewith (58+ years of steelhead & salmon fishing herein the Puget Sound basin) that early-timed winter-run steelhead DO NOT impede wild /native steelhead recovery and said populations, and DO NOT interface to any significant degree with those populations, that occur much later in the winter time (Feb.-Apr). Any WFC science or org that says otherwise is complete bogus and driven by the orgs personal agenda and the cash-cow monies (grants) - then they sue the state for this & that, using litigation that clame hatcheries are bad for wild fish. I want NOAA & NMFS to support and continue our state hatchery system and implement the timely release of ALL steelhead smolts asap, "without any further delay" not only for the resource as a whole, but for the VAST MAJORITY of license recreational buyers who participate in Washington state's fishing.

Thank you,

Ken J. McLeod
past pres. Steelhead Trout Club of Wa.
member of Snohomish Sportmen's Assoc.

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

Abandon The hatchery programs

1 message

Kyle Strozzi <kylestrozzi@yahoo.com> Fri, Mar 4, 2016 at 12:26 PM
Reply-To: Kyle Strozzi <kylestrozzi@yahoo.com>
To: "EWShatcheriesEIS.wcr@noaa.gov" <EWShatcheriesEIS.wcr@noaa.gov>

To whom it may concern,

Please take a moment and follow the link provided below. In 1974, Montana quit stocking rivers and streams that supported wild trout populations. The result: wild trout numbers skyrocketed! The fate of wild steelhead is directly linked to these hatchery programs. Montana proved this over 40 years ago. Do not ignore the science!

http://fwp.mt.gov/mtoutdoors/HTML/articles/2004/DickVincent.htm

EWS Hatcheries FEIS

1 message

bucklj@comcast.net <bucklj@comcast.net> Sun, Mar 6, 2016 at 9:57 PM
To: EWShatcheriesEIS.wcr@noaa.gov
Cc: bucklj <bucklj@comcast.net>

Of the alternates provided for consideration the FEIS presents the best choice all factors considered!

Would I like to see more EWS planted and returning? Yes!

Would I like to see more Puget Sound rivers receiving EWS? Yes!!

Having a viable EWS program throughout all of Puget Sound has significant recreational and economic benefits to the community at large.

But lets get this FEIS in the books in time for the current EWS smolt production can be released into the rivers where they below instead of becoming just planter trout.

//Signed//

Laurence A. Bucklin

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

EW Hatcheries FEIS

1 message

Mike Hayes <myassisdraggin@gmail.com> Sun, Mar 6, 2016 at 6:23 AM
To: EWShatcheriesEIS.wcr@noaa.gov

I'm hopeful that these permits will be approved in time to ensure these hatchery Steelhead will get released. To see this long standing tradition of being able to enjoy fishing for these magnificent fish in local streams with family and friends end would be a shame. It would effect the local economy in a negative way as well. Thank you, Mike Hayes

hatchery steelhead in the dungeness

1 message

OSullivan Family <lindalou@olypen.com> Fri, Mar 4, 2016 at 5:35 PM
To: EWShatcheriesEIS.wcr@noaa.gov

Would love to see the hatchery program on the Dungeness plant enough fish to get the community excited again about steelhead fishing in the area.it has been lost for so long it is sad to see the river during steelhead season, the only river for miles that the community of Sequim and Port Angeles can fish without driving for hours just to fight the crowds on the Boggi to fish and enjoy taking a couple fish home for the table. Thank's for your time.
Shannon o'sullivan

EWShatcheriesEIS wcr - NOAA Service Account <ewshatcherieseis.wcr@noaa.gov>

Re: Puget Sound early winter steelhead Final EIS available for review

1 message

integritymcllc@comcast.net <integritymcllc@comcast.net> Sun, Mar 6, 2016 at 1:04 PM
To: ewshatcherieseis wcr <ewshatcherieseis.wcr@noaa.gov>

First off, thank you for the email and the information.
I, as a license purchasing client of the WDFS. Have a large concern over the fact, that any group would question the hatcheries system, and have any intention of trying to fight to close down hatcheries. I feel, not that I am in any way a biologist, though had quite a bit of it in college. Would have the audacity to think that hatchery closures would help the fish/steelhead runs or any other species of salmonoid. Hopefully this question of closures is dismissed, or the fishing for sportsmen, native, and commercial will suffer the wrath. The WDFS should be on board heavily because of the loss of license purchases will be massive.
Thank you,
Skip Van Diest

From: "NOAA Fisheries" <ewshatcherieseis.wcr@noaa.gov>
To: integritymcllc@comcast.net
Sent: Friday, March 4, 2016 12:00:52 PM
Subject: Puget Sound early winter steelhead Final EIS available for review

NOAA FISHERIES | West Coast Region
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Final Environmental Impact Statement for Early Winter Steelhead Hatchery Programs in Puget Sound

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To Comment by April 11:

You may comment by email to EWShatcheriesEIS.wcr@noaa.gov
If you submit comments by email, please include "EWS Hatcheries FEIS" in the subject line.

You may comment in writing or by FAX to:

William W. Stelle, Jr.
Regional Administrator
NMFS, West Coast Region
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE
Seattle, WA 98115-0070
Fax (206) 526-6426

If you have questions, please contact Steve Leider by email to Steve.Leider@noaa.gov, or phone (360) 753-4650.

NOTE: You have received this noĕce because you previously commented on or expressed an interest in Puget Sound hatchery programs, or steelhead in parĕcular. If you wish to be removed from this list please click "unsubscribe" below. Thank you.