Co-Manager Hatchery Policy

SEPA Comments
Compiled June 5, 2023
Kenneth I Warheit
kenneth.warheit@dfw.wa.gov

Unsigned

2-May-23

I feel having a co-managers have jurisdiction over existing work on the hatchery will violate policy on the Finn clipping. salmon , and opens up opportunity to not clip hatchery salmon in order for them to look like wild fish. Fish and game should not release responsibility of the clipping process of the salmon. I am been a recreational fisherman who grew up here for over 60 years fishing for my food and my families food . And growing up in the projects poor and still being discriminated against when I was trying to feed my family. I think you need to revisit working in the hatcheries and with the call managers so we have more of a say. I do not support the new position of the lower Nicole managers first responsibility in our hatcheries.

Unsigned

2-May-23

Total disagreement with this draft - proposal. This negates any responsibility by the state (Government) to provide proper oversite. This allows tribes to use Federal money without controls by Government. Current controls by the WDFW are limited and poor at best. Current controls by the Tribes are poor at best. WDFW needs to accept more oversite and responsibility to ensure better controls of this issue. This proposal is unacceptable.

Dennis Scott

2-May-23

This doesn't have much to do with SEPA but, it's a huge concern for the Columbia river. Fish management team needs to post how many sea lions are in the Columbia river, so fishermen have some idea what their chances are of catching salmon knowing sea lions are eating the majority.

Best regards,
Dennis

Greg Wright

2-May-23

I support tribal inclusion within the hatchery management plans.
Modern hatchery operations as well as broodstock programs are essential in the long term viability of recreational fishing opportunities as well as species survival.
The Nez Perce tribe has shown great examples of success. If managed correctly, there is minimal threat to "wild" fish stocks from hatchery operations.

Thank you for your considerations,
Greg Wright
Ridgefield WA

Andy Warber
4-May-23

Very good idea. Seen this in action at Bingham Creek on the Satsop River.
Totally agree.

Lower Columbia Fish Recovery Board
18-May-23

Attachment 1 (Page 4)

Wild Salmon Center
25-May-23

Attachment 2 (Page 16)

Martha Hall
26-May-23

Attachment 3 (Page 20)

Jonathan Stumpf (Trout Unlimited and Wild Steelheaders United)
26-May-23

Attached are the comments from Trout Unlimited concerning the SEPA review of the Co-Manager Hatchery Policy.

Please confirm these have been received.

Thank you,
Jonathan
Wild Steelheaders United
www.wildsteelheaders.org
Trout Unlimited
www.tu.org

Attachment 4 (Page 24)

Conrad Gowell (The Conservation Angler, Washington Wildlife First, Kettle Range Association, Orca Conservancy, Wild Fish Conservancy, Wild Orca, Northwest Animal Rights Network)

26-May-23

Good evening,
Please find attached joint comments on the draft Co-Manager Hatchery Policy. Please confirm receipt and let me know if you have any questions.

Kind regards,
Conrad Gowell
Wild Fish Conservancy

Attachment 5 (Page 30)

Conrad Gowell (WFC and Conservation Angler)

26-May-23

Good evening,
Please find the attached joint organizational comments on the draft Co-Manager Hatchery Policy prepared by the Conservation Angler and Wild Fish Conservancy. Please confirm receipt and let me know if you have any questions.

Kind regards,

Conrad Gowell
Wild Fish Conservancy

Attachment 6 (Page 34)

Sharon Stroble

26-May-23

A FULL AND VIGOROUS REVIEW OF THE HATCHERY PLAN in not only warranted, but essential to the welfare and survival of our fisheries. To avoid this is totally unacceptable and suggests flawed leadership on this very important issue.

Bill McMillan

26-May-23

Attachment 7 (Letter & Comments - P. 46). Attachment 8 (Literature: Hatchery Impacts . . . - P. 51).
Attachment 9 (Literature: Effects Climate Change . . . - P. 54). Attachment 10 (Literature: Hatchery Consequences . . . -P. 61).
Attachment 11 (Paper Broader Examples if Failed Results . . . -P. 66).
Attachment 12 (Marblemount Hatchery Skagit Wild Chum 2022 - P. 69).
Attachment 13 (Hatchery Influences on Wild Populations - Literature - P. 73).

Attachment 1

Lower Columbia Fish Recovery Board

Steven Manlow
Executive Director
11018 NE 51st Circle
Vancouver, WA 98682
(360) 425-1555

May 18, 2023

Dr. Kenneth Warheit
Washington Department of Fish and Wildlife
Post Office Box 43200
Olympia, WA 98504-3200

Subject: Lower Columbia Fish Recovery Board Comments on May 1, 2023 State Environmental Policy Act (SEPA) Determination of Nonsignificance (DNS) for the proposed Co-Manager Hatchery Policy

Dear Dr. Warheit:

The Lower Columbia Fish Recovery Board (LCFRB) is writing in response to Washington Department of Fish and Wildlife's (WDFW) above-referenced SEPA DNS for the proposed Co-Manager Hatchery Policy. As one of the eight regional recovery organizations in Washington State, the LCFRB is charged by state statute with developing and facilitating implementation of a salmon and steelhead recovery plan for the Lower Columbia Region. In that capacity, the LCFRB led the collaborative development of the state and federally adopted Washington Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (Recovery Plan) and is now charged with overseeing implementation and adaptive management of recovery strategies. To date, WDFW has been a key partner in the development, implementation and adaptive management of the Recovery Plan. Through development of the Lower Columbia Conservation and Sustainable Fisheries Plan (LCFRB and WDFW 2017), WDFW has also agreed to work proactively to achieve the hatchery and harvest reform targets established in the Recovery Plan. These hatchery and harvest actions are key components of the Recovery Plan. While the existing Policy C-3624 reflects WDFWs recovery and collaboration commitments, unfortunately the proposed Co-Manager Hatchery Policy does not. This lack of alignment is a highlighted concern and will have long-term implications for recovery programs. Please consider the comments we provide below as supplemental to those we provided on February 15, 2023 (Attached).

The proposed Co-Manager Hatchery Policy guiding principles represent a shift from conservation and recovery to hatchery production to support harvest. As reflected in the adopted Recovery Plan, the LCFRB mission includes recovering salmon and steelhead to "*healthy, harvestable levels that will sustain productive sport, commercial, and tribal fisheries through the restoration and protection of the ecosystems upon which they depend and the implementation of supportive hatchery and fishery practices*". The Recovery Plan explicitly recognizes the important, dual role of hatcheries in supporting Tribal, commercial and recreational harvest, and in some cases directly supporting recovery through supplementation and reintroduction. Sustaining Treaty rights is of paramount importance in the Recovery Plan, along with

achieving established threat reduction targets and recovery goals. While the existing Policy C-3624 provides a solid framework for working collaboratively to achieve these multiple goals, unfortunately the proposed Co-Manager Hatchery Policy does not.

References to aligning hatchery programs with state and federally adopted recovery and rebuilding plans, as called for in both the Recovery Plan and Governor's Statewide Strategy, are entirely absent in the proposed policy. Instead, the focus of hatchery production has shifted largely to supporting harvest. Explicit commitments found in Policy C-3624 for coordinating with stakeholders other than the Tribes are also absent. Requirements for a transparent and structured decision-making process and development of a technical procedures document, which are integral to transparency and consistency, have also been eliminated. Most importantly, the prior policy focus on "…conservation and recovery of depressed wild salmon and steelhead populations" is no longer identified as a high priority. The primary focus is now centered on production for harvest and Treaty rights – none of the six principles that will guide co-managed hatchery programs reference "recovery". We view this as a clear pivot away from WDFW's commitments to collaborative recovery of salmon and steelhead in southwest Washington, the Columbia basin, and across the state.

The purpose statement of the Co-Manager Hatchery Policy is grounded in the assumptions that "*legacy habitat degradation requires ongoing mitigation*", and "*ongoing habitat loss and changing environmental conditions and ecosystem functions* ***preclude*** (emphasis added) *for the foreseeable future aggregate natural- and hatchery fish sufficient to meet the recovery needs and legal requirements of the Co-Managers*". The challenges of climate change and both legacy and ongoing habitat losses certainly must be addressed and cannot be ignored. They have inhibited recovery progress. However, this broad and sweeping statement is not supported by any form of analysis. While there may be some watersheds in the state where carrying capacity thresholds have been crossed by permanent habitat destruction, that certainly is not the case for much of the state. In the Lower Columbia we have many watersheds where habitat conditions are improving from updated land use programs (e.g., Forest and Fish rules, Federal Forest Plan, etc.) coupled with active restoration and correction of fish passage barriers. To our knowledge, there has been no statewide evaluation of existing or projected habitat capacity relative to both recovery and harvest needs and goals. To the contrary, recovery targets in the Lower Columbia were indeed set based in part on assessment of habitat capacity and anticipated trends. These unsubstantiated statements may be intended to support a shift from recovery focus to harvest production programs, but unless better substantiated with a statewide analysis, should be removed. On their surface, these statements also perpetuate the false narrative that hatchery production is a functional replacement for habitat losses. What is needed, and we ask for, is a firm commitment from the state that it will use its various land use authorities to ensure that protection of the habitat baseline occurs, and that funding for habitat restoration is given equal consideration to the decades of investments in hatchery infrastructure.

WDFW's use of a phased environmental review is inappropriate. The response to question 7 in the environmental checklist notes that hatchery plans "*…will go through NEPA and/or SEPA review as appropriate*". Under WAC 197-11-060, phased review is only appropriate when the sequence is from a non-project document to a document of narrower scope such as a *site specific analysis*, or the sequence is from an environmental document on a specific proposal at an early stage *to a subsequent environmental document at a later stage* (emphasis added). Inherent in this language is the understanding that there will be an opportunity for site specific analysis and further review under SEPA at a later time. What has not been clearly stated in staff presentations or in the SEPA documentation is that it is WDFW's long-standing practice to categorically exempt development of Hatchery Genetic Management Plans (HGMPs) and hatchery program implementation from SEPA under WAC 197-11-835. There is no public comment period for categorical exemptions. When the LCFRB recently requested copies of individual SEPA determinations for HGMP's in the Lower Columbia Region to better

understand the review process, none were provided because they apparently do not exist. The only exception is SEPA determinations for actual on-the-ground construction projects – but not the hatchery plans themselves and associated program implementation. Because WDFW is not required to document that a proposal is categorically exempt, there is functionally no subsequent environmental review or analysis under SEPA. In addition, the proposed approach merely divides a larger statewide program into exempted fragments, which avoids discussion of cumulative impacts that are of paramount importance when it comes to statewide hatchery programs. This is not appropriate under SEPA and renders use of a phased environmental review for operations under the proposed policy both meaningless and fundamentally flawed. We ask that WDFW provide a full and transparent accounting of how SEPA would be applied to the State's 172 hatchery programs moving forward, before a decision is made on the proposed policy.

The second avenue for environmental review noted in the environmental checklist is reliance upon NEPA and Section 7 consultations with the National Marine Fisheries Service (NMFS) to satisfy SEPA. In the Columbia Basin, a programmatic biological opinion was prepared for Mitchell Act hatchery programs, including those in the Lower Columbia region. For hatchery program implementation, WDFW relies on the 2014 Endangered Species Act (ESA) consultation, with no additional public review on the SEPA side. In other parts of the basin and state, separate federal review processes involving NEPA have occurred. The fundamental problem is that the threshold under a Section 7 consultation is whether the proposed action is "*likely to jeopardize the continued existence*" of the affected species - not whether it contributes proactively to recovery goals and avoids (individually and cumulatively) significant adverse environmental impacts. Pointing to HGMP reviews under NEPA as the vehicle for future environmental review is not appropriate given the different standards of that review, and the fact that in areas like the Columbia Basin, fish population status and trends and habitat conditions have changed substantively since 2014. Coupled with the SEPA limitations described in the previous paragraph, this heightens the need to abandon the "phased review" concept and conduct a robust and meaningful evaluation of environmental impacts from the proposed policy shift.

The SEPA Determination of non-significance should be withdrawn. WDFW has not fully implemented any hatchery policy over the last 20 years. The transition from Policy C-3619 to C-3624 to the proposed policy has led to an ever-shifting management framework, lack of sustained implementation focus, and absence of an objective evaluation of program performance. To date, there has been no comprehensive, statewide analysis of the efficacy of WDFW's hatchery programs at achieving both harvest and conservation/recovery goals using objective metrics. There has also been no rigorous, consistent, and intentional evaluation of cumulative hatchery effects across multiple hatchery programs operating within each major geographic subbasin of the state. This includes lack of assessment of the alignment of increased production for southern residential orca with recovery plans, which is explicitly called for in the Governor's task force recommendations. These analyses must occur prior to a change in policy. WDFW's own 2020 assessment of Policy C-3619 implementation identified major gaps in implementation and noted the agency failed to collect sufficient monitoring data to fully evaluate the environmental effects of hatchery program implementation across the state. Moving forward with the proposed piecemealed approach will not adequately consider portfolio effects of population complexes, or aggregate effects such as density dependence. A more robust and quantified cumulative assessment of hatchery program impacts is warranted. Given that a "phased" review as noted above will not likely yield any form of robust impact analysis, a determination that impacts are "nonsignificant" is premature and should be withdrawn until a thoughtful and transparent assessment of hatchery program impacts can be completed.

Issuance a SEPA Determination of Significance is warranted. While many hatcheries are supporting recovery and reintroduction across the state, and within the Lower Columbia Region as well, other programs continue to impede recovery. Implementation of hatchery reform measures such as program size adjustments and/or elimination, use of weirs, establishment of Wild Salmonid Management Zones, etc., in the Lower Columbia Region have reduced threats and are improving recovery progress, while still supporting fisheries. However,

SEPA threshold determinations cannot be based on a "balancing" of whether the beneficial aspects of a proposal (e.g., support fisheries, economic considerations) outweigh its adverse impacts. Rather, it must consider whether a proposal has any probable significant adverse environmental impacts. Unfortunately, impacts for many fish populations in the Lower Columbia remain high. Currently, draft analyses conducted by the LCFRB on populations with sufficient data indicate that only 13% of coho, 15% of tule fall Chinook, 0% of spring Chinook, 67% of chum, 50% of summer steelhead, and 67% of winter steelhead populations with supporting pHOS data are meeting established performance targets identified in the Recovery Plan. Fortunately, for some populations recent pHOS rates appear to be improving. Deprioritizing recovery in hatchery management decisions under the proposed policy can be expected to exacerbate ongoing impacts, undermine existing recovery progress, and potentially strand habitat restoration and conservation investments that were made in the context of hatchery/harvest reform actions and priorities. These impacts are significant, and alone warrant preparation of an Environmental Impact Statement (EIS) that fully evaluates impacts of the proposed policy. Absent a more thorough analysis of statewide hatchery programs, an EIS may be the most appropriate venue to objectively evaluate environmental impacts from alternative policy choices.

The LCFRB believes that the existing Policy C-3624 provides an effective framework for supporting both recovery and production needed to sustain Treaty rights and harvest opportunities. We encourage the Commission to retain and not abandon this policy, and continue to work with the Tribes to ensure Treaty rights are fully met. This could be addressed as an addendum to Policy C-3624. If the Fish and Wildlife Commission elects to adopt the proposed policy, we strongly recommend, and will continue to promote, that it be updated to address the primary gaps noted above. This should include incorporating the following elements into the body of the policy:

- Establish conservation and recovery of ESA-listed and depressed populations as a high priority goal, in addition to maintenance of Treaty Rights and compatible commercial and recreational harvest opportunities;

- Include a specific commitment to work toward achieving established goals and targets in state and federally adopted salmon recovery and sustainability plans;

- Manage hatcheries in a manner that reflects and supports existing fish population priorities established in recovery plans. These include: primary, contributing, and stabilizing designations; historical "legacy" and "core" populations; and, steelhead gene banks and wild salmonid management zones. These designations have been agreed upon by WDFW, form the basis of recovery scenarios, and have guided tens of millions of dollars in habitat and other recovery work;

- Call for development and implementation of Hatchery Management Plans that are grounded in a transparent risk management framework and structured decision-making process, with a supporting technical procedures document that specifies performance indicators and adaptive management processes;

- Include development and implementation of Hatchery Management Plans using an "All-H" approach that considers the benefits and impacts of hatcheries relative to ongoing recovery efforts, and that also includes coordination with regional recovery organizations and associated stakeholders.

- Establish mechanisms for regular public reporting on program implementation, and progress toward achieving established goals and performance criteria, to support adaptive management of broader recovery efforts; and,

- Both the policy and individual HGMPs should be developed through a robust and transparent process that involves ample public review opportunities.

Impacts from decades of intensive hatchery production were primary factors that led to the numerous listings of northwest salmon and steelhead populations under the Endangered Species Act. To address those impacts, we have worked proactively with WDFW since 2004 to develop and implement hatchery and harvest reforms that are identified in the federally adopted Recovery Plan. Your regional staff work very hard at ensuring hatchery programs align with and support recovery of listed stocks to healthy and harvestable levels, while still maintaining Tribal, commercial and recreational harvest. While challenging, substantive progress has been made. The existing policy provides the framework to ensure this work continues and addresses ongoing gaps. As noted above, the proposed policy in its current form can reverse the important progress made to date. We sincerely request that you consider our input in decision making.

Thank you for the opportunity to provide these comments. If you have any questions regarding these comments, please do not hesitate to contact Director Steve Manlow at (360) 425-1553 or via email at smanlow@lcfrb.gen.wa.us, or me at (503) 347-6251, or via email at Todd.Olson@PacifiCorp.com .

Sincerely,

Todd Olson, Chair

cc: Barbara Baker, Chair, Washington Fish and Wildlife Commission
Molly Linville, Vice-Chair, Washington Fish and Wildlife Commission
Kelley Susewind, Director, Washington Department of Fish and Wildlife
Bryce Glaser, Regional Fish Program Manager, Washington Department of Fish and Wildlife
Erik Neatherlin, Governors Salmon Recovery Office

Attachment: February 15, 2023 Comments on Draft Co-Manager Hatchery Policy

11018 NE 51st Circle
Vancouver, WA 98682
(360) 425-1555

February 15, 2023

Dr. Kenneth Warheit
Washington Department of Fish and Wildlife
Post Office Box 43200
Olympia, WA 98504-3200

Subject: Lower Columbia Fish Recovery Board Comments on the Draft Co-Manager Hatchery Policy

Dear Dr. Warheit:

The Lower Columbia Fish Recovery Board (LCFRB) is writing in response to Washington Department of Fish and Wildlife's (WDFW) February 7, 2023 request for comments on the Draft Co-Manager Hatchery Policy. As one of the seven regional recovery organizations in Washington State, the LCFRB is charged by state statute with developing and facilitating implementation of a salmon and steelhead recovery plan for the Lower Columbia Region. In that capacity, the LCFRB led the collaborative development of the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (Recovery Plan) and is now charged with overseeing implementation. In light of the ongoing importance of hatchery and harvest reform in the state and federally adopted Recovery Plan, we offer the following comments for your consideration.

We appreciate the Draft Co-Manager Hatchery Policy's emphasis on Tribal Treat Rights and established legal management and decision-making processes. Managing fisheries and hatcheries to maintain and protect Tribal Treaty Rights is absolutely of paramount importance. As part of its broader mandate relating to non-tribal hatchery production and fisheries, however, WDFW has also committed to work proactively to implement adopted recovery plans and achieve their associated goals and targets. While that broader perspective is reflected in the existing Hatchery Policy C-3624 to some degree, it is absent in the proposed policy. When compared to the existing Hatchery Policy C-3624, the draft Co-Manager Hatchery Policy:

- Does not establish conservation of natural resources and recovery of depressed salmon and steelhead as the highest priority commitment;
- Strongly emphasizes benefits of hatchery programs but does not provide a commensurate policy platform for acknowledging or proactively managing risks;
- Calls for monitoring and evaluation, but lacks reference to specific science-based and objective metrics for evaluating program impacts, benefits and/or success;

- Does not require alignment of the purposes, goals, and objectives of the policy, and any changes resulting from implementing its provisions, with state and federally adopted recovery and rebuilding plans;
- Lacks a commitment to coordinate in any way with recovery organizations or the GSRO, except in the context of securing funding;
- Constrains the potential for WDFW to independently use best available science and associated management tools to address management needs specific to the State; and,
- Does not include any form of a transparent and robust structured decision-making process.

We greatly appreciate WDFW's ongoing efforts in the Lower Columbia Region to align hatchery and harvest management with both the Recovery Plan and the Conservation and Sustainable Fisheries Plan (LCFRB & WDFW 2017) goals and targets. However, we view the absence of principles like those above as a departure from WDFW's commitments as a recovery partner, especially when considered in the context of both fishery and hatchery policy shifts that have taken place since 2018. The above points reflect key elements of Policy C-3624 that should be retained in any policy update. We would not support any policy update that does not address them.

Attachment A includes more detailed comments on the Draft Co-Manager Hatchery Policy. If you have any questions regarding these comments, please do not hesitate to contact me at (360) 425-1553 or via email at smanlow@lcfrb.gen.wa.us.

Sincerely,

Steve Manlow
Executive Director, LCFRB

cc: Barbara Baker, Chair, Washington Fish and Wildlife Commission
Molly Linville, Vice-Chair, Washington Fish and Wildlife Commission
Kelley Susewind, Director, Washington Department of Fish and Wildlife
Bryce Glaser, Regional Fish Program Manager, Washington Department of Fish and Wildlife
Erik Neatherlin, Governors Salmon Recovery Office

Attachment A – LCFRB Comments on Draft Co-Manager Hatchery Policy

Attachment-A
LCFRB Comments on Draft Co-Manager Hatchery Policy

General Comments:

Lower Columbia Recovery Plan Planning and Implementation Framework:
Large scale salmon and steelhead hatchery production has been occurring for over a century in the Lower Columbia Region and broader Columbia Basin, and was one of the key factors that contributed to listing of salmon and steelhead under the federal Endangered Species Act (ESA). To address these impacts, the LCFRB collaborated with WDFW to develop the Lower Columbia Conservation and Sustainable Fisheries Plan (WDFW & LCFRB, 2017) (CSF Plan), which is now being implemented. The goal of the CSF Plan is to support efforts to return natural origin salmon and steelhead to healthy and harvestable levels, while sustaining important Tribal, commercial and recreational fisheries. The CSF Plan sets forth specific strategies and actions that WDFW has committed to implement in operating its Lower Columbia hatcheries and in managing related fisheries. We do not view those recovery commitments as something that can be simply dismissed with constantly shifting agency policies. Rather, those commitments should be honored and reflected in agency policy updates.

Substantive progress has been made on hatchery and harvest reform in the Lower Columbia Region, and hatcheries are playing an important role in both sustaining fisheries and supporting recovery of species such as spring Chinook and chum. However, excess numbers of hatchery fish on the spawning grounds remains a key limiting factor for many of our ESA listed populations, especially tule fall Chinook and coho. It is therefore important to sustain and adaptively manage CSF Plan implementation and continue to work proactively and explicitly toward achieving Recovery Plan targets. We believe the Governor's recently adopted Statewide Strategy Update also demands nothing short of this.

Hatchery Policy Shifts:
The Draft Co-Manager Hatchery Policy must be viewed in context of a longer-term shift in state hatchery policy that has sequentially reduced recovery emphasis over the last several years. Adoption of Policy C-3619 in 2009 represented a strong response to ESA listings and established science based and objective standards for managing hatcheries in a manner that prioritized recovery needs. That policy was never fully implemented, and in 2018 the Fish and Wildlife Commission (FWC) suspended implementation of the Hatchery Scientific Review Group (HSRG) standards that formed the technical foundation of that policy. Those standards were not reinstated, despite WDFW and the Washington Academy of Sciences reviews that confirmed validity of HSRG metrics in evaluating hatchery programs and their effectiveness. Policy C-3619 was subsequently replaced with Policy C-3624, which diluted recovery emphasis by greatly broadening purpose statements. However, it still called for development of Hatchery Management Plans (HMPs) that were to be supported by a structured, science-based decision-making process. That process was to also include establishment of performance standards and indicators, and consideration of ESU-wide plans, adopted recovery plans, and sustainability plans. Implementation of Policy C-3624 has been occurring for less than one Chinook salmon life cycle. Yet as drafted, the Draft Co-Manager Hatchery

Policy would largely replace it, despite its lack of emphasis on addressing broader salmon and steelhead recovery needs in a transparent and collaborate manner. We are therefore concerned that this narrowly constructed policy could undermine collaborative recovery efforts such as those currently being implemented in the Lower Columbia Region, and could potentially reset hatchery policy to that which existed prior to Policy C-3619.

Purpose:
It is unclear whether this policy would apply to hatchery facilities below Bonneville Dam in the Lower Columbia Region. As written, the parties are referred to as co-managers both collectively and independently. Thus, an independent state managed facility could be viewed as a co-manager facility subject to the policy. Also, the first footnote on page 1 associates co-managed facilities with the Tribes' and WDFW's joint management efforts pursuant to their concurrent fisheries jurisdiction. As such, it appears that this policy would also apply to WDFW managed facilities below Bonneville Dam as they are integrally tied to joint fisheries jurisdiction and decision-making processes. Clarification is needed as to specifically which facilities this policy would apply to.

Scope of Policy:
This section notes that any specific hatchery program plans that are consistent with the Co-Manager Hatchery Policy will supersede direction under Policy C-3624. However, as noted above, when compared to the existing policy C-3624, the draft Co-manager Policy:

- Does not establish conservation of natural resources and recovery of depressed salmon and steelhead as the highest priority commitment.
- Strongly emphasizes benefits of hatchery programs but does not provide a commensurate policy platform for acknowledging or proactively managing risks;
- Calls for monitoring and evaluation, but lacks reference to specific science-based and objective metrics for evaluating program impacts, benefits and/or success;
- Does not require alignment of the purposes, goals, and objectives of the policy, and any changes resulting from implementing its provisions, with state and federally adopted recovery and rebuilding plans;
- Lacks a commitment to coordinate in any way with recovery organizations or the GSRO, except in the context of securing funding;
- Constrains the potential for WDFW to independently use best available science and associated management tools to address management needs specific to the State; and,
- Does not include any form of a transparent and robust structured decision-making process.

The above points encompass key elements of Policy C-3624 that should be retained in any future policy.

Guiding Principles and Policy Positions:
This section places evaluation of benefits and risks in the context of the explicit purposes and principles expressed in the policy and individual agreed-to hatchery management plans. As noted above, the principles and purposes expressed in the policy omit many important recovery considerations and are focused largely on importance of producing hatchery fish to support Treaty Right fishing obligations and nontreaty fisheries. The policy foundation is structured around prior court cases and management agreements, which are indeed foundational to co-manager processes. However, the result is a narrowly constructed policy that defines WDFW's role in the context of legal comanager processes and mandates, rather than as a collaborative and committed partner in other state recovery forums.

Principles 1 and 2:
We fully concur with these statements.

Principle 3:
While this statement is accurate, it should be coupled with a statement that the broader goal is to work toward returning all ESA-listed salmon and steelhead populations to healthy and harvestable levels that meet Tribal, commercial and recreational fishery needs. That principle is foundational to adopted recovery plans and efforts.

Principle 4:
We strongly support development of hatchery plans at the regional level, as that is critical to understanding interrelationships between hatchery programs and issues such carrying capacity and straying impacts. We are also supportive of the proposed All-H approach for development of hatchery plans. However, details on required plan elements are lacking entirely, which contrasts starkly with Policy C-3624.

Providing prey for Southern Resident Killer Whales (SRKW) and buffering pinniped an avian predation should not be used independently as rationale for sustaining or increasing hatchery production, without a broader evaluation of both risks and benefits. Per the Governors recommendations, hatchery production for SRKW should only occur if deemed consistent with recovery plans and available habitat, and done in concert with significantly increased habitat protection and restoration measures. To date, while production has been increased and is now called for in both hatchery and fishery policies, the additional requirements called for in the Governors policy statement have not been met, and efficacy of efforts to increase SRKW prey has not been critically evaluated. While predator buffering has been demonstrated through several studies, it is important to also consider whether documented benefits are outweighed by ecological and biological risks to natural origin fish. To our knowledge that has not been evaluated either.

We appreciate the call for sizing hatchery programs and releases in a manner that considers ecosystem constraints, as the cumulative impact of hatchery production on natural origin salmon and steelhead productivity and estuarine carrying capacity in the Columbia River basin has not been evaluated. This is especially important given hatchery fish currently account for over 2/3 of the average return.

This section calls for a balancing of harvest opportunities, cultural, economic, conservation, and ecological benefits with potential genetic and ecological risks to natural-origin salmonid populations, and environmental conditions such as habitat degradation. However, there is no reference to how this balancing will occur, or establishment of relative priorities across these considerations. As noted above, conservation of natural resources and recovery of depressed salmon and steelhead should be clearly established as a high priority commitment for WDFW. In addition, a transparent and structured decision-making process that includes robust risk assessment should be incorporated.

This section references “hatchery program plans”, but it is not clear whether this is referring to Hatchery Genetic Management Plans (HGMPs), or some new yet to be defined plan. Complying with ESA requirements associated with HGMPs is not the same as proactively working to achieve recovery plan targets. The former is focused on avoiding “jeopardy” determinations and maximizing harvest and hatchery production within ESA thresholds, whereas the latter is working proactively to recover ESA listed species to healthy and harvest levels, in light of population-specific goals. We therefore encourage

incorporation of policy statements that call for alignment of hatchery plans with the goals, objectives, and threat reduction and productivity improvement targets identified in adopted recovery plans, and consulting with regional recovery organizations during plan development.

Principle 5:
This section identifies monitoring and evaluation of both hatchery and natural origin fish and their habitats, but only in the context of the goals established in yet to be defined hatchery plans. WDFW's monitoring associated with hatchery programs is also critical to evaluating progress toward achieving broader recovery goals and targets across the state. This language should be broadened to include monitoring to evaluate progress toward adopted recovery and sustainability plan goals as well.

This section appears to limit WDFW's use of procedure manuals or evaluation tools to only those that are jointly developed or agreed to by the co-managers. This may unduly constrain WDFW's use of management tools such as mass-marking, which is called for in the Recovery Plan but may not be accepted by all co-managers. WDFW should retain the ability to apply best available science and associated tools in hatchery management to meet potentially differing needs.

Principle 6:
We support the strong call for financial support to ensure hatcheries are effectively managed and monitored into the future. However, this section again focuses on securing resources for hatchery management largely in the context legal co-manager agreements and requirements, not broader recovery needs, which require equally important financial support.

State Environmental Policy Act (SEPA) Review:
The LCFRB believes that any changes in policy direction that affects future implementation of the Recovery Plan should be conducted in a manner that provides for thorough, comprehensive and transparent public review. The public notice indicates that this policy will undergo an additional State Environmental Policy Act (SEPA) public comment period. If the Draft Co-Manager Hatchery Policy moves forward substantively as written, we believe that issuance of a "Determination of Significance" (DS) and preparation of an Environmental Impact Statement (EIS) would be warranted.

Conclusion:
From the LCFRB's regional recovery perspective, it would make more sense to retain Policy C-3624, streamline the document while retaining important elements noted above, but add an addendum that addresses additional co-management considerations and responsibilities that may be lacking in its current form. For the reasons noted, we do not support abandoning Policy C-3624 and replacing it with the narrowly constructed Draft Co-Manager Hatchery Policy as currently drafted.

Attachment 2

WA Fish and Wildlife Commission
Washington Department of Fish and Wildlife
c/o Dr. Kenneth Warheit
PO Box 43200
Olympia, WA 98504-3200

Re: Draft Co-Manager Hatchery Policy

May 24, 2023

Dear Dr. Warheit and Commissioners,

Wild Salmon Center is submitting comments on the Draft Co-Manager Hatchery Policy per the request for comments on February 7, 2023.

Wild Salmon Center is a leading conservation organization working on Pacific salmon across their entire range. We take a proactive approach to all the work we do, protecting salmon and steelhead populations with the best chance for recovery and which constitutes the best potential return on public and private investments.

Wherever we work, we partner with local Tribes, organizations, and communities, helping them to secure funding, access the best available science, develop prioritized habitat restoration plans, and implement projects with the highest benefit to salmon and steelhead. Healthy salmon populations are important to all of us – they are cultural connection, subsistence, thriving local economies, recreational opportunities, and clean water for communities, and ecosystems.

We base the overall premise of our comments on **the legislative mandate of the Department and Commission** (RCW 77.04.012) which provides a clear priority to preserve, protect and perpetuate fish and wildlife – and to manage in a manner that does not impair the resource.

We recognize and appreciate the intent of WDFW to emphasize Tribal Treaty Rights in this draft Policy. We firmly believe that the restoration of Indigenous co-governance to salmon management (throughout the salmon geography) is a crucial part of the reconciliation process and that doing so can help decentralize salmon management decisions at a time when diverse impacts are challenging watersheds like never before. And we also believe it imperative that, in addition to this effort, WDFW must simultaneously maintain its broader mandates. This current draft fails to balance these responsibilities.

When compared to C-3624, the draft Co-Manager Hatchery Policy:

INTERNATIONAL HEADQUARTERS
721 NW Ninth Avenue, Suite 300 • Portland, Oregon 97209 USA • tel: 503.222.1804 • fax: 503.222.1805
info@wildsalmoncenter.org • www.wildsalmoncenter.org

- Does not establish conservation of natural origin populations and recovery of depressed salmon and steelhead as the highest priority commitment. With most Washington salmon and steelhead populations experiencing some of their worst returns on record, and many already listed for protection under the Endangered Species Act (ESA), it is critical that this policy clearly identify conservation and recovery of these stocks as its primary priority.
- The draft policy places significant emphasis on the benefits of hatchery production but it provides an abysmal acknowledgement to associated ecosystem risks (well documented in the scientific literature) and fails to include a policy platform to guide the proactive management of risks.
- Fails to identify any form of a robust or transparent decision-making process.
- Fails to require alignment of the policy, and any changes resulting from its implementation, with state and federally adopted recovery and rebuilding plans and wholly lacks a commitment to coordinate with the existing Washington State salmon recovery structure.
- Constrains the potential for WDFW to independently use best available science and associated management tools to address management needs specific to the Departments mandate.

We support the development of comprehensive all-H hatchery management plans, but this draft policy fails to identify the required elements of these plans. We strongly believe that using only a NMFS-approved HGMP and "compliance with provisions of ESA" as the department vision of an adequate hatchery program falls short of your mandated responsibilities. An approved HGMP as a threshold does not constitute what is necessary for recovery or restoration of a population. This draft policy fails to provide guidance for the improvement of HGMPs or in the development of an HMP to examine mechanisms that can be implemented to help recover or restore a population.

This draft policy appears satisfied with the current suite of hatchery programs and actions so long as the hatchery has an approved HGMP. In the development of a HMP, the draft does not require:

- Alignment of hatchery production in the applicable salmon recovery plan (as mentioned above).
- Consideration of climate change through identification of predicted changes for the watershed, fish populations, and hatchery operations, and how each change will impact the facility's ability to successfully provide for sustainable fisheries without negative impact to wild populations while recovering and restoring those wild populations.
- What species, life histories, and release strategies will need to be adjusted to address future conditions and decrease impacts to wild populations?

This draft policy could require the improvement of HGMP provisions in development of the HMPs to reflect a balance between the need to minimize genetic and ecological risks to coincident wild populations while providing for the ecological and societal benefits of hatchery propagated salmon and steelhead. When a species is listed, the federal government steps in because the State has failed to properly protect the species. This draft policy fails to create a process by which Washington State will change its previous approach to management to keep the remaining non-listed populations in the state from following the same decline. When we examine the decline of salmon and steelhead populations and the dire condition they continue to be in, most would agree that their status is due to the decades long decisions by land managers, forest managers, water managers, transportation managers, as well as fish and wildlife managers to balance impacts on salmon and steelhead with the social and economic benefit of their actions. Balancing – or pretending to balance impactful actions has done nothing but perpetuate the decline of our salmon and steelhead populations. This draft policy maintains that status quo.

To successfully rebuild salmon and steelhead populations, we need salmon and steelhead that are adapting with their watersheds, and mention of which is absent from this draft policy. We know that the strength of salmon and steelhead is their adaptability, and we can utilize that strength to help salmon and steelhead prepare for the future. To achieve this, we need to ensure that salmon and steelhead spawning in the watershed are driving the genetics and adaptations to those changing conditions. Ultimately, having populations that are adapting to these changes is good for both wild spawners and hatchery productivity.

As outlined above, we are concerned with the abandonment of C-3624 and development of a new hatchery policy that can only be described as vague, lacking scientific integrity, and inadequate. We recommend amending C-3624 to include clear provisions associated with co-management responsibilities, agreements, and processes. We view the absence of principles and transparent decision-making processes from the draft policy to be a significant departure from the Department's mandate. This draft policy has significant overarching impact on the development of HMPs or improvements to existing HGMPs that we do not believe can be adequately addressed in individually specific SEPA reviews. As such, we do not support the Department's Determination of Non-Significant Phased Review.

Sincerely,

Jessica L. Helsley
Government Affairs Director

Attachment 3

From: Martha Hall <pondfrog.mh@gmail.com>
Sent: Friday, May 26, 2023 11:40 AM
To: Commission (DFW) <COMMISSION@dfw.wa.gov>
Subject: Draft Co-management Hatchery Policy

External Email

To: DFW Commissioners May 26, 2023

Attached are my comments on the new draft Hatchery Co-Manager Policy, SEPA 23015.

Dear Commissioners,

I am very disappointed that the director and staff are proposing this new policy that will replace the existing one for many reasons which are explained in my comments. This new policy is such a radical change in the most fundamental and important ways that it should raise some real concerns about the director and staff who support it. They seem to have forgotten what WDFW's legislative mandates say and who they serve. This new policy also raises serious questions about what their real goal is for their vast empire of hatcheries. Have they forgotten that hatcheries were originally about recovering our wild salmon runs?

I am also very disappointed that the director and staff are trying to avoid a full and rigorous environmental review of their hatchery program. I hope the current commission cares enough about using the best science, about being transparent, and about following the federal ESA to require a much needed environmental review. To use the DNS under SEPA to avoid this is unacceptable. I hope the current commission is willing to change what has been years of unkept promises from this state agency about doing an environmental review. Hatcheries are a huge part of the WDFW budget. Each year WDFW releases millions of hatchery fish into our local rivers and then sells licenses to harvest these fish. To say that these activities do not impact our wild fish and their ecosystems is simply wrong. We expect far better use of real science from our state fish and wildlife agency.

I hope you, our current commissioners, will correct these major problems by requiring a full and rigorous environmental review of WDFW's hatchery program. Our wild fish, the ecosystems they depend on, our Southern Resident Orcas, and the public deserve this review. We have waited far too long for this to happen. This needs to happen now.

Martha Hall
2617 16th Street
Anacortes, WA 98221

Sent via e-mails to two WDFW addresses
on Friday, May 26, 2023

To: SEPAdesk2dfw.wa.gov
and Commission@dfw.wa.gov

Topic: My comments on the Washington Department of Fish and Wildlife's (WDFW) Determination of Nonsignificance (DNS) under the State Environmental Policy Act (SEPA) for the draft Co-Manager Hatchery Policy (Co-Manager Policy).

Main idea: Withdraw the SEPA determination of non-significance because this is obviously just plain incorrect and instead, conduct a thorough environmental review which still has not been adequately done even though WDFW runs one of the largest hatchery operations in the world.

I was shocked when I first heard staff explain this new hatchery policy for co-management of hatcheries with tribal co-managers. I still can't figure out why the staff and director support this new policy and using a DNS to avoid a much needed rigorous environmental review.

1. Why do the director and staff want to discard and undermine all the guidelines about conserving wild fish that are in the current but not this new policy? Shouldn't this be the first and foremost stated goal in any and all hatchery policies? Or perhaps the director and staff have really decided but not disclosed that their goal is to replace wild fish with the hatchery fish they raise and release. They have created quite an empire that produces hatchery fish and sells licenses to fish for these.
2. Why do the director and staff support this new policy that is in direct conflict with WDFW's legislative mandate that directs WDFW to "protect", "preserve" and "perpetuate" our state's fish and wildlife, including listed fish runs?
3. Why do the director and staff support this new policy that fails to follow WDFW's legislative mandate that says WDFW is to manage our state's fish and wildlife for "the state", meaning the people of Washington State?
4. Why are the director and staff unable to understand and develop policies that meet more than one mandate, in this case, the mandate for co-management as well as the legislative mandates? I noted in #2 and #3? Today's world is complex. WDFW is required to co-manage fish with some tribes and to manage wildlife for the people of this state. This new policy suggests that Perhaps WDFW's director and staff are unable to handle this level of complexity.
5. How can the director and staff claim this new policy qualifies for a SEPA determination of non-significance? This is so wrong because of the extensive amount of science that was been developed over the years and which is recognized by most scientists about the negative impacts of hatcheries on wild fish. Perhaps WDFW wants to avoid talking about this.
6. Why have the WDFW director and staff and the WDFW commissions for years avoided to have a full environmental review of its hatchery program which is one of the largest in the world? Is WDFW afraid of having an adequate review where the real and best science will be shared and discussed concerning hatcheries and their impacts on wild fish and the environment? No one else is allowed to dump over 200,000,000 fish into our state's rivers without a complete environmental review. Trying to avoid a thorough environmental review is totally unacceptable.

7. The lack of transparency surrounding this new hatchery policy is also unacceptable. For at least the last 7 years, WDFW has said it needs to be more transparent and has promised to move in this direction. So many things have been kept secret about this new policy. Yes, the tribes may want some of level secrecy, but WDFW has a mandate to serve the people of WA State. This mandate cannot be ignored when negotiated with tribal governments. It is even unclear which tribal governments want this new policy, which ones were at the table when this policy was negotiated, and who wanted a new policy and what they wanted in the new policy.
8. A hatchery policy's number one goal must be recovery of wild fish, not tribal rights and culture. Discussions about tribal rights and culture are important and must be honored but these belong in a different arena and at a different level and with different parties involved.
9. That this new policy will replace C-3624, the Anadromous Salmon and Steelhead Hatchery Policy, wherever tribal co-managers adopt it, creates the need for a state-wide environmental review of the impact of hatcheries.
10. WDFW's attempt to once again avoid a full environmental review by using a DNS only increases WDFW's lack of credibility and honesty. For years WDFW has promised such reviews only to fail to keep these promises. There have been promises to do phased reviews, reviews of implementation plans, to update the science in C 3619, the promise in 2021 to complete a "technical procedures document", etc. WDFW failed to keep these promises. If WDFW staff or commissioners wonder why al large part of the public does not trust WDFW, please look at these failed promises.
11. Some of the fish runs that would be covered in the new hatchery co-management policy are listed species under the federal Endangered Species Act. WDFW has failed to comply with ESA requirements to mitigate the negative impacts of its hatcheries on wild fish species that are federally listed.
12. WDFW has even failed to consider impacts of climate change, one of its basic obligations as it manages the public's fish and wildlife.
13. WDFW's new policy emphasizes hatcheries that have failed so far failed to recover wild fish runs. Instead, ecologically adapted wild fish runs have been replaced by hatchery fish that are produced and raised and released artificially and without the benefit of natural selection and adaptation. We do not need to be fish scientists to understand the folly in this plan. The salmon being produced today by WDFW are nothing like the wild salmon that returned to our rivers when I was child. Today's Chinook salmon are not the salmon that our Southern Resident Orcas ate as they evolved in our waters. We are now seeing the glaring problems that WDFW has created and wants to continue - releasing millions of its hatchery fish into our local rivers each year. In order to do this, the director and staff probably realize that a full and adequate environmental review might result in major changes to their hatchery program.

I am very disappointed in the director and staff who support this new hatchery policy and support using a DNS to avoid an environmental review.
Martha Hall
2617 16th Street,
Anacortes, WA 98221

Attachment 4

May 26, 2023

Dr. Kenneth Warheit
Washington Department of Fish and Wildlife
P.O. Box 43200
Olympia, WA 98504-3200

Sent via website to WDFW and email to: Commission@dfw.wa.gov

Subject: Trout Unlimited Comments on May 1, 2023 State Environmental Policy Act (SEPA) Determination of Nonsignificance (DNS) for the proposed Co-Manager Hatchery Policy

Dear Dr. Warheit:

Trout Unlimited (TU) appreciates this opportunity to comment on the Washington Department of Fish and Wildlife's (WDFW) SEPA DNS for the draft Co-Manager Hatchery Policy.

With over 350,000 members and supporters – including 5,000 members in the state of Washington—and over 250 staff, TU is North America's largest nonprofit organization dedicated to the protection, conservation, and restoration of cold-water fish and their watersheds. Our strength is derived from our grassroots members and volunteers working together with our staff toward the common goal of ensuring resilient fish populations for future generations. TU is dedicated to using the best available science to guide our efforts, and we apply the expertise of our staff fisheries scientists to support policy and science efforts requiring careful analysis.

As an organization dedicated to conserving, protecting, and restoring North America's cold-water fisheries and their watersheds, we offer the following comments for your consideration on your environmental analysis of the draft Co-Manager Hatchery Policy:

Policy Language and Intent
We appreciate and support the considerations laid out in this draft policy that affirm Tribal Treaty Rights but believe this commitment would be stronger if conservation and recovery of

ESA-listed and depressed stocks was given priority and provide compatible harvest opportunities only in a manner consistent with recovery plans.

With many populations of salmon and steelhead in Washington listed for protection under the Endangered Species Act (ESA) and most stocks recently experiencing some of their worst returns on record, it is of the utmost importance that this new policy places a priority on conservation and recovery of wild stocks.

Across the state, there are federally approved recovery plans that serve as guiding documents for WDFW, recovery organizations, and Tribes to implement harvest and hatchery reforms that are consistent with and support recovery of natural-origin fish. These recovery plans, along with the guidelines in the current Anadromous Salmon and Steelhead Hatchery Policy (C-3624), are fundamental to the WDFW's commitment to policies that enhance wild fish recovery objectives and support long-term recreational, tribal, and commercial fisheries into the future. Unfortunately, this new draft Co-Manager Hatchery Policy falls well short of being aligned with federal recovery plans and if adopted as-is, will have long-term implications on the recovery efforts being invested in Washington's steelhead and salmon populations. In addition to the apparent inconsistencies with many federally approved recovery plans, this draft also does not provide guidance as to how WDFW anadromous fish management plans, such as the Statewide Steelhead Management Plan, will inform and/or align with this proposed policy.

Fundamentally, this policy does not put the conservation of wild stocks as the priority for the agency. The draft represents a significant shift away from the conservation and recovery of wild stocks to merely producing fish for harvest, with no language or guiding values that prioritize the recovery of depressed and endangered runs. The latter must be the underlying principle of the policy and align with WDFWs mission and first objectives: "*…to **preserve, protect** and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities."*

Moreover, there is no recognition in the policy or SEPA documents of the well documented risks that hatchery production poses to wild populations, nor how this policy will manage those risks. In fact, the guiding principles in this draft focus solely on the benefit of hatcheries with no acknowledgement of these risks. It's unclear how the WDFW is going to manage the risks of hatchery production because they do not yet have a technical procedures document in place.

The lack of recognition about the risks of hatcheries and the policy shift away from prioritizing recovery of wild stocks is grounded in the misguided statement within the draft policy's Purpose Statement that states: "*Hatcheries are primarily operated to preserve, reintroduce or supplement, natural production that contributes to both the spawning production of those populations and augments harvest.*" Yet, according to a recent WDFW report, *WDFW Hatchery and Fishery Reform Policy Implementation Assessment: Final Report, 2009-2019*, as of 2020, of

the 159 hatchery programs operated by WDFW, 124 of the programs were focused on harvest and only 35 were focused on conservation. Additionally, 67 (42%) of all hatchery programs were operated as segregated hatcheries with the express purpose of keeping hatchery fish off the spawning grounds and minimizing risk to natural populations. With roughly 20% of WDFW's hatchery programs focused on conservation and nearly 80% of the remaining programs being run with the express purpose of harvest augmentation and requiring careful management of the risks to natural populations instead of focusing on conservation of wild stock, the vast majority of state run hatchery programs do **NOT** seek to *preserve, reintroduce or supplement natural production*. As such, the Purpose Statement only perpetuates the false narrative that hatcheries are primarily used to recover wild populations. This is extremely misleading, is not supported by the agency's own data, and must be amended.

Another broad generalization within the draft policy's purpose statement assumes that current ecosystem functions will not support the wild and hatchery fish populations necessary for recovery and the legal requirements of the co-managers. Climate change and habitat loss, both legacy and ongoing, must be addressed and considered within this policy. The Purpose Statement must also include All-H management components into the policy, along with language that recognizes the broad spectrum of habitat available across the state. For instance, the root issues that contribute to habitat loss and addressing the limiting factors to recovery must be a part of any future hatchery plans. Hatcheries alone will not rebuild runs.

SEPA Determination

The WDFW should not use a phased environmental review under SEPA. This approach is fundamentally flawed since WDFW exempts all Hatchery Genetic Management Plans (HGMP) and hatchery program implementation from SEPA under WAC 197-11-835. Therefore, the second phase of the review of individual hatchery programs across the state never takes place and in essence provides a loophole to the required stringent environmental review.

It is also stated within the SEPA checklist that federal requirements like NEPA and Section 7 consultation under the Endangered Species Act will satisfy SEPA requirements and future environmental review. Given the disparity in standards for reviews and goals for both SEPA and NEPA, and how they evaluate and measure impacts to fish populations, it is inappropriate for WDFW to use these two environmental review programs interchangeably. It is also unclear how programs with approved HGMPs through prior NEPA evaluations will be evaluated based on changes presented by this policy. Similarly, under the proposed phased environmental approach, the remaining programs with only Hatchery Management Plans (HMPs), which do not require HGMPs, will not be evaluated. As of 2020, nearly 30% of all WDFW operated hatchery programs do not require HGMPs (Murdoch and Marston 2020) and will only have HMPs. And as such, the lack of any plan to ensure that these programs are evaluated individually under either SEPA or NEPA is particularly problematic. Given these concerns, WDFW should abandon the phased environmental review approach.

With the decades-long incomplete effort by WDFW to fully implement any of the previously adopted hatchery policies (C-3619 and C-3624), combined with the internal assessment that identified a failure to properly monitor and evaluate the impacts of WDFW hatchery programs, we believe that the SEPA Determination of Non-Significance for the Co-manage Hatchery Policy should be withdrawn until a comprehensive review and evaluation of the current programs under the existing Hatchery Policy C-3624 can be completed.

Additionally, we believe a SEPA Determination of Significance is warranted. As previously stated, this draft policy shifts away from recovery and the conservation of wild stocks to prioritizing fish production for harvest. Simultaneously, it minimizes the vast body of scientific evidence (see review by Anderson et al. 2020) demonstrating the risks hatcheries pose to recovery while undermining the significant investments in habitat restoration across Washington. These proposed policy shifts are substantial and should be addressed as such within the SEPA process through a Determination of Significance, but not ruling out the possibility for a full Environmental Impact Statement (EIS) to comprehensively review the potential impacts from this draft policy.

Overall, we are concerned with the direction of this draft Co-Manager Hatchery Policy and would urge WDFW to not abandon C-3624, but instead work to update it with a new section that clearly addresses co-management responsibilities, agreements, and processes. It is our belief that if C-3624 is abandoned, hatchery management within the state will shift back to a period when the full set of risks to natural-origin populations from hatchery programs were not taken into consideration and the recovery of wild stocks was not a priority.

We appreciate your consideration for these comments and are happy to answer any questions you may have about our concerns.

Sincerely,

Jonathan Stumpf
Washington Advocate – Wild Steelhead Initiative
Trout Unlimited

Gary Marston
Science Advisor – Wild Steelhead Initiative
Trout Unlimited

References:

- Anderson, J.H., K.I. Warheit, B.E. Craig, T.R. Seamons and A.H. Haukenes. 2020. A review of hatchery reform science in Washington State. Washington Department of Fish and Wildlife. Olympia, Washington.

- Murdoch, A. and G. Marston. 2020. WDFW hatchery and fishery reform policy implementation assessment: final report, 2009-2019. Washington Department of Fish and Wildlife, Olympia, WA.
- Washington Administrative Code, Title 197, Chapter 197-11, Section 197-11-835: Department of Fish and Wildlife.

Attachment 5

May 26, 2023

WDFW State Environmental Policy Act Comments
P.O. Box 43200
Olympia, WA 98504-3200
Delivered electronically to: commission@dfw.wa.gov, CoManagerPolicy@PublicInput.com

Re: Comments on DNS for draft Hatchery Co-Manager Policy (SEPA #23015)

Thank you for inviting comments on the Washington Department of Fish and Wildlife's (WDFW) Determination of Nonsignificance (DNS) under the State Environmental Policy Act (SEPA) for the draft Co-Manager Hatchery Policy (Co-Manager Policy). If adopted and signed by all tribal co-managers, the Co-Manager Policy would replace the current hatchery policy in whole and undermine or remove many of the current guidelines in place to conserve wild fish populations throughout the state. The undersigned organizations write to urge you to withdraw your determination of nonsignificance, because it fails to consider the significant potential environmental impact of the Co-Manager Hatchery Policy, and reevaluate the process for developing co-management policies in order to prioritize wild salmon and steelhead recovery.

Recent Commission discussions have helped resolve some of the ambiguity with the Co-Manager Policy, making clear that it will fully replace the Anadromous Salmon and Steelhead Hatchery Policy (C-3624) in all regions where tribal co-managers adopt it. Because that potential geographic scope is unknown, the environmental impacts must be assessed statewide.

As with WDFW's previous and current hatchery management policies, the Co-Manager Policy relies upon a "phased SEPA review" that leaves important details regarding the management of individual hatchery programs to later plans and processes, while refusing to evaluate the cumulative impacts of all of its hatchery programs. Beginning in 2009, WDFW made similar promises to perform phased SEPA review of policiesC-3619 and C-3624, but has never honored them.

In 2009, as part of hatchery reform policy C-3619, WDFW pledged to create Hatchery Action Implementation Plans and subject them to SEPA environmental and public review. It failed to complete any of these plans in the decade that C-3619 remained in effect. WDFW's Hatchery and Fishery Reform Policy Implementation Assessment, completed in 2020, exposed substantial additional gaps in the implementation of C-3619. For example, that assessment highlighted the fact that WDFW had not even collected the monitoring data needed to assess the environmental impact of its hatchery programs.

Most recently, policy C-3624, which took effect on April 9, 2021, indicated WDFW would strive to complete a "technical procedures document" outlining a "science-based risk management process" within a year and submit it for SEPA review. More than two years later, WDFW still has not completed this document, let alone submitted it for SEPA review.

WDFW's continued postponement of meaningful environmental review, which in turn it never performs, means that it has never examined the environmental impact of any of its hatchery policies or reviewed the cumulative impact of its hatchery programs. This chronic evasion of SEPA is unlawful and should not be allowed to continue.

Indeed, despite the overwhelming weight of scientific evidence demonstrating that hatcheries negatively impact wild fish, which the department recognized in its 2020 paper, A review of hatchery reform science in Washington State, WDFW has never conducted a SEPA review of the environmental impact of the increases in hatchery production that it initiated in 2018. Nevertheless, WDFW continues to blindly implement these production increases and subject wild fish to these unknown and unexamined risks, while at the same time it knowingly operates its hatcheries out of compliance with the permits required by the federal Endangered Species Act, which are intended to mitigate harm to wild fish.

WDFW leadership and the Commission have consistently failed to acknowledge or effectively address these broken promises or taken action to bring WDFW into compliance with state and federal law. Before making any new commitments, WDFW must undertake an objective and comprehensive review of the Co-Manager Policy that considers the likelihood that WDFW will actually implement that policy or perform any of the promised environmental reviews.

Most importantly, WDFW should conduct a rigorous scientific analysis to assess the necessary measures for reversing the decline of Washington's wild fish populations, particularly considering the escalating risks and uncertainties associated with climate change. Without undertaking such an examination, WDFW is merely taking a shot in the dark by continuing to revise its hatchery policies without acquiring the essential data needed to analyze the consequences of its hatchery management actions.

Now, just over two years since adopting the last hatchery policy, WDFW proposes to replace it with a new policy that further weakens protections for wild fish–without considering the impact of those weakened protections through a meaningful SEPA review. Of particular concern is the fact that the draft Co-Manager Policy does not address the importance of conserving and restoring locally-adapted wild fish populations. Instead, it increases emphasis on hatchery production while overlooking a crucial and extensively documented paradox: excessive reliance on hatcheries hinders the recovery of wild fish and ultimately undermines the hatcheries themselves. In the long run, the continuation of hatcheries relies on the genetic diversity provided by wild fish which remain at low abundance. Without a policy informed by rigorous environmental analysis and the best available science, hatchery production in Washington will continue to compromise the overall fitness and reproductive success of salmon and steelhead populations throughout the state and beyond. Consequently, and ironically, these increases in hatchery production also pose a growing threat to the hatcheries themselves.

The DNS for the draft Co-Manager Policy is thus inadequate because it (1) once again kicks meaningful SEPA review down the road, allowing WDFW to continue to evade such review; and (2) fails

to assess the environmental impact of the Co-Manager Policy's weakened protections for wild fish, which will potentially apply statewide.

We fully support the goal of collaborating with tribal co-managers. However, WDFW must perform a full environmental analysis before approving yet another hatchery policy that will further weaken protections for wild fish, with potentially devastating consequences for wild fish, orcas, and the ecosystems that depend on them. We ask WDFW to withdraw its determination of nonsignificance, and work with its biologists and co-managers to develop a responsible hatchery policy that is scientifically sound and will sustain Washington's wild fish populations for future generations.

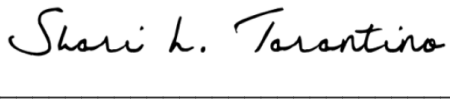
Respectfully,

Undersigned organizations:

David Moskowitz
The Conservation Angler

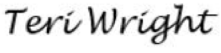
Samantha Bruegger
Washington Wildlife First

Timothy Coleman
Kettle Range Association



Shari Tarantino
Orca Conservancy

Emma Helverson
Wild Fish Conservancy



Teri Wright
Wild Orca

Hannah Thompson-Garner
Northwest Animal Rights Network

Cc: Members of the Washington Fish and Wildlife Commission

Attachment 6

May 26, 2023

Lisa Wood
SEPA/NEPA Coordinator
WDFW Habitat Program, Protection Division
P.O. Box 43200
Olympia, WA 98504-3200
Submitted via: CoManagerPolicy@PublicInput.com

Re: COMMENTS ON DNS 23-015: WDFW AND TRIBAL CO-MANAGER HATCHERY POLICY

Dear Ms. Wood:

The Conservation Angler (TCA) and Wild Fish Conservancy (WFC) submit these comments on the Washington Department of Fish and Wildlife's (WDFW) unlawful Determination of Nonsignificance (DNS) on the draft WDFW and Tribal Co-Manager Hatchery Policy (Co-Manager Policy). The DNS continues WDFW's pattern of evading environmental review of Washington's hatchery system, which produces the most hatchery salmon and steelhead in the world.[1] This ongoing evasion deprives the public and decision-makers of the evidence necessary to understand the impact of hatchery operations on the environment and make informed policy choices. This attempt to evade environmental review for the third hatchery policy in 14 years is especially concerning because the Co-Manager Policy poses unprecedented threats to wild salmon and steelhead that could continue in perpetuity because the policy includes no clause to allow the state to terminate or amend the agreement.[2]

The DNS is clearly erroneous because no responsible official could determine that the Co-Manager Policy's abandonment of C-3624's basic procedural and substantive safeguards for wild salmon and steelhead would have no probable significant adverse environmental impacts. Even more egregious, this

[1]WDFW. 2023. Hatchery Mass Marking, https://wdfw.wa.gov/fishing/management/hatcheries/mass-marking#:~:text=The%20state%20of%20Washington%20has,contributing%20to%20the%20statewide%20economy (last retrieved May 25, 2023) ("The state of Washington has the largest system of salmon hatcheries in the world, raising more than 200 million juvenile fish at more than 100 state, federal, and tribal facilities each year.").

[2] *See*, Letter from Wild Fish Conservancy and The Conservation Angler to the Washington Dep't of Fish and Wildlife, (Oct. 12, 2020) (on file with author); Letter from Wild Fish Conservancy to the Washington Fish & Wildlife Commission, (Oct. 12, 2020) (on file with author); Letter from Wild Fish Conservancy to the Washington Fish & Wildlife Commission, (Sept. 7, 2020); all *available at* https://wdfw.wa.gov/sites/default/files/2020-10/c-3619_combined_public_comment.pdf (explaining how revisions to C-3619, which resulted in the adoption of C-3624, removed important protections for wild salmon and steelhead, including but not limited to following the Hatchery Science Reform Group's science-based guidelines for managing hatchery risks).

DNS builds on a series of similar determinations and false promises of phased review, **which have combined to ensure that the Department has never conducted substantive state environmental reviews of any of its hatchery policies.** Instead of compounding these failures– by once again kicking the proverbial can down Phased Review Road and dicing environmental review into informationally deficient and misleading chunks–WDFW should have prepared an EIS to examine the broad and far-reaching potential impact of the Co-Manager Policy on wild fish, orca, and ecosystems, as required by the State Environmental Policy Act (SEPA). RCW 43.21C.030; WAC 197-11-055(2); WAC 197-11-960(1).

WDFW's practice of evading environmental review of its extensive hatchery complex must end. TCA and WFC request that WDFW withdraw the DNS and either perform a full Environmental Impact Statement (EIS), or preferably, revise the Co-Manager Policy to include necessary protections for wild salmon and steelhead and ensure that WDFW maintains authority to manage taxpayer-funded hatcheries.

I. CO-MANAGER POLICY WILL REDUCE TRANSPARENCY AND CAUSE STATE TO LOSE CONTROL OVER ITS HATCHERIES.

By not including any termination or amendment clauses in the policy "agreement," the Co-Manager Policy transfers the state's sole decision making authority of its hatcheries to an unspecified number of additional Co-Managers. Specifically, due to the need for consensus between *all* the co-managers, the state could be prevented from making any changes to the policy, or hatchery plans developed under the policy, that may be necessary to protect wild salmon and steelhead or to comply with state and federal law. Instead of including basic termination and amendment provisions that could apply in the event of a disagreement between the parties (e.g., a dispute over managing pHOS), the policy agreement only provides for a vague dispute resolution process that involves a "higher official," whomever that person may be. Co-Manager Policy, at 4. If this "higher official" cannot resolve the dispute, the policy provides that parties may agree to use a third-party mediator, but there is no process for resolving disagreements if they do not agree to use a mediator, or if such mediation is unsuccessful. *Id.*, at 4-5. Neither does the Co-Manager Policy provide for any public involvement in any subsequent negotiations, indicating that WFDW will be left to negotiate any changes in the same way this agreement was negotiated–behind closed doors and hidden from public view.

The likelihood that future decisions about state-run and taxpayer-financed hatcheries would be made behind closed doors is antidemocratic and antithetical to our open system of government, and allows WDFW to further evade public accountability going forward. The lack of transparency or definitive process for amending or terminating the agreement are more than reason enough to reject it. But if WDFW insists on going forward with the policy, SEPA requires a full examination of the potential environmental consequences of an agreement to bring hatchery operations behind closed doors, which may last in perpetuity. Certainly, no responsible official could determine the Co-Manager Policy is not likely to have significant adverse environmental impact, since it apparently eliminates the state's ability to respond to hatchery threats and potentially puts the fate of wild salmon and steelhead in the hands of unidentified higher officials operating in secrecy. The DNS provides no discussion of these enormous potential consequences, and must be rejected for that reason alone. TCA and WFC encourage WDFW

and the Washington Fish and Wildlife Commission to consult with the Attorney General's Office on how to develop a Co-Manager Policy that does not transfer state control of hatcheries to other governments, further reduce the transparency of the already opaque process of hatchery management, and assure that the state will comply with federal and state environmental laws.

II. WDFW's THRESHOLD DETERMINATION VIOLATES SEPA

No responsible official could determine that the Co-Manager Policy would not have a probable significant adverse environmental impact, because the policy erases C-3624's commitments to wild salmon and steelhead protection and eliminates multiple procedural and substantive safeguards intended to reduce hatchery threats. *See* WAC 197-11-340(1) (standards for a DNS). In making a threshold determination, the responsible official must determine if the proposal is likely to have probable significant adverse impacts based on the proposed action. *Id*. The proposed action is the adoption of the Co-Manager Policy, which supersedes C-3624 in geographic areas where a Tribal Co-Manager signs the Co-Manager Policy. Co-Manager Policy, at 2. Therefore, as Tribal Co-Managers sign the policy, it would automatically nullify significant commitments that C-3624 makes to wild salmon and steelhead in those portions of the state, including but not limited to: reforming hatcheries, conserving and recovering wild fish populations, safely perpetuating hatchery fish, separating hatchery and wild fish, conserving healthy wild fish populations, and controlling disease.

Hatchery Reform: The Co-Manager Policy abandons the state's commitment to "advance the conservation and recovery of wild salmon and steelhead by implementing hatchery reform measures." C-3624, at 1. The Co-Manager policy does not say anything about reforming hatcheries to protect wild salmon and steelhead, thereby indicating that the Co-Managers have no intent to reform hatcheries in areas where the policy applies. Based on the overwhelming weight of scientific evidence documenting the harm that hatcheries cause to wild salmon and steelhead, no responsible official could determine that eliminating hatchery reform would result in no probable significant adverse environmental impacts.[3]

Conservation and Recovery of Wild Fish Populations. Under the Co-Manager Policy, protecting wild fish would no longer be Washington's highest priority. Under C-3624, the state's "highest priority" is the "conservation of natural resources," which includes:

> "*** the conservation and recovery of depressed coincident wild salmon and steelhead populations, the maintenance or recovery of wild salmon and steelhead life history

[3] *See,* Araki, H., and C. Schmid. (2010) (explaining that out of 266 peer-reviewed papers that evaluated the impacts of hatcheries on wild fish, nearly three-quarters of them found negative effects on wild fish and none showed positive effects); *See also e.g.*, Bowlby and Gibson (2011), Quinones et al. (2014), Araki et al. (2009), Reisenbichler and Rubin (1999), Bartron and Scribner (2004), Binkham et al. (2014), Christie et al. (2012), Weigel et al. (2019), Johnson et al. (2013), Wilmes et al. (2018), Hess and Matal (2014); Carmichael et al. (2015); Chilcote (2003); Chilcote (2011); and Christie et al. (2016).

> diversity, the maintenance of wild populations currently in a healthy condition, the conservation of genetic resources in found in hatchery populations, and providing critical ecological benefits such as prey to endangered Southern Resident Orca (SRO) and marine nutrient cycling."

C-3624, at 1. The Co-Manager Policy retains the commitment to operate the orca feeding program that paradoxically starves orca by harming their prey base (i.e., large, wild Chinook). Co-Manager Policy, at 3 ("Hatchery program plans should support ecosystem function, such as providing prey for Southern Resident Killer Whales ***."). It also provides that hatcheries should continue failed efforts to conserve the genetic diversity and adaptability of hatchery fish even though hatchery fish can never replace the genetic diversity and adaptability of wild fish which hatchery fish erode when they reproduce with wild fish. *Id.* ("Hatchery plans should consider how hatchery operations can maintain or enhance the genetic diversity and adaptability of hatchery broodstock."). However, it is unclear if even these priorities are more or equally important to producing hatchery fish for harvest, as the Co-Manager Policy does not rank them.

In any event, the Co-Manager Policy terminates the highest priorities in C-3624 that relate to protecting wild salmon and steelhead. Specifically, through its silence on these issues, the Co-Manager Policy eliminates the following three priorities: (1) the conservation and recovery of depressed coincident wild salmon and steelhead populations; (2) the maintenance or recovery of wild salmon and steelhead life history diversity; and (3) the maintenance of wild populations currently in a healthy condition. C-3624, at 1. Therefore, when a Tribal Co-Manager signs the policy, protecting wild salmon and steelhead will take a back seat to producing hatchery fish in certain geographic areas.

Safely Perpetuate Hatchery Fish. The Co-Manager Policy abandons multiple guidelines in C-3624 that are intended to protect wild salmon and steelhead from hatchery operations. Specifically, C-3624 provides that genetic and ecological risks "shall be minimized in accordance with Hatchery Management Plans." C-3624, at 3. C-3624 requires Hatchery Management Plans (HMPs) to be based on the best available science regarding the risks of hatchery production on wild salmon and steelhead. *Id.*, at 4. It also requires WDFW to use a science-based risk management framework that quantitatively addresses these risks and incorporates uncertainty regarding them. *Id.* Additionally, the policy requires WDFW to develop a structured decision-making process to be described in a technical procedures document that would be subject to environmental review. *Id.* Among other things, the technical procedures document is intended to ensure that "hatchery production levels are based on the deliberative, transparent, and science-based process" described in that document. *Id.*, at 5. Although TCA and WFC do not believe C-3624 sufficiently protects wild salmon and steelhead on paper or in practice, the policy at least calls for a systematic, quantified, environmentally reviewed, transparent, and accountable approach to hatchery management.

The Co-Manager Policy does not require this approach and thereby abandons C-3624's inadequate but better-than-nothing protections for wild salmon and steelhead. Instead of requiring managers to take action to minimize genetic and ecological risks and to balance those risks through structured decision-

making, the Co-Manager Policy only requires the Co-Managers to "*strive* to balance" harvest and other benefits with "potential" genetic and ecological risks. Co-Manager Policy, at 3. In other words, under the Co-Manager Policy, the Co-Managers need only make some effort to strike that balance, not succeed.

The Co-Manager Policy does not even mention the phrase "best available science" let alone require the Co-Managers to follow it when developing hatchery program plans. Instead, the Co-Manager Policy only requires that hatcheries be designed and operated in a "scientifically-sound, defensible manner," which may simply mean that hatcheries are earthquake resistant or follow generally accepted aquaculture procedures (e.g., regularly cleaning fish waste from rearing ponds); it does not expressly require that hatchery operations meet basic, nearly universally accepted safeguards for ensuring that wild salmon and steelhead are protected from hatchery operations (e.g., pHOS limits). *Id.*

In any event, there is no reasonable dispute that the Co-Manager Policy weakens scientific standards by replacing C-3624's "best available science" requirement with the vague "scientifically-sound, defensible manner" criteria. *Compare*, C-3624, at 4 ("Each HMP shall be based on the *best available science* on the risks of hatchery production on wild salmon and steelhead ***."), Co-Manager Policy, at 3 (emphasis added) ("Hatcheries are to be designed and operated in a s*cientifically-sound and defensible manner* ***.") (emphasis added). The best available science criteria is the gold standard in environmental decision-making. For example, the Endangered Species Act requires the National Marine Fisheries Service ("NMFS") and U.S. Fish and Wildlife Service to use the "best available scientific and commercial data" when making certain decisions regarding threatened and endangered species. 16 U.S.C. §§ 1533(b)(1)(A), 1536(a)(2). Although the ESA does not define that phrase, courts have interpreted it to mean, among other things, that an agency may not manipulate "its analysis by unreasonably relying on certain sources to the exclusion of others" or "disregard 'scientifically superior evidence."' *Southwest Ctr. for Biological Diversity v. Norton*, No. 98-934, 2002 WL 1733618 (D.D.C. July 29, 2002); *See also, Bennett v. Spear*, 520 U.S. 154, 176 (1997) ("The obvious purpose of the requirement that each agency 'use the best scientific and commercial data available' is to ensure that the [Endangered Species Act] not be implemented haphazardly, on the basis of speculation or surmise."). In short, requiring agencies to use the best available science communicates that agencies are expected to consider all relevant evidence and make sound objective decisions based on the best information available. The "scientifically-sound, defensible manner" standard is not equivalent, as a decision may be scientifically-sound or defensible based on some scientific literature (e.g., one publication) but outweighed by scientific evidence to the contrary. Thus, the Co-Manager Policy reduces protections for wild salmon and steelhead by enabling the Co-Managers to rely on scientific data that may be defensible but inconsistent with the majority opinion of the scientific community.

The Co-Manager Policy also replaces the concept of managing hatcheries in accordance with a consistent science-based risk management framework with "genetic management protocols" and "other plans" to be developed by Co-Managers on an ad hoc basis. *Id.*, at 2. No responsible official could determine that replacing C-3624's basic, yet consistent and science-based decision-making processes, with the procedurally and substantively unmoored Co-Manager Policy would have no probable significant adverse environmental impacts.

Separating Hatchery and Wild Fish. C-3624 requires increased separation of hatchery and wild salmon and steelhead where scientifically justified, logistically feasible, and agreed to with Co-Managers. C-3624, at 6. The Co-Manager Policy does not require separation of hatchery and wild fish at all. Considering the overwhelming scientific evidence demonstrating that failing to separate hatchery fish from spawning grounds harms wild salmon and steelhead populations, no responsible official could determine that the Co-Manager Policy would have no probable significant adverse environmental impacts.

Examples of where separation of hatchery fish is not occuring, despite federal Endangered Species Act agreements to limit these genetic impacts include Mill, Abernathy, and Germany Creeks where the 4 year rolling mean of Fall Chinook hatchery fish spawning with wild fish is approximately 75%. Delaying action through yet another phased SEPA review to reveal these kinds of impacts throughout WDFW's hatchery programs will directly harm primary fall Chinook populations struggling with recovery.

Special Protections for Certain Wild Salmon and Steelhead Populations. Unlike C-3624, the Co-Manager Policy does not call for protecting wild salmon and steelhead strongholds. Under C-3624, certain healthy wild salmon and steelhead populations are supposed to be afforded a "special, high level of protection" from hatchery programs. C-3624, at 5. Providing such sanctuaries is critical to recovering ESA-listed populations and ensuring that wild genetic resources are preserved. The Co-Manager Policy delineates no safety zones for healthy wild fish populations, however, and therefore it abandons this commitment to the "relatively few populations that meet this premium status." *Id*. Compared to the previous C-3619 policy, only 15% of the wild salmonid management zones requested to be designated were ever established.

Protection from Disease. The Co-Manager Policy does not provide necessary protections from disease for either wild *or* hatchery fish. Under C-3624, WDFW is required to develop a co-manager policy that has "similar development and joint commitment provisions to those in 'The Salmonid Disease Control Policy of the Fisheries of Co-Managers of Washington State.'" *Id.*, at 3. The Co-Manager Policy does not include those joint commitment provisions – in fact, it does not mention disease at all. No responsible official could determine that abandoning safeguards against disease would have no probable significant adverse environmental impacts.

WDFW knows that numerous diseases such as *Flavobacterium columnare* (Columnaris), *Flavobacterium psychrophilum* (Cold Water Disease), and *Ichthyophthirius multifilis (ICH)* are commonly detected and amplified at state owned and operated hatchery facilities. For example, the non-native Piscine reovirus (PRV) was first detected in commercial aquaculture sources in Washington State and British Columbia, and it has since spread to state hatchery facilities throughout the Columbia River, Puget Sound, and Washington Coast, including the Kalama, Cowlitz, Soos, Grays, Marblemount, Soos, Wallace, Aberdeen, Elwha, Eastbank, Issaquah, Lyons Ferry, and Samish Hatcheries. Since these viruses and diseases are being seen

in both the adult and juvenile fish, and various diseases exhibit both vertical and horizontal transmission, evaluating the environmental impact of these diseases narrowly under a "project level" evaluation is inappropriate.

These are just some of the elements in the Co-Manager Policy that should alert any responsible official of the need to produce an environmental impact statement, not a DNS. WDFW should withdraw the DNS, revise the Co-Manager Policy to protect wild salmon and steelhead, and conduct a new threshold determination that complies with SEPA.

III. PHASED REVIEW OF THE CO-MANAGER POLICY IS INAPPROPRIATE

WDFW's decision to conduct a phased review of the Co-Manager Policy violates SEPA. Phased review is not appropriate when "[i]t would merely divide a larger system into exempted fragments or avoid discussion of cumulative impacts ***." WAC 197-11-060(5)(d)(ii); *Indian Trail Property Owner's Ass'n v. City of Spokane*, 76 Wash.App. 430, 443 (1994) (holding that phased review is inappropriate where it would serve only to avoid discussion of cumulative impacts). WDFW's proposed phased review of the Co-Manager Policy would prevent a discussion of the policy's broad impact on the environment, in favor of focusing exclusively on the impact of single hatcheries. For example, WDFW's proposed review would avoid the discussion of historic, ongoing, and future hatchery impacts on wild salmon and steelhead, as well as the impacts of commercial, recreational, and tribal fisheries on ESA-listed species and other impacts (e.g., habitat degradation). Because a phased review of the Co-Manager Policy would operate to avoid this discussion of cumulative impacts, WDFW's decision to issue a DNS violates SEPA. WAC 197-11-060(5)(d)(ii).

The DNS inappropriately relies on the development of new or revised Hatchery Genetic Management Plans (HGMPs) and related National Environmental Policy Act (NEPA) analyses of those HGMPs as the second phase of SEPA review for certain hatchery facilities. As the DNS explains, WDFW considers the Co-Manager Policy as a nonspecific non-project policy that will be followed by future documents of narrow scope – specifically, hatchery program plans that will be subject to NEPA and/or SEPA review. WDFW, SEPA Environmental Checklist for WDFW and Tribal Co-Manager Policy, at 2-3, 5 available at https://wdfw.wa.gov/sites/default/files/2023-05/checklist-sepa-checklist-comanager-hatchery-policy-final-kw230414.pdf. WDFW cannot reasonably rely on those HGMPs and related NEPA reviews for multiple reasons. First, it is unreasonable to believe that WDFW will obtain HGMPs and related NEPA reviews before it increases hatchery production because WDFW has repeatedly failed to receive required approvals from NMFS before operating its hatcheries. In other words, the lack of NMFS-approved HGMPs and related NEPA reviews has not stopped WDFW from committing resources to hatchery production before, so there is no reason to trust that WDFW will follow the law now. Indeed, WFC was forced to sue WDFW so that it would finally start developing multiple HGMPs, including those for hatchery programs that have operated without these permits for nearly two decades.

There is also no guarantee that future NEPA reviews of HGMPs will adequately address the cumulative impacts of the Co-Manager Policy. WDFW's apparent plan is to rely on NEPA reviews of individual hatchery programs as new or revised HGMPs are submitted to NMFS for its approval. This scheme would likely result in a less extensive review of the cumulative impacts of hatchery operations on wild salmon and steelhead, if any, as each review would focus on individual hatchery actions that NMFS may determine do not trigger the need to produce an EIS. Therefore, WDFW cannot rely on future HGMPs and associated NEPA review to provide the necessary evaluation of the cumulative impacts of the Co-Manager Policy.

Even if a phased review was appropriate, which it is not, WDFW's promises to conduct such a review has little value, because WDFW has been reneging on similar promises for many years. WDFW promised to conduct a phased review of hatchery programs when it issued determinations of nonsignificance for C-3624 and C-3619. WDFW never performed those phased reviews. Based on WDFW's track record of failure, it is unreasonable to rely on WDFW's promises to conduct a phased review now – at least those portions that WDFW has not passed on to NMFS to perform during future reviews of HGMPs that WDFW may decide to submit before ratcheting up hatchery production.

WDFW's phased review of the Co-Manager Policy serves to "piecemeal" SEPA review to avoid a holistic view of the policy's impact. *See Concerned Taxpayers Opposed to Modified Midsouth Sequim Bypass v. Dep't of Transp.*, 90 Wash.App. 225, 231 (1998) (discussing piecemealing). Essentially, piecemealing is "a method of circumventing SEPA's informational mandate by dividing a proposal into pieces and separately studying their adverse impacts." Keith H. Hirokawa, *The Gap Between Informational Goals and the Duty to Gather Information: Challenging Piecemealed Review under the Washington State Environmental Policy Act*, 25 Seattle Univ. L. Rev. Vol. 343, 344 (2001). By separately studying these adverse impacts, "the environmental impacts of each individual part may appear negligible, and so comprehensive environmental review appears unwarranted even though the proposal as a whole may have a significant impact on the environment." *Id.* WDFW is engaging in such a process with the Co-Manager Policy by relying on individual environmental reviews of each hatchery program rather than comprehensively reviewing the impacts of Washington's extensive hatchery system or the Co-Manager Policy. This attempt to avoid meaningful environmental review violates SEPA.

IV. CO-MANAGER POLICY ADDS TO THE HATCHERY "SNOWBALL"

WDFW has never conducted any meaningful review of any of its hatchery policies, much less of its decision to increase hatchery production. It is notable that the department has not denied this in the litigation that the undersigned have brought in King County court. Instead, the department has outrageously contended that because it has been violating SEPA for so long, the court must allow it to continue to do so. This is what is known as the SEPA "snowball" effect. As the Washington Supreme Court has warned that when government fails to perform the required SEPA review before a project picks up momentum, it "may begin a process of government action which can "snowball" and acquire virtually unstoppable administrative inertia." At that point:

> "Even if adverse environmental effects are discovered later, the inertia generated by the initial government decisions (made without environmental impact statements) may carry the project forward regardless. When government decisions may have such snowballing effect, decisionmakers need to be apprised of the environmental consequences before the project picks up momentum, not after."

King County v. Washington State Boundary Review Bd. for King Co., 122 Wash.2d. 648, 664 (1993). WDFW has evaded SEPA for its hatchery policies for so long that it has already built up a sizeable "snowball." Approval of the Co-Manager Policy without a full environmental review would help turn this snowball into an avalanche, creating such momentum that the state may lose control of its ability to stop harmful hatchery practices in the future. Since the Co-Manager Policy includes no clause regarding terminating or changing the agreement, and all such negotiations are conducted in private away from the public eye, it is possible that WDFW is now embarking on a road from which it will never return.

WDFW has a legal obligation to produce an EIS on the significant adverse environmental impacts that may flow from the Co-Manager Policy. Among other things, that analysis must include evaluation of the impact of WDFW's holistic hatchery policy (since it has never been evaluated), as well as assessing the impact of the changes the Co-Manager Policy would make to C-3624 to further weaken protections for struggling state salmon populations, and the potential consequences of adopting a policy that the state may lose the ability to amend or terminate.

V. CONCLUSION

Our organizations support collaborative efforts with tribal co-managers to recover wild fish populations and responsibly manage hatchery production. But the state cannot use the secrecy afforded to it for tribal negotiations to approve yet another policy that will significantly weaken protections for wild fish, without even bothering to perform a full review of the potential environmental impacts. The adoption of the Co-Manager Policy would undermine the few remaining safeguards in place to protect wild fish populations, leading to severe consequences not only for the future of Washington's wild salmon and steelhead, but also for all the species and ecosystems that rely on them. We urge WDFW to withdraw this determination of nonsignificance and direct its biologists and Co-Managers to develop a responsible hatchery policy that adheres to scientific principles and ensures the long-term sustainability of Washington's wild fish populations.

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Attachment 7

May 26, 2023
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RE: DNS 23-015: WDFW AND TRIBAL CO-MANAGER HATCHERY POLICY

I appreciate the opportunity to make comments to the proposed WDFW and Tribal Co-Manager Hatchery Policy as presently drafted.

Unfortunately, reading this draft policy stimulates great concerns about a number of assumptions that largely ignore what the majority of scientific findings have found the past 60 years regarding what the consequences of even the best intended hatchery operations are in their effects to wild fish populations, their life history and genetic diversity, and on the natural ecosystem balances.

This stimulates considerable concern about the level of science that is actually being applied by WDFW and the Tribal Co-Managers on the effects of hatchery programs, and the seeming intent in anadromous fishery management in the State of Washington to virtually add to the conditions that lead to extinction of wild salmonid anadromous populations by focusing on desired goals driven primarily by hatcheries and harvest rather than sustainable viability of wild populations. This ignores the Endangered Species Act (ESA) as driven by the assumption to not only stem further extinctions, but rather with plans specifically made for recovery. But more to the point of this policy's intent, the expectations for the future of known climate consequences on salmon and steelhead production, it can only lead to further depletions and collapsing salmon ecosystems at sea and inland.

Specific comments and related supportive attachments to the Hatchery Policy principles follow.

Sincerely,
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Principle 1: Co-Managers acknowledge and re-commit to follow all court orders and management agreements arising under U.S. v. Washington, Hoh Indian Tribe v. Baldrige, and U.S. v. Oregon pertaining to salmonid hatchery operations and management.

Comment: Please do spell out what these court orders require regarding hatcheries, and what the alternatives are if it proves that hatcheries can't meet the principles claimed below. There is

every reason to believe that a sustainable future for salmon and steelhead is increasingly unlikely based on hatchery operations and management. Further comments for each principle follow with included attachments.

Principle 2: Hatchery fish support Treaty Right fishing obligations that cannot be provided by natural-origin salmonid populations alone.

Comment: There has been a long prehistory of the necessity of indigenous peoples to adapt to the many differing climate shifts that have occurred that have included great reductions, great increases, extinctions, as well as new species on a worldwide basis. These shifts have included glaciation, moderate periods, and periods of increasing warmth. At the more local level over time it has included eruptions of mountains with great impacts on rivers and salmon, landslides that have denied salmon passage for years at a time with the necessity for rapid adaptations with geographic movements in search of alternative resources for sustainability, or otherwise perish. We are now in what is known as the Anthropocene, based on a human caused climate shift with well recognized consequences that have already occurred, and are increasingly occurring with adverse consequences for anadromous fish in much of the West Coast of North America south of Alaska. Attached are parts of but a few of the published papers on the presently occurring climate shift and what past climate shifts have resulted in regarding shifts in use of resources by indigenous peoples: **From the Literature on the Effects of Past Climate Change on Natural Resources such as Salmon and Indigenous Cultural Necessity for Adaptations**

Principle 3: Hatcheries produce fish for state-regulated recreational and commercial fishing opportunities beyond that provided by natural-origin salmonid populations.

Comment: The principle described does not appear to be able to shift to what we all face with climate change and the necessities for creating a sustainable anadromous fish future in Washington that hatchery programs only further deny. The actual necessity is to honestly inform recreational and commercial fishing user groups of the facts we all face of continuing diminishing opportunities for commercial harvest and even high levels of catch-and-release sport fisheries. There has been a long history of failure of hatchery programs to be able to support intended fisheries without great impact on wild populations of salmon and steelhead. Attached are parts of but a few of the published papers on the impacts of hatchery fish on wild: **From the Literature on Hatchery Impacts on Wild Salmon and Steelhead**

Principle 4: The Co-Managers will develop and/or operate hatcheries in accordance with hatchery program plans that include clearly-defined hatchery goals and describe hatchery operations at the regional and/or watershed level. The hatchery plans should indicate how the hatchery production is integrated with habitat, hydropower, and harvest. Hatchery program plans should: (1) support ecosystem function; (2) consider how natural-origin salmonids support ecosystem function; (3) consider how hatchery production can contribute to productive natural-spawning populations that are locally adaptive and diverse genetically; (4) consider how hatchery operations can maintain or enhance the genetic diversity and adaptability of hatchery broodstock; and (5) include program goals that strive to balance harvest opportunities, cultural, economic, conservation, and ecological benefits with potential genetic and ecological risks to natural-origin salmonid populations, while considering current environmental conditions.

Comments: This principle is made up of a list of pipe dreams now outdated by 40-60 years of evidence to the contrary regarding the mythology of what hatcheries could accomplish but have not. Regarding support of ecosystem function, attached is: **From the Literature on the Hatchery Consequences on Natural Ecosystems.** Also attached, is a broader overall perspective: **A Paper on Broader Examples of Failed Results of Conservation Focused Introductions of Captive-Born Fish and Wildlife into the Wild;** and: **From the Literature on Hatchery Impacts on Wild Populations.** For an overall view of the broad negative implications of hatchery programs on wild salmon and steelhead populations attached is a table on this initially developed in 2012 and subsequently updated: **Hatchery Influences on Wild Salmonid Populations, Including Steelhead.** Although it is far from comprehensive in all the scientific literature available on the negative consequences of hatchery programs, it provides a table of 8 potential mechanisms that hatchery influences can result in: 1) Spawning Interactions; Genetic Hybridization; 2) Unintended Straying to Natural Spawning Grounds; Lack of Spawn Time Separation between Wild and Hatchery Steelhead Selected to Be Different; 3) Reduced Fitness and/or Reproductive Success; 4) Reduced or Altered Life Histories; 5) Competition/Density Dependence; 6) Direct Predation; 7) Indirect Predation; and 8) Overharvest in Mixed Stock Fisheries. A number of references related to each is included and brief description of the findings from each reference provided.

Principle 5: Hatcheries are to be designed and operated in a scientifically-sound and defensible manner, including adaptive management processes for informing decisions that include monitoring, evaluation, and research programs.

Comments: The above principle has been touted for years, but it has remained that hatchery programs have been initiated without an HGMP public and science review process. One of the most recent examples has been the Upper Skagit Tribe/WDFW Skagit River chum salmon program initiated with wild brood collection in the fall of 2021 and 2022. Brood collection goals were not met in 2021 due to a long period of poor chum returns to the Skagit, but with a large increase of wild chum back to the Skagit this past fall in 2022 as wild chum have apparently begun a sudden recovery from whatever limitations had occurred since about 2007-2008. This sudden wild increase had nothing to do with the secret chum hatchery program initiated by the Co-Managers on the Skagit at Marblemount Hatchery. Chum have a typical 3-5 year age of return and those taken for hatchery brood in 2021 will not return until 2024-2026, and those taken in 2022 will return in 2025-2027. This sort of circumvention of proper HGMP review does not bode well for what Principle 5 suggests. **Attached are the WDFW hatchery escapement reports for Washington for 2020, 2021, and 2022 that provide the evidence of no Skagit chum broodstock taken in 2020, relatively low numbers in 2021, and more than the original plan in 2022.** Of further consequence, in the case of the Skagit of my own close familiarity, but not an isolated case, not since the steelhead returns of have there been updates of what the tribal steelhead catch data by wild and hatchery (for those years of hatchery returns). I have requested this information from WDFW, as have others, but the response has been nil by all contacted. Harvest information by wild and hatchery is vital from which to determine what run-sizes have been as compared to escapement (the latter all that is available). Again, this lack of information provided to the public and independent researchers is inexcusable and again counters the assertions in Principle 5.

Principle 6: Co-Managers shall work to secure adequate financial resources to meet current and future challenges to the successful use of salmonid hatcheries in accomplishing the purpose of this Policy. This includes planning for the negative effects of climate change on salmonid survival and the resources needed to support them.

Comments: With the great focus on funding hatchery programs, there will be little funding left for the vital necessity of monitoring wild populations as the important basis for whatever potential remains for their adaptations to the increasing rapidity of climate change, and with wild populations already depleted by past hatchery programs, harvest, and habitat alterations. Yet the focus continues to be on Harvest and Hatcheries as the two most immediately resolvable problems to wild salmon and steelhead among the noted 4Hs that threaten their sustainability. WDFW and the Co-Managers are going backward rather than scientifically forward.

Attachment 8

From the Literature on Hatchery Impacts on Wild Populations

Nakae, M., K. Hasegawa, and K. Miyamoto. 2022. Domestication of captive-bred masu salmon *Oncorhynchus masou masou* (Salmonidae) leads to a significant decrease in numbers of lateral line organs. *Sci Rep* **12**, 16780 (2022). https://doi.org/10.1038/s41598-022-21195-3

Abstract
Because captive-bred animals gradually adapt to artificial rearing environments due to evolving life history traits, such individuals sometimes show lessened performance in natural environments. The lateral line system, one of the principal sensory organs of fishes, varies according to habitat environments, sometimes differing even within the same species. A reduction in lateral line elements may also occur in successive generations of captive-bred fish. Such a reduction, involving neuromasts over the entire body, was examined for the first time in captive-bred masu salmon Oncorhynchus masou masou. The total number of neuromasts in captive-bred fish was ca. 10% lower than in wildcaught and F1 fishes, suggesting that the system in captive-bred fish had reduced in number due to domestication. Furthermore, differences in total neuromast numbers between captive-bred and wild fish were greater than between anadromous and fluvial populations of the species. The lower number of neuromasts could be one of the reasons behind the lower survival of captive-bred fish in natural environments.

Grant, W.S. 2012. Understanding the adaptive consequences of hatchery-wild interactions in Alaska salmon. *Environ Biol Fish* **94**: 325–342. https://doi.org/10.1007/s10641-011-9929-5

Abstract
About 31% of salmon harvested in Alaska comes from the hatchery production of hundreds of millions of pink and chum salmon and smaller numbers of sockeye, Chinook, and coho salmon. The numbers of hatchery-reared juveniles released in some areas are greater than the numbers of juveniles from wild populations. However, virtually nothing is known about the effects of hatchery fish on wild populations in Alaska. Possible effects of these interactions can be inferred from studies of salmonids in other areas, from studies of other animals, and from theory. Numerous studies show a complex relationship between the genetic architecture of a population and its environment. Adaptive responses to nature and anthropogenic selection can be influenced by variation at a single gene, or more often, by the additive effects of several genes. Studies of salmonids in other areas show that hatchery practices can lead to the loss of genetic diversity, to shifts in adult run timing and earlier maturity, to increases in parasite load, to increases in straying, to altered levels of boldness and dominance, to shifts in juvenile out-migration timing, and to changes in growth. Controlled experiments across generations show, and theory predicts, that the loss of adaptive fitness in hatchery salmon, relative to fitness in wild salmon, can occur on a remarkably short time scale. All of these changes can influence survival and impose selective regimes that influence genetically based adaptive traits. The preservation of adaptive potential in wild populations is an important buffer against diseases and climate variability and, hence, should be considered in planning hatchery production levels and release locations. The protection of wild populations is the foundation for achieving sustained harvests of salmon in Alaska.

Zhivotovsky, L.A., L.K. Fedorova, G.A. Rubtsova, M.V. Shitova, T.A. Rakitskaya, V.D. Prokhorovskaya, B.P. Smirnov, A.M. Kaev, V.M. Chupakhin, V.G. Samarsky, V.P. Pogodin, S.I. Borzov, and K.I. Afanasiev. 2011. Rapid expansion of an enhanced stock of chum salmon and its impacts on wild population components. *Environmental Biology of Fishes* 94(1): 249-258 DOI:10.1007/s10641-011-9873-4

Abstract
A harvested stock of chum salmon homing to Kurilskiy Bay, Iturup Island, consists of two genetically distinct river populations that reproduce in two rivers that drain into the bay and are characterized by limited gene flow. One of these is small and can be regarded as wild, whereas the other is much larger and, until recently, was composed of naturally reproducing components spawning in the river's mainstem and tributaries, with almost no hatchery reproduction during the past two decades. The only human impact on reproduction of the chum salmon stock was regulation of the escapement, with officially accepted limits to avoid 'over-escapement'. Recently the hatchery began to release a large amount of chum salmon juveniles. As confirmed by data on variation in both age composition and microsatellite DNA, first-generation hatchery-origin fish that returned from the first large releases occupied spawning grounds and presumably competed directly with, and potentially displaced wild fish. The most dramatic example is a genetically distinct beach-spawning form of chum salmon that was swamped by much more numerous hatchery-origin fish of the river-spawning form. In order to restore and support naturally reproduced population components, careful estimation of the carrying capacity of natural spawning grounds is necessary with efforts to increase escapement to these habitats. We also recommend concerted efforts to restore and conserve a unique beach spawning population of chum salmon. We further recommend development of a marking program for direct estimation of straying and evaluation of ecological and genetic impacts of hatchery fish on neighboring wild and natural populations.

Attachment 9

From the Literature on the Effects of Past Climate Change on Natural Resources such as Salmon and Indigenous Cultural Necessity for Adaptations

Ian Hutchinson, I., and M.E. Hall. 2019. Chinook Salmon, Late Holocene Climate Change, and the Occupational History of Kettle Falls, a Columbia River Fishing Station, Environmental Archaeology, DOI: 10.1080/14614103.2019.1648118 https://doi.org/10.1080/14614103.2019.1648118

Abstract

... we propose that the occupational history of the Kettle Falls fishery echoes long-term variations in the returns of salmon to the upper Columbia River linked to climate change.

P-9-11
Glacial Dynamics, Marine Conditions, and the Salmon Fishery at Kettle Falls: A Summary

The record of activity at the Kettle Falls fishery, as reconstructed from the radiocarbon record, is inversely correlated with the record of regional palaeotemperatures, and remarkably similar to the record of local glacial advances (Figure 8). This suggests that any 'oldwood' bias in the Kettle Falls SPDF is likely to be small, and that these patterns likely have a common cause – century-long phases of predominantly lower temperature in the northern hemisphere during the LALIA and the LIA were echoed in lower SSTs in the northeast Pacific and episodes of glacial advance in the local mountains. Lower SSTs during the LALIA and LIA also enhanced the survivorship of generations of Chinook salmon during their years at sea. Concurrent changes in thermal and precipitation regimes onshore undoubtedly affected the hydroclimate of local rivers, and, as a consequence, the spawning success of returning adult salmon and the survival of smolts. The resultant increases in the Chinook salmon runs attracted greater numbers of people to fishing stations such as Kettle Falls.

The only major mismatch between the Kettle Falls and glacial advance SPDFs occurs in the interval between about 650–550 cal BP (Figure 8). The Kettle Falls SPDF indicates a substantial reduction in activity at the fishery at that time; the glacial record suggests that rates of advance may have slowed, presumably in response to the slight increase in temperature evident in regional pollen sequences (Figure 8). That supposition, however, is open to debate, because the interval is close in age to that of the Bonneville landslide (Figure 1), which impounded the Columbia River (Reynolds et al. 2015). The landslide dam, and the cascades that still mark its location, may have drastically reduced the number of salmon reaching spawning grounds upriver for several decades. We describe that event, and discuss the archaeological evidence of its impact above and below the dam in a forthcoming publication.

The evidence that we have compiled leads us to conclude that the century-scale variation in the tempo of activity at Kettle Falls is an echo of the strength of the local Chinook salmon runs, increasing during cooler climatic phases, and declining during warmer periods. There were most likely corresponding echoes throughout the Columbia Plateau at other fisheries. Did these fluctuating returns have a substantial impact on the diets of the people who visited these camps each summer, or are Butler and Campbell (2004), and Campbell and Butler (2010) correct in asserting that salmon use on the Columbia Plateau was essentially stable over the course of the Holocene, despite changes in the physical environment? If more salmon were caught during

cooler climatic phases, did this affect settlement patterns (cf. Prentiss et al. 2005)? And what were the repercussions during warmer phases, when there were fewer salmon to harvest, and more mouths to feed? This last question we also reserve for a future paper.

Brown, K.J., and G. Schoups. 2015. Multi-millennial streamflow dynamics in two forested watersheds on Vancouver Island, Canada. *Quaternary Research*, 83: 415 - 426.

Abstract
Holocene streamflow was reconstructed for two rivers on Vancouver Island, British Columbia, Canada in 500-yr intervals. The San Juan River watershed is located on the wetter western side of the island, whereas the Koksilah River watershed is positioned on the drier eastern side. Both watersheds are forested. To reconstruct streamflow, temporal changes in precipitation (estimated using a pollen-based transfer function) and evapotranspiration were established for each watershed and integrated into a water balance model, calibrated using modern data. While seasonal streamflow variability was maintained throughout the Holocene, with greater flow in the winter relative to the summer, the amount of discharge has changed markedly through time. Lowest simulated flow occurred in the earliest Holocene, with low-flow conditions beginning earlier in the year and extending later into the fall. Such conditions may have inhibited salmon from using many of the smaller rivers in the region. Streamflow steadily increased throughout the early Holocene so that by ca. 6500 cal yr before present near modern flow regimes were established. As climate changes in the future, the San Juan and Koksilah watersheds are expected to remain as pluvial hydroclimatic regimes, though with an extended season of low flow similar to conditions during the early Holocene.

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In addition to the aforementioned items, other factors were also important in regulating salmon over the longer term. For example, during and immediately after deglaciation, transport of uncolidated surface sediment and river incision combined to create unstable river environments, creating unsuitable spawning conditions. Consequently, salmon were likely regionally absent along the coast of British Columbia in the latest Pleistocene. Instead, they may have persisted in more stable unglaciated environments, including Beringia to the north and in regions south of the glacial limits (Hebda and Frederick, 1990).

In contrast to the deglaciation interval, salmon populations established along the coast of British Columbia during the early Holocene as the region became suitable for recolonization (Hebda and Frederick, 1990; Beechie et al., 2001; Moss et al., 2007). As such, salmon were a valuable food source for the people in the region at that time (Butler and O'Connor, 2004; Moss et al., 2007). Given that flow conditions were lower in the early Holocene, especially during the fall, winter and spring (Fig. 8), it is posited that salmon in southern British Columbia were initially restricted to the larger rivers. Utilizing the smaller, more ubiquitous rivers and streams at that time may have been more difficult due to the overall low-flow conditions, which may have delayed access to suitable spawning grounds by weeks or possibly months, or inhibited access altogether. In addition to low streamflow, warmer river temperatures would have also limited spawning success and survival (Lepofsky et al., 2005; Richter and Kolmes, 2005). Further, the incidence of forest fires, as deduced from fossil charcoal records (Gavin et al., 2007; Brown and Power, 2013)

was also relatively high during the early Holocene (Brown and Hebda, 2002a,b; Hallett et al., 2003), potentially reducing shading and increasing water temperature to stressful or lethal levels (Richter and Kolmes, 2005). In addition, fire-induced erosional events (Colombaroli and Gavin, 2010) may have negatively impacted salmon populations and reproduction potential by increasing the delivery of sediment to fluvial systems (Berg and Northcote, 1985; Greig et al., 2005).

Waples, R.S., G.R. Pess, and T. Beechie. 2008. Evolutionary History of Pacific Salmon in Dynamic Environments. *Evolutionary Applications*, vol. 1, no. 2: pp. 189-206

Abstract
Contemporary evolution of Pacific salmon (Oncorhynchus spp.) is best viewed in the context of the evolutionary history of the species and the dynamic ecosystems they inhabit. Speciation was complete by the late Miocene, leaving c. six million years for intraspecific diversification. Following the most recent glacial maximum, large areas became available for recolonization. Current intraspecific diversity is thus the product of recent evolution overlaid onto divergent historical lineages forged during recurrent episodes of Pleistocene glaciation. In northwestern North America, dominant habitat features have been relatively stable for the past 5000 years, but salmon ecosystems remain dynamic because of disturbance regimes (volcanic eruptions, landslides, wildfires, floods, variations in marine and freshwater productivity) that occur on a variety of temporal and spatial scales. These disturbances both create selective pressures for adaptive responses by salmon and inhibit long-term divergence by periodically extirpating local populations and creating episodic dispersal events that erode emerging differences. Recent anthropogenic changes are replicated pervasively across the landscape and interrupt processes that allow natural habitat recovery. If anthropogenic changes can be shaped to produce disturbance regimes that more closely mimic (in both space and time) those under which the species evolved, Pacific salmon should be well-equipped to deal with future challenges, just as they have throughout their evolutionary history.

Moss, M.L., D.M. Peteet, and C. Whitlock. 2007. Mid-Holocene culture and climate on the Northwest Coast of North America. IN: Anderson, David G., Kirk A. Maasch, and Daniel H. Sandweiss (Editors). 2007. *Climate Change and Cultural Dynamics: A Global Perspective on Mid-Holocene Transitions*. Elsevier Science, Chapter 14: 491-529.

Abstract
On the Northwest Coast of North America, the middle Holocene was a time of changing climate and culture. In this chapter, we review the paleoclimatic and archaeological records of this region with the intent of approaching possible causal relationships between them. Early Holocene archaeological sites are relatively few, containing artifact assemblages predominantly of chipped stone, and only rarely, faunal remains. The mid-Holocene climate of the Northwest Coast was cooler and wetter than the early Holocene, but warmer and somewhat drier than today. Archaeologists have observed that compared to the early Holocene, during the mid-Holocene the number of archaeological sites increased, their average size was larger, and shell middens became common, preserving bone and antler technologies as well as abundant faunal remains. Archaeologists have traditionally viewed 5800 cal yr BP (5000 14C yr

BP) as a major turning point in the prehistory of the Northwest Coast. Many archaeologists have perceived the supposed dramatic cultural changes as related to environmental changes including stabilization of sea levels, shellfish beds, and salmon runs. This review demonstrates that archaeological sites with mid-Holocene components are not common, nor are they well known. Nevertheless, a time of cultural transition does appear to be indicated at about 4850 cal yr BP (4300 14C yr BP). Mid-Holocene climate change undoubtedly affected Northwest Coast societies, and we suggest a few ways in which changing climate may have affected some of the key resources upon which people relied. Limitations of both the paleoclimatic and archaeological records, however, preclude all but a preliminary treatment of these issues.

Beechie, T. J., B. D. Collins, and G. R. Pess. 2001. Holocene and recent geomorphic processes, land use and salmonid habitat in two north Puget Sound river basins. In J. B. Dorava, D. R. Montgomery, F. Fitzpatrick, and B. Palcsak, eds. Geomorphic Processes and Riverine Habitat, Water Science and Application, Vol. 4: 37–54. American Geophysical Union, Washington DC, USA.

Abstract

The quantity, quality, and distribution of salmonid habitats in the Skagit and Stillaguamish River basins have changed dramatically in response to post-glacial landscape evolution and volcanism over the last 16,000 years, and the more recent history of land use (approximately 150 years). After retreat of the Cordilleran ice sheet about 16,000 years ago, streams incised rapidly into valley-filling glacial sediments, lowering valley floors and creating terraces. Mainstems and floodplain sloughs on valley floors provided the majority of habitat, but moderate-gradient tributaries on terraces provided additional habitat for some salmonids. Channels in bedrock terrain were too steep to support anadromous salmonids and remain so today. Voluminous lahars from Glacier Peak approximately 5,500 years before present created an extensive low-gradient delta on the Skagit River, which then developed abundant habitats in wetlands and distributary channels. Since non-Native American settlers arrived in the mid-1800s, removal of beaver ponds, diking, ditching, and dredging of streams on the floodplains and deltas has isolated or obliterated approximately 50% of the coho salmon winter rearing habitat in both basins. These losses are associated mainly with agricultural practices, which occupy the same landforms as the majority of historical coho salmon habitat. Forestry activities are concentrated on the steeper slopes of the glacial sediments and bedrock terrain, and contribute to habitat losses by increasing sediment supplies and reducing wood abundance. Understanding the interplay of Holocene landscape evolution, geomorphic processes, land use, and salmonid habitat provides a context for developing habitat restoration programs.

Anderson, E.N. (1996) *Ecologies of the Heart. Emotion, Belief, and the Environment.* Oxford University Press, New York. IN: Haggan, N., N. Turner, J. Carpenter, J.T. Jones, Q. Mackie, and C. Menzies. 2006. 12,000+ Years of Change: Linking traditional and modern ecosystem science in the Pacific Northwest. Working Paper Series # 2006-02, University of British Columbia.

P-11

Anderson (1996) notes that pre-contact indigenous technology was fully capable of wiping out natural resources many times over, and did so from time to time at a local level (1998; See also Johnsen 2001; Jones 2002; Trosper 2003). He proposes that long before contact, coastal societies

evolved strategies to mitigate against over-harvesting, and suggests, for example, that stratified social organization:

"...seems to have been a cultural elaboration on the requirement of salmon management. Salmon had to be conserved. Except for the groups at the lower reaches of the large rivers, fishing out a stream could be done quite easily with Native technology. Human populations were high enough, and lavish enough with their fish (at potlatches and feasts), to decimate the smaller stocks of salmon and other anadromous or freshwater fish. There were few great rivers and hundreds of small streams…Many myths ward against the evils of too-efficient weirs, and the like"
(Anderson 1996)

Traps share challenges with modern technology. They are very efficient at catching fish, but someone has to be in charge. The knowledge and work involved in trap construction and operation has led some authorities to consider that trap construction and operation may well have had a reciprocal effect on social organization (Carpenter *et al.* 2000; Johnsen 2001; Jones 2002).

Chatters, J. C., V. L. Butler, M. J. Scott, D. M. Anderson, and D. A. Neitzel. 1995. A paleoscience approach to estimating the effect of climatic warming on salmonid fisheries of the Columbia River Basin. *Canadian Special Publications of Fisheries and Aquatic Sciences* 121:489–496.

Abstract: Efforts to estimate the effect of climate change on fisheries are hampered by the lack of models that project realistic aquatic habitat conditions at the regional scale. Data from the paleosciences are a suitable alternative both for environmental scenario development and model validation. We are using a paleoscience approach to calculate the potential effect of global warming on anadromous salmonid stocks of the Columbia River basin, western North America. First, archaeologically dated fluvial sediments and bivalves were used with terrestrial paleoecologicl data to reconstruct the flow, flow patterns, temperatures, and bed conditions 6000-7000 yr ago, when paleoclimatic indicators and atmospheric models suggest regional temperatures were up to 2°C warmer. Next, these conditions were imposed on Columbia system subbasins and their effects on salmon stocks were modeled. Results thus far indicate a 30-60% decline in salmon stocks relative to current conditions. Finally, fish remains from archaeological sites were analyzed for evidence of actual salmon production under the reconstructed stream conditions to assess the validity of model projections. Preliminary findings are comparable to model predictions.
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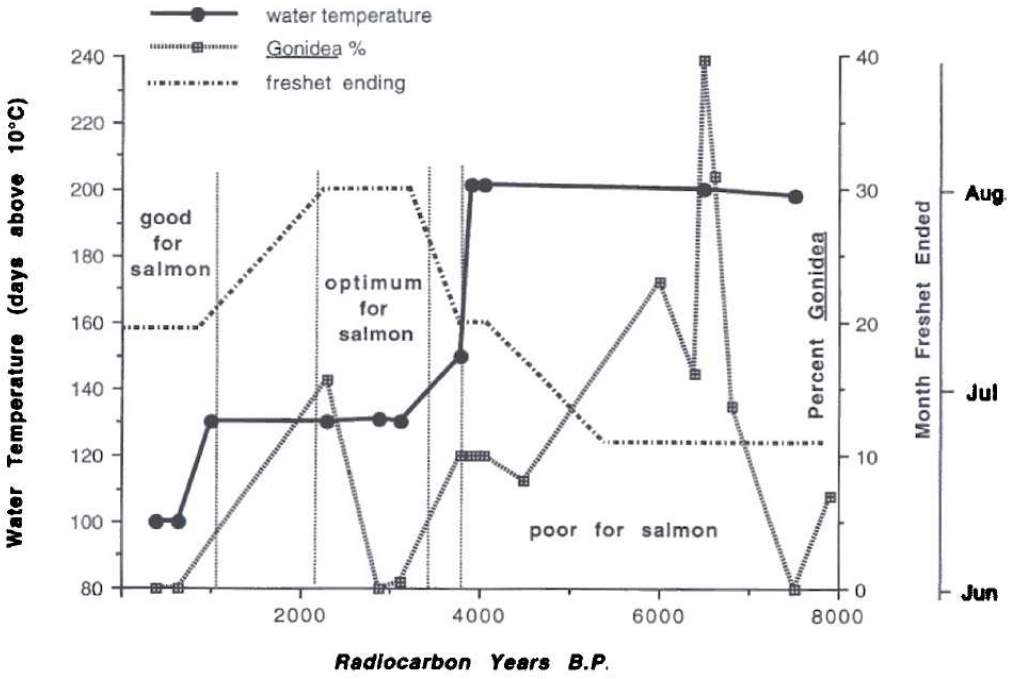

Fig. 2. A summary of evidence for stream conditions in the Wells Reach of the Columbia River since 8000 yr B.P.and their inferred effects on salmon production if they were manifested basinwide.

Attachment 10

From the Literature on the Hatchery Consequences on Natural Ecosystems

Teruia, A., H. Urabe, M. Senzaki, and B. Nishizawa. 2023. Intentional release of native species undermines ecological stability. Proc Natl Acad Sci U S A, 120(7): 1-9 e2218044120. doi: 10.1073/pnas.2218044120. https://doi.org/10.1073/pnas.2218044120

Abstract
The massive release of captive-bred native species ("intentional release") is a pervasive method to enhance wild populations of commercial and recreational species. However, such external inputs may disrupt the sensitive species interactions that allow competing species to coexist, potentially compromising long-term community stability. Here, we use theory and long-term data of stream fish communities to show that intentional release destabilizes community dynamics with limited demographic benefit to the enhanced species. Our theory predicted that intentional release intensifies interspecific competition, facilitating the competitive exclusion of unenhanced species that otherwise stably coexist. In parallel, the excessive input of captive-bred individuals suppressed the natural recruitment of the enhanced species via intensified within-species competition. Consequently, the ecological community with the intentional release is predicted to show reduced community density with unstable temporal dynamics. Consistent with this prediction, stream fish communities showed greater temporal fluctuations and fewer taxonomic richness in rivers with the intensive release of hatchery salmon—a major fishery resource worldwide. Our findings alarm that the current overreliance on intentional release may accelerate global biodiversity loss with undesired consequences for the provisioning of ecosystem services.

P-1
Significance
The intentional release of captive-bred individuals is a common practice for conservation and natural resource management. However, we know little about its potential consequences for the whole ecological community. Here, we show that the intentional release undermines community stability with limited demographic benefit to the enhanced species. Theory and data agree that intentional release destabilizes community dynamics by facilitating competitive exclusion while suppressing the natural recruitment of the enhanced species. The effect size of the intentional release was striking in its magnitude, doubling temporal fluctuations of enhanced communities compared to those with no intentional release. Our findings point to major limitations of intentional release as a primary tool for conservation and sustainability.

P-6
Implications. Despite the significant attention to the fate of captive-bred individuals (2, 24), current schemes rarely consider the self-regulation process of biodiversity. Our results suggest that ignorance of this critical process may erode the long-term persistence of the recipient community, likely impacting the stable delivery of ecosystem services (51). We anticipate that the detrimental community-level consequence is not rare, or even pervasive, because many release programs are designed to aid declining populations (6, 30, 31, 52). In rural Spain, two million individuals of reared red-legged partridge, the most important game bird in this area, are introduced into the wild every year to overcome the regional decline of this species (7). In the

United States, a nationwide initiative exists to augment populations of freshwater mussels, which have rapidly disappeared over the past decades for enigmatic reasons (6). The exact causes behind such population declines are often unknown or controversial, yet it is reasonable to assume that those habitats are no longer suitable and can support limited numbers of individuals (i.e., low carrying capacity). As long as this important theoretical condition of limited carrying capacity holds true, the phenomenon observed in our study streams may occur broadly across taxa and ecosystems.

While socioeconomic analysis is required to provide detailed guidance on release programs, it is clear that habitat conservation should be prioritized for the sustainability of natural resources. Protected areas and environmental restoration are promising tools to conserve biodiversity, and a smart spatial design is integral to achieving successful conservation. For example, coordinated placement of conservation sites considering spatial biodiversity patterns is crucial in improving the ecological outcomes (53–56). Governance may also play a central role in enforcing environmental legislation, potentially determining the effectiveness of conservation investment (57). These considerable potentials indicate that viable management options exist before blindly accepting intentional release. Without a comprehensive framework that appreciates the ecological integrity of natural communities, the intentional release will never be effective but impairs biodiversity.

Ohlberger, J., E.J. Ward, R.E. Brenner, M.E. Hunsicker, S.B. Haught, D. Finnoff, M.A. Litzow, T. Schwoerer, G.T. Ruggerone, and C. Hauri. 2022. Non-stationary and interactive effects of climate and competition on pink salmon productivity. *Global change biology*, *28*(6), 2026–2040. https://doi.org/10.1111/gcb.16049

Abstract
Pacific salmon (*Oncorhynchus* spp.) are exposed to increased environmental change and multiple human stressors. To anticipate future impacts of global change and to improve sustainable resource management, it is critical to understand how wild salmon populations respond to stressors associated with human-caused changes such as climate warming and ocean acidification, as well as competition in the ocean, which is intensified by the large-scale production and release of hatchery reared salmon. Pink salmon (*O. gorbuscha*) are a keystone species in the North Pacific Ocean and support highly valuable commercial fisheries. We investigated the joint effects of changes in ocean conditions and salmon abundances on the productivity of wild pink salmon. Our analysis focused on Prince William Sound in Alaska, because the region accounts for ~50% of the global production of hatchery pink salmon with local hatcheries releasing 600–700 million pink salmon fry annually. Using 60 years of data on wild pink salmon abundances, hatchery releases, and ecological conditions in the ocean, we find evidence that hatchery pink salmon releases negatively affect wild pink salmon productivity, likely through competition between wild and hatchery juveniles in nearshore marine habitats. We find no evidence for effects of ocean acidification on pink salmon productivity. However, a change in the leading mode of North Pacific climate in 1988–1989 weakened the temperature productivity relationship and altered the strength of intraspecific density dependence. Therefore, our results suggest non-stationary (i.e., time varying) and interactive effects of ocean climate and

competition on pink salmon productivity. Our findings further highlight the need for salmon management to consider potential adverse effects of large-scale hatchery production within the context of ocean change.

Ruggerone, G.T., A.M. Springer, L.D. Shaul, and G.B. van Vliet. 2019. Unprecedented biennial pattern of birth and mortality in an endangered apex predator, the southern resident killer whale, in the eastern North Pacific Ocean. Marine Ecology Progress Series, Vol. 608: 291–296 https://doi.org/10.3354/meps12835

ABSTRACT: We report on an unprecedented, synchronized biennial pattern of birth and mortality in an apex predator inhabiting the eastern North Pacific Ocean—the critically endangered southern resident killer whale *Orcinus orca*. From 1998−2017, mortality of newborn and older whales was 3.6 times higher (61 versus 17 whales) and successful births 50% lower (16 versus 32 whales) in even years than in odd years as the population decreased from 92 to only 76 whales. Percent mortality was 3.1 times higher in even years during the recent 20 yr period of population decline than during an earlier 22 yr period (1976−1997) of population increase and relative high abundance, whereas mortality in recent odd years was 43% lower. Recognized potential mechanisms of decline (low abundance of a key prey species, Chinook salmon *Oncorhynchus tshawytscha*, toxic contaminants, and ship noise) cannot explain this biennial pattern. We present evidence that the causal mechanism is indirectly linked to pink salmon *(O. gorbuscha)*, which exhibit a unique and extreme biennial pattern of abundance and interact strongly with other species in marine ecosystems in the North Pacific. Further investigation of this unique biennial pattern in southern resident killer whales is needed to inform recovery efforts for the population.

Springer, A.M., G.B. van Vliet, N. Bool, M. Crowley, P. Fullagar, M.A. Lea, R. Monash, C. Price, C. Vertigan, and E.J. Woehler. 2018. Transhemispheric ecosystem disservices of pink salmon in a Pacific Ocean macrosystem. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(22), E5038–E5045.

Abstract
Pink salmon (*Oncorhynchus gorbuscha*) in the North Pacific Ocean have flourished since the 1970s, with growth in wild populations augmented by rising hatchery production. As their abundance has grown, so too has evidence that they are having important effects on other species and on ocean ecosystems. In alternating years of high abundance, they can initiate pelagic trophic cascades in the northern North Pacific Ocean and Bering Sea and depress the availability of common prey resources of other species of salmon, resident seabirds, and other pelagic species. We now propose that the geographic scale of ecosystem disservices of pink salmon is far greater due to a 15,000-kilometer transhemispheric teleconnection in a Pacific Ocean macrosystem maintained by short-tailed shearwaters (Ardenna tenuirostris), seabirds that migrate annually between their nesting grounds in the South Pacific Ocean and wintering grounds in the North Pacific Ocean. Over this century, the frequency and magnitude of mass mortalities of shearwaters as they arrive in Australia, and their abundance and productivity, have been related

to the abundance of pink salmon. This has influenced human social, economic, and cultural traditions there, and has the potential to alter the role shearwaters play in insular terrestrial ecology. We can view the unique biennial pulses of pink salmon as a large, replicated, natural experiment that offers basin-scale opportunities to better learn how these ecosystems function. By exploring trophic interaction chains driven by pink salmon, we may achieve a deeper conservation conscientiousness for these northern open oceans.

Attachment 11

A Paper on Broader Examples of Failed Results of Conservation Focused Introductions of Captive-Born Fish and Wildlife into the Wild

Willoughby, J. R., and M.R. 2019. Long-term demographic and genetic effects of releasing captive-born individuals into the wild. *Conservation biology : the journal of the Society for Conservation Biology*, *33*(2), 377–388. https://doi.org/10.1111/cobi.13217

Abstract: Because of continued habitat destruction and species extirpations, the need to use captive breeding for conservation purposes has been increasing steadily. However, the long-term demographic and genetic effects associated with releasing captive-born individuals with varied life histories into the wild remain largely unknown. To address this question, we developed forward-time, agent-based models for 4 species with longrunning captive-breeding and release programs: coho salmon (*Oncorhynchus kisutch*), golden lion tamarin (*Leontopithecus rosalia*), western toad (*Anaxyrus boreas*), andWhooping Crane (*Grus americana*). We measured the effects of supplementation by comparing population size and neutral genetic diversity in supplemented populations to the same characteristics in unaltered populations 100 years after supplementation ended. Releasing even slightly less fit captive-born individuals to supplement wild populations typically resulted in reductions in population sizes and genetic diversity over the long term when the fitness reductions were heritable (i.e., due to genetic adaptation to captivity) and populations continued to be regulated by density-dependent mechanisms over time. Negative effects for species with longer life spans and lower rates of population replacement were smaller than for species with shorter life spans and higher rates of population replacement. Programs that released captive-born individuals over fewer years or that avoided breeding individuals with captive ancestry had smaller reductions in population size and genetic diversity over the long term. Relying on selection in the wild to remove individuals with reduced fitness mitigated some negative demographic effects, but at a substantial cost to neutral genetic diversity. Our results suggest that conservation-focused captive-breeding programs should take measures to prevent even small amounts of genetic adaptation to captivity, quantitatively determine the minimum number of captive-born individuals to release each year, and fully account for the interactions among genetic adaptation to captivity, population regulation, and life-history variation.

P-6

Across all species, we documented a consistent increase in population size during supplementation followed by a decrease in population size after captive breeding ended (Fig. 3). For many scenarios, population declines began within the first 5 years of supplementation because an increasing fraction of wild-born individuals with previous captive ancestry were unintentionally used by the breeding program. The demographic effects of releasing captive-born individuals scaled inversely with life span; species with shorter life spans had greater reductions in long-term population size (Fig. 3; detailed Whopping Crane results in Supporting Information). Particularly for shorter-lived species, increasing the number of captive offspring released, relative to wild offspring, resulted in larger effects when population size and neutral genetic diversity were compared with the control populations (Supporting Information).

Neutral genetic diversity was also consistently reduced long after the release of captive-born individuals had been stopped (Fig. 3). The observed reduction in genetic diversity was related to

the size of the demographic decrease that occurred for each species; a large population size decrease after supplementation was followed by a large decrease in genetic diversity (cf. salmon to Whooping Cranes) (Fig. 3). The loss of genetic diversity was not mitigated by increasing the number of effective migrants from large, adjacent populations, as even 10 effective migrants each year could not restore genetic diversity (Supporting Information).

Across all simulated fitness reductions (i.e., 0–0.3), all 4 species had a population size reduction that was proportionately larger than the decrease in fitness due to captive breeding (Fig. 4a). As little as a 2.5% yearly reduction in fitness due to genetic adaptation to captivity lead to a long-term population size reduction of up to 20%. Species-specific patterns were related to maximum life span, as species with the shortest life spans (golden lion tamarin and coho salmon, 8 and 7 years, respectively), had larger population size reductions relative to the longer-lived species. We found a similar relationship for genetic diversity (Fig. 4b).

Attachment 12

Marblemount Hatchery: Skagit wild chum brood take 2022
https://wdfw.wa.gov/fishing/management/hatcheries/escapement#weekly-reports

WDFW In-Season Hatchery Escapement Report

CAUTION - All Numbers represent preliminary estimates only

Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
KENDALL CR HATCHERY	Nooksack River- M	-	-	1,748,798	-	-	-	-	-	-	-	-	12/14/22	
KENDALL CR HATCHERY	Nooksack River- U	1,512	-	-	486	-	1,006	262	-	-	20	-	12/14/22	
WHATCOM CR HATCHERY	Whatcom Creek- H	338	-	209,300	-	-	220	-	-	-	44	74	12/07/22	
SAMISH HATCHERY	Samish- W	170	-	-	-	-	-	-	170	-	-	-	10/28/22	
MARBLEMOUNT HATCHERY	Skagit River- M	-	-	1,067,092	-	-	-	-	-	-	-	-	12/12/22	
MARBLEMOUNT HATCHERY	Skagit River- U	835	-	-	-	-	802	-	-	-	33	-	12/12/22	
WALLACE R HATCHERY	Skykomish River- U	232	-	263,722	-	-	204	-	13	-	15	-	11/28/22	
GEORGE ADAMS HATCHERY	Hood Canal Stock- U	510	-	-	-	-	-	-	-	-	28	482	11/21/22	
MCKERNAN HATCHERY	Hood Canal Stock- H	-	-	18,746,800	-	-	-	-	-	-	-	-	11/16/22	
MCKERNAN HATCHERY	Hood Canal Stock- U	50,409	-	-	-	-	15,752	-	-	12	754	33,891	11/23/22	
HOODSPORT HATCHERY	Hood Canal Stock- H	-	-	15,468,842	-	-	-	-	-	-	-	-	11/22/22	
HOODSPORT HATCHERY	Hood Canal Stock- U	19,150	-	-	-	-	11,798	-	-	-	474	6,878	11/22/22	
MINTER CR HATCHERY	Minter Creek- M	-	-	4,121,995	-	-	-	-	-	-	-	-	11/30/22	
MINTER CR HATCHERY	Minter Creek- U	26,905	-	-	-	-	3,599	-	10,803	-	305	12,198	12/14/22	
MAYR BROTHERS REARIN	Wishkah River- W	149	-	150,000	-	-	144	-	-	-	5	-	11/29/22	
LK ABERDEEN HATCHERY	Wynoochee River- W	17	-	-	-	-	-	-	14	-	3	-	11/28/22	

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WDFW In-Season Hatchery Escapement Report

CAUTION - All Numbers represent preliminary estimates only

Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
KENDALL CR HATCHERY	Nooksack River- M	-	-	161,798	-	-	-	-	-	-	-	-	11/22/22	
KENDALL CR HATCHERY	Nooksack River- U	312	-	-	196	-	116	-	-	-	-	-	11/22/22	
WHATCOM CR HATCHERY	Whatcom Creek- H	79	-	-	74	-	-	-	-	-	5	-	11/16/22	
SAMISH HATCHERY	Samish- W	170	-	-	-	-	-	-	170	-	-	-	10/28/22	
MARBLEMOUNT HATCHERY	Skagit River- M	-	-	657,192	-	-	-	-	-	-	-	-	11/21/22	
MARBLEMOUNT HATCHERY	Skagit River- U	806	-	-	288	-	509	-	-	-	9	-	11/21/22	
WALLACE R HATCHERY	Skykomish River- U	197	-	164,244	67	-	121	-	-	-	9	-	11/14/22	
GEORGE ADAMS HATCHERY	Hood Canal Stock- U	510	-	-	-	-	-	-	-	-	28	482	11/21/22	
MCKERNAN HATCHERY	Hood Canal Stock- H	-	-	18,746,800	-	-	-	-	-	-	-	-	11/16/22	
MCKERNAN HATCHERY	Hood Canal Stock- U	49,623	-	-	-	-	15,752	-	-	12	754	33,105	11/21/22	
HOODSPORT HATCHERY	Hood Canal Stock- H	-	-	15,468,842	-	-	-	-	-	-	-	-	11/22/22	
HOODSPORT HATCHERY	Hood Canal Stock- U	19,150	-	-	-	-	11,798	-	-	-	474	6,878	11/22/22	
MINTER CR HATCHERY	Minter Creek- M	-	-	2,358,320	-	-	-	-	-	-	-	-	11/22/22	
MINTER CR HATCHERY	Minter Creek- U	6,496	-	-	2,288	-	1,959	-	-	-	26	2,223	11/22/22	
MAYR BROTHERS REARIN	Wishkah River- W	149	-	150,000	-	-	144	-	-	-	5	-	11/22/22	
LK ABERDEEN HATCHERY	Wynoochee River- W	14	-	-	-	-	-	-	14	-	-	-	11/21/22	

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WDFW In-Season Hatchery Escapement Report

CAUTION - All Numbers represent preliminary estimates only

Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
KENDALL CR HATCHERY	Nooksack River- U	12	-	-	12	-	-	-	-	-	-	-	11/09/22	
WHATCOM CR HATCHERY	Whatcom Creek- H	48	-	-	44	-	-	-	-	-	44	-	11/09/22	
SAMISH HATCHERY	Samish- W	170	-	-	-	-	-	-	170	-	-	-	10/28/22	
MARBLEMOUNT HATCHERY	Skagit River- M	-	-	89,393	-	-	-	-	-	-	-	-	11/09/22	
MARBLEMOUNT HATCHERY	Skagit River- U	162	-	-	106	-	56	-	-	-	-	-	11/09/22	
WALLACE R HATCHERY	Skykomish River- U	197	-	78,188	131	-	57	-	-	-	9	-	11/08/22	
GEORGE ADAMS HATCHERY	Hood Canal Stock- U	102	-	-	-	-	-	-	-	-	-	102	11/04/22	
MCKERNAN HATCHERY	Hood Canal Stock- H	-	-	13,550,600	-	-	-	-	-	-	-	-	11/09/22	
MCKERNAN HATCHERY	Hood Canal Stock- U	27,295	-	-	1,034	-	11,644	-	-	-	272	14,345	11/09/22	
HOODSPORT HATCHERY	Hood Canal Stock- H	-	-	7,700,246	-	-	-	-	-	-	-	-	11/08/22	
HOODSPORT HATCHERY	Hood Canal Stock- U	11,582	-	-	1,583	-	5,568	-	-	-	474	3,957	11/08/22	
MINTER CR HATCHERY	Minter Creek- U	186	-	-	183	-	-	-	-	-	3	-	11/07/22	
MAYR BROTHERS REARIN	Wishkah River- W	125	-	122,000	-	-	120	-	-	-	5	-	11/08/22	
LK ABERDEEN HATCHERY	Wynoochee River- W	14	-	-	2	-	-	-	12	-	-	-	11/08/22	
BINGHAM CR HATCHERY	Satsop River- U	22	-	-	-	-	-	-	22	-	-	-	11/09/22	

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Marblemount Hatchery: Skagit chum wild brood take 2021

WDFW In-Season Hatchery Escapement Report

CAUTION - All Numbers represent preliminary estimates only

Fall Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
WHATCOM CR HATCHERY	Whatcom Creek- H	102	-	-	-	-	18	-	-	-	84	-	12/01/21	

Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
KENDALL CR HATCHERY	Nooksack River- M	-	-	2,738,580	-	-	-	-	-	-	-	-	12/20/21	
KENDALL CR HATCHERY	Nooksack River- U	2,846	-	-	8	-	2,068	-	-	-	753	17	12/20/21	
WHATCOM CR HATCHERY	Whatcom Creek- H	153	-	-	144	-	-	-	-	-	9	-	11/17/21	
MARBLEMOUNT HATCHERY	Skagit River- M	-	-	112,818	-	-	-	-	-	-	-	-	12/09/21	
MARBLEMOUNT HATCHERY	Skagit River- U	137	-	-	-	-	109	-	-	-	17	11	12/09/21	
WALLACE R HATCHERY	Skykomish River- U	148	-	141,260	-	-	112	-	7	-	29	-	12/07/21	
GEORGE ADAMS HATCHERY	Hood Canal Stock- U	497	-	-	-	-	-	-	-	-	-	497	11/23/21	
MCKERNAN HATCHERY	Hood Canal Stock- H	-	-	20,278,110	-	-	-	-	-	-	-	-	11/16/21	
MCKERNAN HATCHERY	Hood Canal Stock- U	39,149	-	-	-	-	19,940	-	-	-	2,610	16,599	11/29/21	
HOODSPORT HATCHERY	Hood Canal Stock- U	20,870	-	12,687,517	-	-	11,645	-	-	-	429	8,796	11/22/21	
MINTER CR HATCHERY	Minter Creek- M	-	-	4,392,251	-	-	-	-	-	-	-	-	11/23/21	
MINTER CR HATCHERY	Minter Creek- U	33,644	-	-	-	-	3,868	-	10,440	-	574	18,762	11/30/21	

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Marblemount Hatchery: No Skagit wild chum brood take 2020

WDFW In-Season Hatchery Escapement Report

CAUTION - All Numbers represent preliminary estimates only

Chum

Facility	Stock-BO	Adult Total	Jack Total	Total Eggtake	On Hand Adults	On Hand Jacks	Lethal Spawned	Live Spawned	Released	Live Shipped	Mortality	Surplus	Date	Comments
KENDALL CR HATCHERY	Nooksack River- M	-	-	3,104,300	-	-	-	-	-	-	-	-	12/22/20	
KENDALL CR HATCHERY	Nooksack River- U	2,591	-	-	-	-	2,455	-	-	-	136	-	12/22/20	
WHATCOM CR HATCHERY	Whatcom Creek- H	1,851	-	1,108,600	-	-	1,000	-	-	-	357	494	12/02/20	Final in-season estimate.
WALLACE R HATCHERY	Skykomish River- U	206	-	233,022	-	-	183	-	10	-	13	-	11/30/20	
GEORGE ADAMS HATCHERY	Hood Canal Stock- H	-	-	386,900	-	-	-	-	-	-	-	-	11/30/20	
GEORGE ADAMS HATCHERY	Hood Canal Stock- U	522	-	-	-	-	387	-	-	4	15	116	11/30/20	
MCKERNAN HATCHERY	Hood Canal Stock- H	-	-	12,038,182	-	-	-	-	-	-	-	-	11/30/20	
MCKERNAN HATCHERY	Hood Canal Stock- U	14,471	-	-	-	-	11,558	-	-	-	379	2,534	11/30/20	
HOODSPORT HATCHERY	Hood Canal Stock- H	-	-	9,491,978	-	-	-	-	-	-	-	-	11/30/20	
HOODSPORT HATCHERY	Hood Canal Stock- U	12,529	-	-	-	-	8,204	-	-	-	150	4,175	11/30/20	
MINTER CR HATCHERY	Minter Creek- M	-	-	3,745,926	-	-	-	-	-	-	-	-	12/01/20	
MINTER CR HATCHERY	Minter Creek- U	16,323	-	-	-	-	3,936	-	7,931	-	195	4,261	12/07/20	
MAYR BROTHERS REARIN	Wishkah River- W	78	-	65,000	-	-	68	-	-	-	10	-	12/15/20	Final in-season estimate.
LK ABERDEEN HATCHERY	Wynoochee River- W	7	-	-	-	-	-	-	7	-	-	-	11/23/20	
BINGHAM CR HATCHERY	Satsop River- U	173	-	-	-	-	-	-	158	-	15	-	11/23/20	
SATSOP SPRINGS PONDS	Satsop River- M	-	-	460,000	-	-	-	-	-	-	-	-	11/30/20	

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Attachment 13

Hatchery Influences on Wild Salmonid Populations, Including Steelhead

(Bill McMillan, April 7, 2023)

Originally from:
Pflug, D., E. Connor, B. Hayman, T. Kassler, K. Warheit, B. McMillan, and E. Beamer. 2013. Ecological, genetic and productivity consequences of interactions between hatchery and natural-origin steelhead of the Skagit watershed. Saltonstall-Kennedy Grant Program. Skagit System Cooperative, LaConnor, WA
http://skagitcoop.org/wp-content/uploads/Ecological-Genetic-and-Productivity-Consequences-of-Interactions-between-Hatchery-and-Natural-Origin-Steelhead-of-the-Skagit-Watershed.pdf

Updated in:
McMillan, B. 2016. Mid Skagit River Tributary Spawning Surveys and a Recent Divergence at Two Tributaries with Greatly Elevated Steelhead (*Oncorhynchus mykiss*) Redd Counts. Part 1. An Independent Biological Interest Report.
http://www.academia.edu/29427536/Mid_Skagit_River_Tributary_Spawning_Surveys_and_a_Recent_Divergence_at_Two_Tributaries_with_Greatly_Elevated_Steelhead_Oncorhynchus_mykiss_Redd_Counts_Part_1_FINAL_B.McMillan_10-25-2016

Further updated October 10, 2020, September 26, 2021, and April 7, 2023.

Hatchery Influences on Wild Salmonid Populations, Including Steelhead

The mechanisms by which hatchery salmonids can negatively affect wild salmonid populations have been described in numerous publications dating to at least the 1930s, and specifically for steelhead dating to 1977. Table 16 lists several of these mechanisms and the cited sources related to them (updated from Pflug et al. 2013), and Appendix E provides their fuller descriptions and the references they are drawn from (updated from McMillan 2012).

Table 16. Potential mechanisms for hatchery impacts on wild salmonid populations, including steelhead

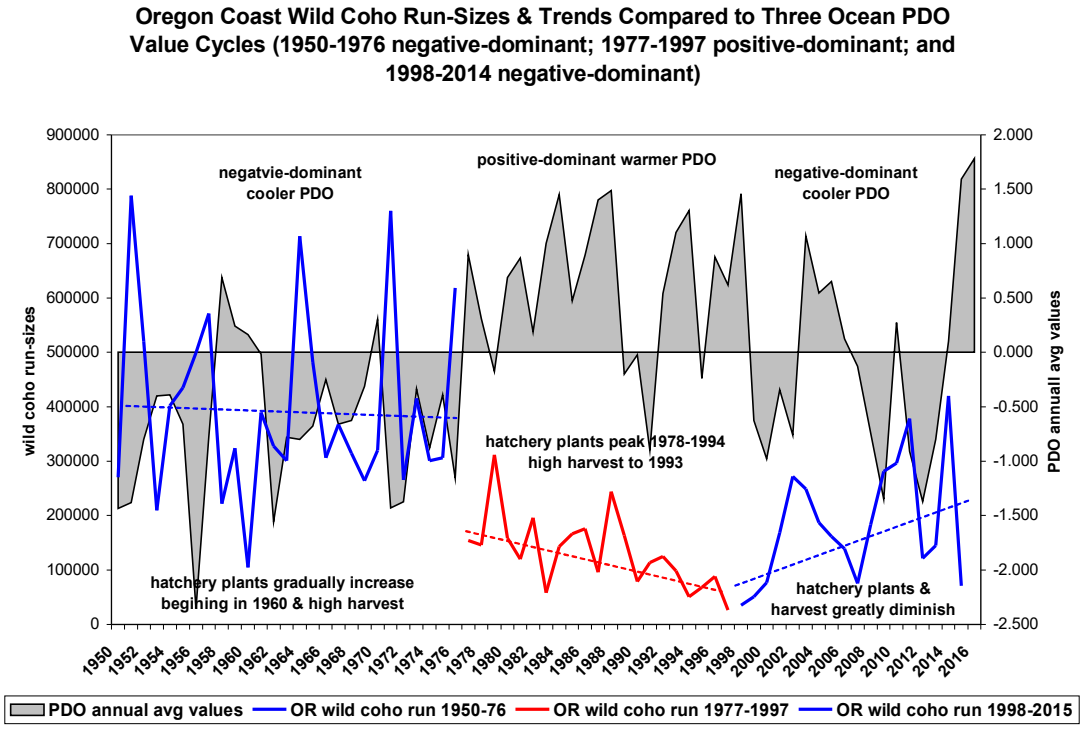
Potential mechanism	References
Spawning Interactions; Genetic Hybridization	Adults (Reisenbichler and McIntyre 1977; Reisenbichler and Rubin 1999; Seamons et al. 2012) Precocious male parr (McMichael et al. 1999; Tipping et al. 2003; McMillan et al. 2007; McMillan et al. 2011; Christie et al. 2011-a)
Unintended Straying to Natural Spawning Grounds; 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; Zaporozhets and Zaporozhets 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. 2013; Sashi et al. 2021)
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 residualism 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)
Direct Predation	Hatchery steelhead smolts and 'residuals' preying on salmonid fry as an impact on wild populations (HSRG 2004; Naman 2008)
Indirect Predation	The relationship of hatchery releases and predator attraction (Thompson and Tufts 1967; Wood 1984; 1985; 1986; and 1987; Beamish et al. 1992; Moore et al. 2015; Nickelson 2003; Collis et al. 1995; Einum and Fleming 2006; Handelmann et al. 1996; Steward and Bjornn 1990; Malick et al. 2022; Sægrov and Skilbrei 1999)
Overharvest in Mixed Stock Fisheries	(Flagg et al. 1995; Larkin 1977; Wright 1993)

Fisheries management of itself can also have negative or positive effects on wild salmonid populations (as in the Oregon coho example in Figure 33) related to the determinations of where and when the fishing occurs, methods of fishing, and harvest levels allowed or not allowed. If hatchery programs are in place there are further decisions necessary to determine the numbers of hatchery fish released, where and when they are released, at what life history stage they are released, the origin of broodstock used, how to harvest hatchery fish without impacting wild populations, and subsequent decisions that may increase, diminish, or eliminate hatchery fish releases. Obviously, once a hatchery program is put into place it compounds the breadth of management

decisions necessary from that of managing wild fish alone, and most management decisions related to hatchery fish can only attempt to minimize the problems to wild populations. To eliminate the problems to wild populations would require eliminating the hatchery program altogether, or otherwise potentially lose the wild population, or lose the attributes (genetic and/or life history diversity) essential for the wild population to effectively propagate into the future.

Figure 33.



Appendix E

Negative Consequences Hatchery Fish Can Have on Wild Fish Populations

Studies designed to determine wild to hatchery Pacific salmon productivity date back to 1931 when several methods of hatchery propagation were found to be less productive than natural propagation for wild sockeye salmon at Cultus Lake of the lower Fraser River (Foerster 1931). There have been numerous studies indicating that hatchery steelhead do not perform well in the wild and can have subsequent negative effects on wild steelhead dating from the 1970s to the present (Reisenbichler and McIntyre 1977; Chilcote et al. 1986; Araki 2007(a); Araki 2007(b); Araki 2008; Araki et al. 2009; Seamons et al. 2012; Byrne and Copeland 2012; and Christie et al. 2012) and this can occur in a very short time (Christie et al. 2011). There have also been broader overviews of the range of consequences and mechanisms on wild populations as a result of hatchery

fish (Flagg et al. 2000; Kostow 2008; Jonsson and Jonsson 2006; Grant 2012; Morrison 2012). Specific concerns about Washington's hatchery steelhead program's effects on the wild steelhead populations date to 1972 (Royal 1972). Some of the more specific mechanisms through which hatchery fish have negative consequences on wild fish populations as indicated in differing studies and reports include the following:

1) Spawning Interactions/Genetic Hybridization

Steelhead overall

- Reisenbichler and McIntyre 1977: hatchery, wild, and hatchery x wild steelhead progeny were tracked with WW having highest survival, HH the lowest, and HW intermediary as found by their different genetic markers; hatchery fish were genetically different from wild fish and when they interbreed with wild fish may reduce the number of smolts produced;
- Reisenbichler and Rubin 1999: attempts to limit deleterious genetic effects from artificial propagation have been limited or ineffectual, often because participants don't agree that a problem exists; however, published studies provide strong evidence for a problem, and that the fitness for natural spawning and rearing can be rapidly and substantially reduced by artificial propagation;
- Seamons et al. 2012: despite a weir to deter hatchery spawning, up to 80% of naturally produced steelhead were hatchery/wild hybrids, and despite a hatchery steelhead stock selected to supposedly spawn at different time from wild steelhead.

Precocious male parr and resident males

- McMichael et al. 1999: 0.7%-4% of released "smolts" were sexually mature precocial males in 3 of 4 study years;
- Tipping et al. 2003: in Washington hatcheries 1-5% of steelhead smolts were commonly found to be precocious male parr and in Idaho as much as 64% were and can negatively affect wild steelhead by remaining in the stream);
- McMillan et al. 2007: resident O. mykiss life histories that included residual hatchery steelhead smolts were observed as part of the spawning population competing for anadromous female steelhead in the Sol Duc and Calawah rivers of WA;
- McMillan et al. 2011: larger *O. mykiss* males with higher lipid levels had a greater probability of maturing as a resident at age-1+ and lipid content was found to be a factor related to early expression of resident or anadromous life histories;
- Christie et al. 2011(a): juvenile hatchery steelhead that residualize provide a route for gene flow from hatchery into wild populations; although resident hatchery males produced more offspring with wild anadromous females than with hatchery anadromous females only 1% of steelhead genes came from residualized hatchery fish, while 20% of steelhead genes came from wild residents; further 23% of anadromous steelhead genes came from matings of two resident parents and about 40% of all steelhead genes came from wild trout each generation; management must take into account interconnected O. mykiss life histories.

2) Unintended Straying to Natural Spawning Grounds; and Lack of Spawn Time Separation between Wild and Hatchery Steelhead Selected to Be Different

Straying examples of steelhead and salmon

- Shapovalov and Taft 1954: 0-9% range hatchery steelhead **donor** strays from Scot Creek, CA; 0-41% range hatchery **recipient** strays at Waddell Creek, CA;
- Lirette and Hooton 1988: 5.4% **donor** hatchery steelhead straying from Big Qualicum River, Vancouver Island; 14.6% **recipient** hatchery straying to the Big Qualicum River; range of **donor** straying was 0.6-53% depending on stream and smolt release strategy; one recipient stray to Quinsam River was from 300km away;
- Schroeder et al. 2001: **recipient** straying 4-26% and mean of 11% in streams where hatchery steelhead released; and **recipient** range 9-43% range and mean of 22% in streams where hatchery steelhead were not released on Oregon Coast;
- Jonsson et al. 2003: 15% hatchery **donor** Atlantic salmon straying to 6% wild straying from River Imsa, Norway, and straying >50% if selected as broodstock for 4 generations or more;
- Keefer and Caudill 2012: Columbia basin steelhead hatchery **donor** strays: Tucannon River mean 55%; Grande Ronde River mean 11% with 4-25% range. Columbia basin **recipient** population hatchery strays: John Day River mean 23% and 7-41% range; Warm Springs River of Deschutes >50%;
- Seamons et al. 2007: at Snow Creek, WA, a wild steelhead study stream, of 6 returning total adults to the weir in 1990, 33% were hatchery, and of 2 males 50% were hatchery despite no hatchery release sites nearby;
- Seamons et al. 2012: even a weir did not prevent unwanted straying of hatchery steelhead to the natural spawning grounds upstream at Forks Creek, WA.
- Zaporozhets and Zaporozhets 2012: it was found that wild fish stray to hatcheries and hatchery fish stray to natural spawning grounds as found with Paratunka River chum salmon; since operation of the Paratunsky Salmon Hatchery the number of fish naturally spawning has been reduced by a factor of three, and 17-45% of the chum on the spawning grounds are hatchery origin; it exceeds the level suggested to avoid negative ecological and genetic effects on sympatric wild populations;

Lack of Spawn Time Separation between Wild and Hatchery Fish Selected to be Different

- Mackey et al. 2001: the Washington management approach of wild and hatchery steelhead has been to separate the time of return and spawning through hatchery selective breeding for early timed hatchery fish but an overlap in timing and spatial distribution could permit genetic and ecological interactions; at Forks Creek, although hatchery fish tended to return and spawn about 3 months earlier there was some temporal overlap and radio-tracking indicated that spatial distributions of the populations overlapped considerably, permitting interbreeding and ecological interactions;
- Seamons et al. 2012: divergent life history of hatchery steelhead in return and spawn time at Forks Creek, WA failed to prevent interbreeding and even a weir did not

prevent unwanted straying of hatchery steelhead to the natural spawning grounds upstream at Forks Creek, WA.

3) Reduced Fitness and/or Reproductive Success

- Reisenbichler and McIntyre, 1977: hatchery, wild, and hatchery x wild steelhead progeny were tracked with WW having highest survival, HH the lowest, and HW intermediary;
- Close 1999: introduced Kamloops strain hatchery rainbows resulted in decline of Lake Superior tributary wild self sustaining steelhead population;
- Kostow and Zhou 2006: 50% decline in wild steelhead productivity with 86% outmigrating steelhead smolts of hatchery origin and 70% returning steelhead on spawning grounds hatchery origin;
- Araki et al. 2007(a): traditional hatchery fish from multi-generational hatchery broodstock not only had reduced mean reproductive success but also increasing variance in reproductive success among breeding parents in wild;
- Araki et al. 2007(b): genetic effects of domestication reduce subsequent steelhead reproductive capabilities by ~40% per captive-reared generation when fish are moved to natural environments;
- Araki 2008: summarizes existing data on the fitness of hatchery fish in the wild, and investigates the conditions under which rapid fitness declines can occur;
- Araki et al. 2009: reproductive fitness was only 37% in wild-born fish from two captive-bred parents and 87% from one captive-bred and one wild parent, relative to those from two wild parents; also there is a significant carry-over effect of 8% loss of fitness in the wild population in the generation after supplementation;
- Chilcote et al. 1986: the success of hatchery summer steelhead in producing smolt offspring was only 28% of that for wild fish and under such conditions, the genetic integrity of wild populations may be threatened;
- Chilcote et al. 2011: for 89 Chinook, coho, and steelhead populations modeled the recruitment performance for a population of all hatchery fish would be 0.128 of that for a population of all wild fish, and the impact of hatchery fish from "wild type" broodstocks was no less adverse than for hatchery domesticated broodstocks;
- Christie et al. 2011: study found that a single generation in captivity can result in a substantial response to selection on traits that are beneficial in captivity but severely maladaptive for steelhead in the wild;
- Bernston et al. 2011: hatchery steelhead reproductive success 30-60% of wild;
- McLean et al. 2003: hatchery steelhead spawning in the wild had markedly lower reproductive success than native wild steelhead; native wild females produced 42 times more total adult offspring than wild spawning hatchery females;
- Seamons et al. 2012: wild population decline of smolts and adults 10-20% related to hatchery fish interactions;
- Byrne et al. 1992: a life history model used to assess hatchery steelhead supplementation of a native population found release of either fry or smolts would lead to long-term extinction in some scenarios;

- Byrne and Copeland 2012: 14 years of hatchery supplementation intended to increase an ESA listed wild steelhead population instead resulted in their continued decline;
- Christie et al. 2012: additional hatchery steelhead doubled the total number of adult steelhead on the spawning grounds each year, but cut the effective population size of the total population, wild and hatchery fish combined, by about two-thirds.

4) Reduced or Altered Life Histories

- McMillan et al. 2022: using historical to contemporary tribal and sport catch records it was found that the wild winter steelhead run-timing at the Quillayute, Hoh, Queets, and Quinault rivers, Washington, peaked 1-2 months earlier than at present and overall migration timing has contracted by up to 26 days with wild winter steelhead abundance 55% less than in 1948-1960; these changes occurred during the period of early migrating hatchery winter steelhead introductions and increased industrial forestry impacts;
- Jonsson and Jonsson 2006: in addition to genetic effects such as those caused by cultured fish introgressing wild gene pools, cultured salmon influence wild populations by increasing their emigration and mortality, decreasing their growth rate, biomass, and production, and altering their life history traits;
- Zaporozhets and Zaporozhets 2012: life history trait divergence between wild and hatchery salmon in the Kamchatka region has occurred as found at several rivers for chum, sockeye, and chum salmon and where hatchery salmon return at younger ages, smaller sizes, and exhibit lower life history diversity compared to wild counterparts; as evidence for great concern, 17-45% of the chum salmon on the Paratunka River spawning grounds in Kamchatka are hatchery origin; they indicate that by simplifying the age structure of the spawning population it may become less resilient to change in a future scenario of unfavorable conditions either in the river or in the sea, and that hatcheries tend to result in a net loss in life history diversity; they further indicate their results mirror those reported for Atlantic salmon where a 33% reduction in the number of age classes occurred in the hatchery population compared to the wild population inhabiting the same river system on the Kola Peninsula in Western Russia;
- Miyakoshi et al. 2013: run timing of Hokkaido chum salmon populations have changed due to the hatchery selection, and while there were both early- and late-run populations of chum salmon in Hokkaido until the early 1980s, the late-run population had almost disappeared by the late 1990s; this is attributed to artificial selection in the hatchery programs; since the early 1980s, efforts to enhance the early-run population have been encouraged, but instead the late-run population has continued to decrease because adults captured late in the season were not used in hatchery fertilization but simply sold;
- Sahashi 2021: homogenization in the timing of spawning migration in relation to hatchery transplantation in chum salmon has occurred at Hokkaido rivers of Japan with inter-river variation in the timing of spawning migration more reduced in transplanted rivers than in nontransplanted rivers; it suggests that both wild and

transplanted salmon are returning and spawning naturally in the uncaught rivers and interbreeding between wild and transplanted fish at different return timings may alter the original timing of spawning migration.

5) Competition/Density Dependence and Effects of Smolt Residualism

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: all indicate evidence of negative effects on wild fish due to competition with hatchery fish and often related density dependence was indicated.

Residualism of Hatchery Smolts

Among the most problematic conditions for competition/density dependence for wild juvenile steelhead is through residualism of hatchery smolts released that remain in the system to compete with wild fish, prey on them, and/or to be part of the subsequent wild spawning population as indicated by the following:

- Royal 1972: several hatchery smolt residualism findings were referenced with concerns on effects for Washington wild steelhead populations;
- Cannamela 1992: estimated 10-25% residualism for 1-1.3 million hatchery steelhead smolts released at Upper Salmon River, ID, estimated to result in 100,000-325,000 residuals;
- Viola and Schuck 1995: 14% of hatchery steelhead planted directly into the Tucannon River residualized;
- Tipping et al. 1995: an average of 20% of Chambers Creek hatchery steelhead smolts released at Snow Creek, WA over a 3 year period residualized with a range of 13%-26% even after sexually mature precocious parr were first culled out;
- McMichael et al. 1997: presence of residual hatchery steelhead led to reduced growth of wild rainbow trout indicating that high densities of residual juvenile steelhead from hatchery releases may have significant adverse effects;
- McMichael et al. 1999: hatchery steelhead displaced wild *O. mykiss* in 79% of the contests observed between these groups. Our results indicate that the behavior of hatchery steelhead can pose risks to preexisting wild *O. mykiss* where the two interact;
- Washington Trout 2004: a table was developed for comments to a Draft Environmental Impact Statement related to a planned Skagit River hatchery rearing pond regarding hatchery smolt residualism rates found, a range of 2%-47% depending on location and year, and the computed numbers of hatchery residuals in the Skagit River for two differing smolt release levels. (See Table 5 that follows References that is from Washington Trout 2004).

6) Direct Predation (added Oct. 10, 2020)

- HRSG 2004: the potential for predation on wild salmonid fry by hatchery-reared salmonids in Washington and that hatchery steelhead smolts have been observed to remain in rivers for months or years after release and known as ‘residual’

steelhead, and further concluded that predation by residual steelhead may represent an important impact on wild salmonid populations;

- Riley et al. 2001: snorkeling in WA coastal streams reported counts of residual steelhead between 1.25–37.7 fish per km several months after release; stomach sampling on one stream revealed that ten of 44 (22%) residual steelhead sampled contained salmonid or unidentifiable fish remains;
- McMichael and Pearsons 2001: in a tributary of the Yakima Basin residual steelhead were found as far as 12.8 km upstream of their release point, indicating wide distribution and outnumberd wild salmonid yearlings in a number of areas;
- Naman 2008: the extent of predation by juvenile hatchery steelhead on naturally produced salmonid fry in the upper-Trinity River of California was investigated in the spring of 2007; 315 residualized hatchery steelhead and 1,636 juvenile hatchery steelhead were examined for salmonid fry stomach contents; when expanded to represent about 440,000 juvenile steelhead it was estimated that over 110,000 naturally produced salmonid fry had been consumed in 30 days with about 50,000 coming from one particularly productive side channel.

7) Indirect Predation

- Thompson and Tufts 1967: the relationship of hatchery releases and predator attraction dates to at least 1967 when it was found that the diets of bull trout and northern pikeminnow shifted from relatively low numbers of wild sockeye juveniles to significantly higher levels dominated by hatchery juveniles at the time of releases of hatchery fish;
- Wood 1984; 1985; 1986; 1987: at Vancouver Island, it was found that streams with hatchery salmon attract aggregations of common mergansers that prey on them, with particularly detrimental consequences to species that rear for longer periods in freshwater (Wood 1984), such as steelhead (Wood 1987), and particularly for wild populations (Wood 1984; and Wood 1986).
- Beamish et al. 1992: at the Big Qualicum River of Vancouver Island large numbers of spiny dogfish targeted the mouth of the river preying on the Chinook and coho smolt releases and also fed on the returning adults; it was concluded that the long-term decline in Chinook survival to the hatchery, and the similar decline of other hatchery produced salmon in the area was related to the dogfish predation;
- Nickelson 2003: on the Oregon Coast wild coho productivity at 12 Oregon coastal river basins and two lake basins was negatively correlated with the average number of hatchery coho salmon smolts released in each basin; it was indicated that productivity of wild populations can be reduced by the presence of large numbers of hatchery coho smolts in lower rivers and estuaries that attract predators; a primary consideration for recovery of the wild populations was to avoid release of large numbers of hatchery coho smolts in areas where wild coho are also concentrated;
- Moore et al. 2015: in particular reference to Puget Sound and Skagit River steelhead, it was found that predation on wild steelhead smolts entering and migrating through Puget Sound occurred primarily in the period of early May

when hatchery smolt releases occurred while with higher survival before and after with the conclusion that hatchery smolt releases may be attracting high predation that included that on wild smolts mixed with them;

- Malick et al. 2022: it was found that weekly steelhead survival was significantly negatively related to abundances of hatchery-released Coho; their results suggested that releases of Coho into Puget Sound mediate mortality of steelhead smolts, possibly via increased predation pressure by shared predators;
- Sægrov and Skilbrei 1999: it indicates stocked juvenile Atlantic salmon represent an instantaneous increase of the fish biomass into the river environment and that stocked juveniles normally suffer high initial mortality, presumably by predators; repeated stocking may benefit the predator stocks, particularly brown trout; as the stocked juveniles are depleted, predation upon their wild conspecifics may increase;
- Collis et al. 1995; Einum and Fleming 2006; Handelmann et al. 1996; Steward and Bjornn 1990: these references further indicate predation consequences linked to hatchery fish.

8) Overharvest in Mixed Stock Fisheries

- Flagg et al. 1995: large releases hatchery coho in Lower Columbia River led to harvest rates of up to 90% and mixed wild populations declined to near extinction of wild coho;
- Larkin 1977: less productive wild populations that are intermingled among the hatchery fish and are fished at unsustainable rates;
- Wright 1993: targeted harvest on hatchery fish impacted vulnerable wild populations of Hood Canal chum salmon and lower Columbia River Chinook salmon.

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