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August 28, 2019 via email: Hatcheries.Public.Comment@noaa.gov

RE: Snake River Hatcheries DEA comments

Dear NOAA Fisheries[1]:

Thank you for extending this comment period. We very much appreciate this effort to accommodate meaningful public input. The undersigned request notice by mail of anything connected to this proposed action, pursuant to 40 C.F.R. § 1506.6. What we have cited below is what we think is the best available science. If the agency is relying on science other than this, we expect a citation and an explanation as to the relevancy and persuasiveness of the science relied upon by the agency. Following the signature blocks is a list of acronyms we have used in this document.

The EA has not disclosed enough information to facilitate a common member of the public with limited knowledge on the legal landscape of salmonids to meaningfully participate in this process. How NOAA deals with salmonids under the ESA is incredibly complicated. Friends of the Clearwater is an organization that watchdogs the Nez Perce and Clearwater National Forests—we do not focus on one species, but rather all organisms within our mission area. While the EA discusses "section 4(d) determinations," the agency never describes what this actually means for salmonids. While the website where this EA is housed states that the agency may make "limit 5" or "limit 6" determinations for state or joint state-tribal hatcheries, the EA never mentions limits 5 or 6 determinations, much less explains what they are. Only through legal research and exchanges with attorneys who specifically focus on salmonids was Friends of the Clearwater able to find the relevant regulation. We looked in good faith through the EA and could not find one place where the EA cited it.

[1] In this comment, we refer to NOAA (NOAA Fisheries). We include the National Marine Fisheries Service when we refer to NOAA.

While omitting such basic information is understandable for this agency since it has been at this so long, not every person will share the same basic knowledge when reading your documents. The Endangered Species Act prohibits individuals from taking (i.e., harassing or harming) species listed as endangered.[2] Some potential commenters may not have understood that salmonids are listed as threatened or that the take prohibition applies to endangered species absent special regulations by the Secretary of Commerce..[3] Potential commenters also might not know that the Secretary of Commerce has passed a special regulation, under section 4(d) of the Act,[4] that prohibits take for these threatened species (similar to the level of protection afforded endangered species), and that this regulation is found at 50 C.F.R. § 223.203(a). Potential commenters might not understand that there are limits to the prohibition on take for threatened salmonids, i.e., exceptions found under subsection 223.203(b) ("Limits on the prohibitions"), where—so long as hatchery programs meet the criteria outlined in subsections (5) (state) or (6)—the prohibition on take would not apply to these hatchery programs.

Comparing the hatchery programs against these criteria, thus excusing the programs from the ESA's prohibition on take, seems like a "section 4(d) determination," but NOAA has actually broadened this determination in the EA: "The 4(d) determination would affirm that the programs do not jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat."[5] We think considering jeopardy in addition to whether these programs meet the criteria under §223.203(b)(4)-(6) is sound because of the general scientific consensus acknowledging the great risk that hatcheries can pose to wild populations. While we found this regulation cited in tangential documents (state and tribal applications), NOAA never cited to it for the reader, and that falls short of the high quality of information that NEPA requires. For people to understand the scope of this determination and this analysis, the agency, at a minimum, should be explaining this decision much better in the introduction and citing the relevant regulation. When you come out with the EIS (which, as we argue below, is necessary in this case), you need to remedy this deficiency of high quality information with citations to regulation and the law so people who comment can inform themselves about the framework within which they are commenting and look up the laws and regulations for themselves. It would take a couple of paragraphs to a page at most, as demonstrated above. Anything less would procedurally violate NEPA by failing to give the public high-quality information, thus prejudicing members of the public by constructively frustrating meaningful comments.

One issue we have found especially confusing on the website is that NOAA states that it may make "[f]ive ESA Section 4(d) determinations on tribal plans," "ESA Section 4(d) determinations...for four state plans," and "[s]even ESA Section 4(d) Limit 6 determination...on seven joint state-tribal plans." But, the agency never clarified which determinations will be made for which plans. The Final Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination document also does not clarify this. That document states that "The following discussion [in the document] evaluates the criteria in Section 223.203(b)(5) of the 4(d) rule for salmon and steelhead."[6] This suggests that the South Fork Clearwater (Clearwater Hatchery) for B-run steelhead, operated by Idaho Fish and Game (IDFG), would be a limit 5 determination.

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[2] 16 U.S.C. §§ 1538(a)(1)(C) ("Section 9" or "the prohibition on take"), 1532(19).
[3] Endangered Species Act sections 4(d) and section 9 (16 U.S.C. §§ 1533(d), 1538.
[4] 16 U.S.C. § 1533.
[5] EA, Chapter 1, page 1 (pdf p. 11).
[6] Final Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination, p. 2.

But, in the table following this paragraph, it lists the ESA pathway for steelhead as a "limit 6" determination, which is for joint tribal-state plans.[7] IDFG mentions that limit 5 and limit 6 determinations are "functionally equivalent," to limits on tribal plans, considered under 50 C.F.R. § 223.204 (also not cited in the EA), but neither NOAA nor IDFG supports this conclusion with an explanation. Parsing out which hatchery is subject to which determination may have legal implications. Thus, NOAA must clarify the explicit links between which determination it is making for which hatchery. Not disclosing so would violate NEPA's mandate to disclose to the public high-quality information and prejudices us from making informed, meaningful comments. The extent of the prejudice will reveal itself over time if this is not corrected in an EIS.

Whatever 4(d) determinations you are making, common facts and science support making this determination after analysis under an environmental impact statement.[8] Between the nature of what you are deciding, piling 15 programs together shows—and the own gaps in your knowledge reveals—a determination about a complicated subject matter with highly uncertain effects that must be analyzed. Importantly, subpopulations of Snake River steelhead have significantly dropped in size since the last status review of the species, and this lower abundance has not been accounted for in the hatchery proposals or the biological opinion. This means that, despite protections as a threatened species, the current mechanisms are failing the species. Hatcheries are one of the factors pushing steelhead over the edge. Science suggests that some of your regulatory limits promulgated under section 4(d) are part of the problem. For example, there is enough science to suggest that the hatchery programs themselves introduce uncertainty and ultimately undermine species recovery, despite meeting parameters in 50 C.F.R. § 223.203. This uncertainty makes any analysis less than an EIS inappropriate, but the need for detailed environmental review is compounded when one adds the fishery programs, which rely on hatcheries and inflict their own impacts on wild steelhead. Also, when considering your fisheries management plans, NOAA is currently considering a fisheries-management plan for Chinook that will include longer seasons, overlapping with the steelhead season and causing steelhead bycatch when fishing for Chinook. This will add to the fishery impacts, and will represent a cumulative impact of the hatchery management plans.

Environmental assessments cannot legally substitute for environmental impact statements—they exist to answer whether environmental impact statements should follow.

> The environmental assessment is a concise public document which has three defined functions. (1) It briefly provides sufficient evidence and analysis for determining whether to prepare an EIS; (2) it aids an agency's compliance with NEPA when no EIS is necessary, i.e., it helps to identify better alternatives and mitigation measures; and (3) it facilitates preparation of an EIS when one is necessary. *Section 1508.9(a).*[9]

When there are substantial questions as to significance, NOAA must analyze that question in an EIS, as that analysis serves a purpose different from an environmental assessment. The Ninth Circuit has highlighted how the purpose of an EA is distinct from the purpose of an EIS:

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[7] Final Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination, p. 2.
[8] Environmental impact statement = EIS
[9] Council on Environmental Quality, Executive Office of the President (1981). *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*. Memorandum to Agencies.

> [A]n EIS serves different purposes from an EA. An EA simply assesses whether there will be a significant impact on the environment. An EIS weighs any significant negative impacts of the proposed action against the positive objectives of the project. Preparation of an EIS thus ensures that decision-makers know that there is a risk of significant environmental impact and take that impact into consideration. As such, an EIS is more likely to attract the time and attention of both policymakers and the public.

Anderson v. Evans, 314 F.3d 1006, 1023 (9th Cir. 2002). Significant impacts can be adverse, or they can be beneficial. You seem to have tried to take the purpose of an EIS and fit it into an EA by basing alternatives on ones in the Mitchell Act final environmental impact statement.[10] Because the alternatives in the Mitchell Act were in an EIS, the alternatives weighed the negative impacts against the positive objectives.[11] Because of the different purposes of EAs and EISs, subject matter for an EIS doesn't become an EA simply because you've already analyzed it. If an EIS was appropriate for a subject matter the first time and you want to add knowledge (through more recent science or status of the listed species) to those alternatives and focus on a subset of hatcheries that weren't funded by the Mitchell Act, only an EIS can satisfy that objective. The scope of the Mitchell Act was also broader than the more site-specific levels (individual hatcheries) that you are examining here. The Mitchell Act EIS generally compared alternatives across ecological provinces, and not by subbasin, "which can be too detailed a comparison."[12] NOAA is now looking at that subbasin, Snake River Basin hatcheries. Because you are applying the risks from the Mitchell Act FEIS to a more localized set of alternatives, more detail is appropriate for the adverse risks already acknowledged, so an EIS should be done.

EISs are appropriate when there is a *potential* for significant impact. We completely disagree with any suggestion that, in every alternative this EA posited, hatcheries could in no way lead to a potential significant impact. Using steelhead as an example, alternative 1 and alternative 2 cover the same operation of steelhead hatchery programs as have existed. But in alternative 3, you have proposed reduction of hatchery programs by 50 percent. In contrast, under alternative 4, the hatcheries terminate. Basically, through these four alternatives, from maintaining current levels of the programs now to ending the hatcheries all together, what the EA seems to suggest is that none of these alternatives pose a potential for significant impact (positive or negative) to steelhead. This is an absurd conclusion set against a rapidly declining steelhead population.

The Council on Environmental Quality (CEQ) directs how to consider what is significant—it includes long-term and short-term time horizons, and it includes both positive and negative impacts:

> *Significantly* as used in NEPA requires considerations of both context and intensity:
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> (a) *Context.* This means that the significance of an action must be analyzed in several

[10] EA pdf p. 141: "Consequently, this assessment focuses on looking at any changes to those impacts or new information within the project area, particularly (in many cases) the extent to which it modifies the information presented in the Mitchell Act FEIS."
[11] The Mitchell Act Record of Decision identified the "environmentally preferred alternative," but then chose a competing alternative that it adjudged to provide "the best balance." NOAA Mitchell Act ROD pp. 2, 9.
[12] NOAA, Mitchell Act FEIS, Chapter 2, page 4 (pdf. p. 136).

contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) *Intensity*. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

40 C.F.R. § 1508.27.

Finally, NOAA indicates this is a one-time determination with no expiration date. This is an arbitrary way of handling this question, given hatcheries are changing, fish populations are changing, and science is changing. Because these factors change over time, regular reviews are prudent. The limit 5 regulation[13] requires regular evaluations of HGMPs. Thus, anything less than regular 4(d) determinations that hatcheries are not jeopardizing the continued existence of endangered or threatened species, or adversely modify or destroy their critical habitat, would be unlawful under NEPA and the ESA.

Given the determination NOAA has set out to make, and considering the significance factors, an EIS must be completed. We set out the reasons for this below.

I. The factual backdrop of declining steelhead populations

One global comment that impacts all discussions in this comment is a declining wild steelhead population that has reached new lows in the time since you published the other environmental analyses. The issue with this is that NOAA relies on these other environmental analyses, and is missing a discussion about impacts with current wild steelhead numbers. NOAA completed the Mitchell Act FEIS in 2014. NOAA completed the status review for steelhead in 2016, likely using numbers from 2015. NOAA completed the biological opinion for steelhead hatcheries in 2017, likely relying on numbers prior to 2017. And NOAA completed the ESA Recovery Plan for Snake River Spring/Summer Chinook salmon and Snake River steelhead in 2017, also presumably relying on numbers prior to 2017. However, in the past few years, particularly in 2017 and 2018, wild steelhead are returning at all-time lows. This year, abundance is trending similar to numbers reported in 2018.[14] These are the *total* numbers, wild (not hatchery) steelhead are a fraction of this number, and wild (not hatchery) B-run steelhead are an even smaller fraction. None of the environmental analyses upon which NOAA is referencing were based on these numbers, so this is a new existing condition that needs to be considered in light of the adverse impacts that hatcheries have on wild populations.

IDFG has asserted that conditions have improved since the ocean warming between 2014 and 2017 that created an environment less productive for salmon.[15] However, the ocean has absorbed more than 90 percent of the planet's warming between 1971 and 2010,[16] so this event was not unique, and it needs to be a future condition that figures into analyses. Our oceans are warming faster than predicted,[17] so this will absolutely impact the returns from salmon and steelhead.

Additionally, the forthcoming EIS should use numbers in the analysis. Using percentages inappropriately minimalizes a discussion of adverse impacts. Given that real biological populations have substantial probabilities of extinction when their absolute numbers are low, the

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[13] 50 C.F.R. § 223.203(b).
[14] Barker, E. "Steelhead numbers down to a trickle," Lewiston Tribune (Sept 6, 2018); Idaho Fish and Game website, *Steelhead Counts—Bonneville and Lower Granite Dams, available at* https://idfg.idaho.gov/fish/steelhead/dam-counts (last visited Aug. 22, 2019); Barker, R. "As runs dwindle, experts say Idaho's salmon, steelhead 'could be gone in a generation." Idaho Statesman (Feb. 16, 2019).
[15] Barker, R. "As runs dwindle, experts say Idaho's salmon, steelhead 'could be gone in a generation." Idaho Statesman (Feb. 16, 2019).
[16] Zanna et al. 2019. *Global reconstruction of historical ocean heat storage and transport*. Proceedings of the National Academy of Sciences 116(4): 1126-1131.
[17] Harvey, C. "Oceans Are Warming Faster than Predicted." Scientific American (Jan. 11, 2019).

forthcoming EIS must explicitly consider the likelihood that wild steelhead populations will go extinct. Throughout much of the EA, NOAA discusses hatchery impacts in terms of percentages. Absolute abundance matters more, and an EIS must take this into account.

For steelhead, even the biological opinions highlight various viability uncertainties due to a lack of data, few data, or large gaps in data.[18] Because the uncertainty of the species is so high, and EIS should be done.

II. Hatchery programs are detrimental to wild populations, and this potential for a negative impact warrants an environmental impact statement when deciding on a 4(d) determination.

NOAA has recognized the real risks of hatchery programs in the last five-year review for Snake River salmonid species.[19] The status review stated that hatcheries with non-local broodstock operations have negligible to negative effects on the natural population viability parameters: productivity, diversity, abundance, and spatial structure.[20] Non-local broodstock operations that can effectively isolate the hatchery program from wild fish have the negligible effects—so the hatchery fish won't breed with the wild fish. But, there are several broodstock operations that are not careful with that, including operations for the South Fork Clearwater. The five-year review acknowledged there is a problem in Idaho:

> Steelhead programs in the Snake River basin are under ESA review. One important issue is determining where and to what extent unaccounted for hatchery steelhead are interacting with depressed listed populations, particularly those in Idaho. The practice of releasing steelhead into mainstem areas where they are difficult to monitor and manage has been reduced since the last review.[21]

According to the EA, the practice still exists. Because of the impacts of hatcheries, NOAA recommended at the five-year review that, for steelhead, there were four existing hatchery programs that warranted further review: (1) Dworshak National Fish Hatchery; (2) Lolo Creek Hatchery – Clearwater River; (3) North Fork Clearwater Hatchery; and (4) Little Sheep Creek/Imnaha River Hatchery.[22] NOAA would not have made this recommendation if there weren't some potential for significant impact to a species that it recommended stay listed as endangered.

Hatchery programs introduce ecological and genetic risks, discussed below. The agency recognizes these risks.

II.A. Ecological hatchery risks

Large releases of hatchery fish increase ecological risk factors. "Several studies have specifically implicated large numbers or high proportions of hatchery fish as contributing to a

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[18] Nine Snake River Steelhead Hatchery Programs and one Kelt Reconditioning program in Idaho biological opinion, pdf p. 38.
[19] NOAA. 2016. Five-year review of Snake River species, pp. 87-88.
[20] NOAA. 2016. Five-year review of Snake River species, p. 89.
[21] NOAA. 2016. Five-year review of Snake River species, p. 90.
[22] NOAA. 2016. Five-year review of Snake River species, p. 97.

decrease in wild fish productivity, abundance, or survival. Kostow 2009. *Factors that contribute to the ecological risks of salmon and steelhead hatchery programs and some mitigating strategies*, Rev. Fish Biol Fisheries 19:9-31, DOI 10.1007/s11160-008-9087-9

Kostow discusses a historical example of what the cumulative effects of large-scale hatchery programs, habitat loss and degradation, and high harvest rates can wreak, using the Columbia River Basin:

> A specific example of this pattern is the lower Columbia River, which historically produced abundant wild Chinook, coho and chum salmon and steelhead. Extensive releases of hatchery fish, particularly of Chinook and coho, occurred throughout the twentieth century. By the early 1990s, Oregon Department of Fish and Wildlife (ODFW) was releasing about 28–35 million fall Chinook, 8–9 million spring Chinook and 11 million coho annually into the lower Columbia and its major tributary the Willamette River (Kostow 1995). Washington was releasing additional Chinook and Coho salmon in the same area. These releases produced tens of thousands of adult hatchery fish that supported high harvest rates (Wright 1993; Flagg et al. 1995; Good et al. 2005). The hatchery fish that escaped the harvest returned to natural production areas in the lower Columbia River basin that by the 1990s contained no more than a few hundred adult wild fish (Wright 1993, Kostow 1997). By the early 2000s, many wild Chinook and coho salmon populations in the lower Columbia were considered to be extirpated (Good et al. 2005) and the remaining wild fish were listed under the ESA, along with the steelhead and chum populations in the same geographic area. Although the specific mechanisms of hatchery–wild fish interactions were not assessed, the large numbers of hatchery fish released and the high harvest rates in fisheries targeting the hatchery fish were among the factors found to contribute to the poor status of these populations in the reviews leading to the final ESA listing decisions (Flagg et al. 1995; Weitkamp et al. 1995; Myers et al. 1998; Good et al. 2005).[23]

Large hatchery releases negatively impact wild fish survival. The group size of hatchery fish, whose individuals don not disperse as far as wild fish, attract predators. The group-size attraction, compounded with exhibiting behavior not typical of wild fish (“aggressive displays, surface feeding, and failure to seek cover”), increase predation risks: “Wild fish are typically intermingled among the hatchery fish, and so are also consumed at higher than natural rates when the hatchery fish are present and attracting predators (Collis et al. 1995; Nickleson 2003).”[24]

Hatchery fish pressure the environment’s carrying capacity, and highly inflated numbers of hatchery fish will cause density-dependent fish mortality not typically experienced in natural populations. This means that, for more than one offspring to replace a parent, and for populations

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[23] Kostow 2009. Factors that contribute to the ecological risks of salmon and steelhead hatchery programs and some mitigating strategies, Rev. Fish Biol Fisheries 19:9-31, DOI 10.1007/s11160-008-9087-9
[24] Kostow 2009. Factors that contribute to the ecological risks of salmon and steelhead hatchery programs and some mitigating strategies, Rev. Fish Biol Fisheries 19:9-31, DOI 10.1007/s11160-008-9087-9

to recover from events that might lower abundance, the density of parents, eggs, and juveniles, in the environment must be relatively low.[25]

II.B. Genetic hatchery risks—Hatcheries with nonlocal broodstock have a negative impact on wild fish, and the negative impact is potentially significant.

Science finds hatcheries to commonly exert negative genetic effects on wild populations, including lower survival and reproductive fitness.[26]

Hatchery-reared fish negatively impact wild fish populations. This happens because numerically rare wild fish will mate with hatchery fish, and the offspring are genetically predisposed to have low fitness in a wild setting.[27] Studies on segregated broodstocks with a nonlocal origin "indicate very low relative fitness of the hatchery fish."[28] A summary of these studies point to a fish's genetic makeup as a reason why. Scientists think that the mechanism that most likely explains fitness decline is selection imposed by domestication: "Domestication selection has long been known to be a strong evolutionary force intentionally changing the characteristics of captive-reared organisms, and unintentional selection is likely to occur in typical supplementation programs as well." One study has confirmed this, finding that some of the genetics selected for captivity are severely maladaptive in wild environments,[29] and resulting fitness decline in succeeding generations can be rapid.

Researchers studying the genetic effects of domestication have found that hatcheries produce fish that are genetically predisposed to have low fitness in natural stream environments. This lower fitness arises after only a few generations of domestication selection, leading researchers to suggest "repeated use of captive-reared parents to supplement wild populations should be carefully reconsidered."[30] This study was repeated in 2016 by NOAA's own scientists with similar results.[31]

Lower relative fitness from hatchery fish carries over to their wild-born descendants, thus impacting wild fish populations. In a study published by Araki et al, researchers reconstructed a genetic pedigree on steelhead trout and estimated reproductive fitness of wild-born descendants.

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[25] Kostow 2009. Factors that contribute to the ecological risks of salmon and steelhead hatchery programs and some mitigating strategies, Rev. Fish Biol Fisheries 19:9-31, DOI 10.1007/s11160-008-9087-9

[26] Araki et al. 2010. Is hatchery stocking a help or harm? Evidence, limitations and future directions in ecological and genetic surveys. Aquaculture 308:S2-S11.

[27] Relative fitness is "the survival and/or reproductive rate of a genotype (or phenotype) relative to the maximum survival and/or reproductive rate of other genotypes in the population." https://www.radford.edu/~rsheehy/GraphingDemo/fitness1.html. Essentially, this is how many offspring one genotype of an organism leaves behind (in comparison to anther genotype) that make it to the breeding stage. Offspring production can fail for fish that don't hatch or survive their early life states, for fish that don't make it upstream, or for fish that don't mate.

[28] Araki et al. 2008. *Fitness of hatchery-reared salmonids in the wild,* Evolutionary Applications ISSN 1752-4571 (a synthesis).

[29] Christie et al. 2012. *Genetic adaptation to captivity can occur in a single generation.* Proceedings of the National Academy of Science 109(1):238-242. www.pnas.org/cgi/doi/10.1073/pnas.1111073109.

[30] Araki et al 2007 *Genetic Effects of Captive Breeding Cause a Rapid, Cumulative Fitness Decline in the Wild*, Science 318: 100-103.

[31] Ford et al.2016. *Broodstock history strongly influences natural spawning success in hatchery steelhead (Oncorynchus mykiss).* Plos|One, DOI:10.1371/journal.pone.0164801

In comparison to fish with two wild-born parents, wild-born fish with a single hatchery parent have a relative fitness of 87%, while wild-born fish with two hatchery parents have a very low relative fitness of 37%.[32] These data are relevant to the long-term success of *wild-born* salmon. This is particularly concerning when it is clear that more hatchery-born fish are added every year in these systems. The fitness of wild-born fish appears to be in danger, though the cumulative effects are highly uncertain. Regardless, there is a distinct possibility of extinction that needs to be explicitly considered.

Summarizing the science provided, hatcheries have a negative impact on the genetics of wild fish populations. This negative impact can span generations as wild-born fish with hatchery parentage produce offspring with low relative fitness. The cumulative effects of this over generations could absolutely become significant and are amplified in a dwindling wild fish population.

Non-local broodstock are incredibly problematic for subpopulations such as Clearwater steelhead. As discussed above, the numbers of steelhead passing Lower Granite Dam are at all-time low numbers. The wild-born and the wild-born B-run are even smaller fractions of those numbers. Although the primary goal for several steelhead hatcheries, including the South Fork Clearwater program, is supplementation for recreational and tribal fisheries, NOAA claimed—in a footnote, citing a personal communication—that the South Fork Clearwater steelhead program could have "some conservation benefit to natural populations because propagated fish contain what is remaining of the genetic material from the North Fork population, which has been extirpated."[33] We contest the notion that there would be any foreseeable conservation benefit.

The South Fork Clearwater program is not designed for conservation, and NOAA should consider it to have no conservation benefit. It is one of several programs that are not an integrated program meant to aid the survival of the species—it exists to mitigate fish losses from the dams so that a fishery may also exist.[34] Even accepting the premise that this non-local broodstock has genetic remains from the extirpated North Fork Clearwater population, it has also had generations of domestication selection (described above) at the hands of humans—this stock has been repeatedly propagated and reared at Dworshak before released as juveniles. For this reason, even though the broodstock might have a minor genetic legacy of its ancestry (the extent of which was never described in the EA except anecdotally) from a neighboring basin, artifacts of domestication selection cannot be ignored. Minimally, releasing steelhead that are the result of domestication selection into the same streams as wild steelhead is a potential for significant impact to genetic fitness. Also, perhaps we should just accept that we, as a species, have extirpated the North Fork population with Dworshak Dam, and we should work on trying to save the wild populations that remain. Continuing to use the sliver of genetic remnants from one extirpated species to propagate millions of hatchery-born fish will threaten to extirpate a second subpopulation of wild species. Calling the manipulative use of genetic remains "conservation" when the very use of those remains will eliminate more species is perverse logic and has no place in a section 4(d) determination. There is no conservation benefit to using non-local broodstock.

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[32] Araki et al. 2009. *Carry-over effect of captive breeding reduces reproductive fitness of wild-born descendants in the wild*, Biol. Letters 5: 621-624, doi:10.1098/rsbl.2009.0315
[33] EA, Chapter 2, page 18 (pdf p. 34).
[34] EA, Chapter 2, pp. 9, 13-14 (pdf pp. 26, 30).

All hatcheries with non-local broodstock risk significant impacts to rare populations of wild fish. For this reason, an EIS is minimally necessary. NOAA must figure out what kind of genetic impacts have thus far happened and how that might affect wild salmon in the short term and long term, given current population trends and what science has told us about carryover effects of reduced genetic fitness.

II.B.1. *As applied to steelhead*

In the last status review, the Northwest Fisheries Science Center updated risk assessments for major population groups of steelhead in Clearwater River (Major Population Group). The Center renewed the Lower Clearwater steelhead population at a "moderate risk" for abundance and productivity. The Center issued a "high risk" rating on abundance and productivity for Lolo Creek and South Fork Clearwater, where "[t]here are relatively large and consistent hatchery releases into the area."[35] The Center stated,

> The PBT results for the initial year of adult hatchery returns (2012) indicate substantial numbers of hatchery fish are available to spawn after accounting for known removals. It is not possible at this time to generate productivity estimates for this grouping since estimates of the total number of spawners including hatchery fish are not available. For this review, the provisional high risk A/P ratings applied in prior reviews will be carried forward.[36]

In the updated risk assessments in NOAA's five-year review, "the Clearwater [Major Population Group] does not meet the [ICTRT] criteria for a viable [major population group].[37] Have productivity estimates become available since then?

In the Final Steelhead Hatcheries PEPD, the authors admitted that "interbreeding and competition with hatchery fish that outnumber natural-origin fish" are one of the reasons that Snake River Steelhead DPS remain threatened, and that "[h]atchery effects are likely more pronounced when the program occurs on a listed population."[38] Then the PEPD listed various streams where the fraction of hatchery fish exceeded 50 percent: Tucannon, Asotin Creek, Lolo Creek, South Fork Clearwater, Little Salmon River, Pahsimeroi, Lemhi, East Fork Salmon, and Upper Salmon River. Because, as outlined above, a smaller fraction of hatchery fish could pose a significant effect, having the majority of fish in the area be the hatchery fish is going to significantly increase that threat.

The downturn in wild steelhead runs raise the question of whether there will be wild steelhead runs in Idaho in the near future, which requires determining whether steelhead runs are self-sustaining. The EA fails to do this. Given that the B-steelhead run is a biological population, answering whether the wild runs are self-sustaining is answering whether their numbers are in decline or not over time. Given the data from the past few runs (discussed above) and ocean conditions from global warming, it seems likely that this population will continue its decline.

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[35] Northwest Fisheries Science Center. 2015. *Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Pacific Northwest*, p. 116.
[36] Northwest Fisheries Science Center. 2015. *Status Review Update for Pacific Salmon and Steelhead Listed Under the Endangered Species Act: Pacific Northwest*, p. 116.
[37] NOAA Five-year status review for Snake River salmonids, p. 27
[38] Idaho Steelhead Proposed Evaluation Pending Determination, p. 6

First, a very small number of B steelhead have been counted in the last several years. This year there are only 5,600 B-run steelhead expected. From that number, 4,130 are forecast to be clipped hatchery fish, 770 unclipped hatchery fish, and only 665 are expected to be wild.[39] While small population per se does not guarantee it will decline, there are several important reasons why this is likely. Plans for the release of hatchery fish will continue to cause hatchery steelhead to dramatically outnumber B steelhead fish. These two types of fish are not identical -- hatchery steelhead are genetically divergent because of artificial selection, which causes offspring that survive poorly in natural stream environments.[40] Hatchery fish that mate with wild fish will pass along the genetic divergence to their offspring. Specifically, hybrid offspring are much less fit than B steelhead born of two wild parents and raised in natura.[41] Natural-born steelhead therefore face a one-two punch given their rarity: they will very likely mate with hatchery fish and then produce offspring that are poorly suited to survive.

There is no doubt that B steelhead populations are small and have been increasingly so. The hatchery plans can possibly further endanger B steelhead and potentially drive them to extinction. The agency can make predictions in an EIS given the tremendous amount of data gathered that are directly relevant to the size of populations and the survival and reproduction of fish. A simple yet informative starting place for modeling would use these data to forecast steelhead populations and their likely numbers of offspring given reasonable assumptions on their likelihood of mating with hatchery fish. In addition, predictions on population abundance should also incorporate environmental and demographic sources of randomness on the population size of B steelhead. Importantly, these models must address the chances that the B steelhead population is lost because of extinction. For these reasons, an EIS is warranted and necessary.

III. The uncertainty and controversy associated with straying

The EA relies on a plan where there is no more than 5% straying from hatchery-origin steelhead,[42] but there is no information on whether this has been achieved up until now. This is a relevant point to examine because the proposed plan continues the status quo. The EA inappropriately and broadly underestimates the straying issue with steelhead, so there is no rational support for the conclusion that there would be no significant potential impact to steelhead.

Strays from large donor populations can numerically overwhelm native fish in small recipient populations, even at low (~1%) stray rates.[43] Some scientists consider strays from large donor hatchery populations to be a significant threat to wild populations.[44] The *size* of the

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[39] Barker, E. (Jul. 26, 2019), "Idaho steelhead forecast remains poor." The Spokesman Review.
[40] *See* Christie et al. 2012. *Genetic adaptation to captivity can occur in a single generation*. Proceedings in the National Academy of Sciences, Vol 109(1): 238-242.
[41] Araki et al. 2009. *Carry-over effect of captive breeding reduces reproductive fitness of wild-born descendants in the wild.* Biology letters 5:621-624, doi:10.1098/rsbl.2009.0315.
[42] EA Chap 2, pp. 18, 20.
[43] Keffer, M.L. & Caudill, C.C. 2012. *A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations*, Technical Report 2012-6, prepared for the U.S. Army Corps of Engineers (Walla Walla District), p. v.
[44] Keffer, M.L. & Caudill, C.C. 2012. *A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations*, Technical Report 2012-6, prepared for the U.S. Army Corps of Engineers (Walla Walla District), p. 5

recipient populations is important.[45] "When the donor population contributes strays at higher rates or the donor population size increases, strays can rapidly become a majority in the recipient population []."[46] These impacts can be reduced if the recipient population abundance increases,[47] but that is not the case for B-run steelhead, as discussed above.

There is considerable straying and more unknowns associated with straying in the South Fork of the Clearwater and the Upper Salmon River. The biological opinion disclosed a percentage for strays detected from hatchery programs into the South Fork Clearwater and the Upper Salmon River programs to be 23.7% and 26.7%, respectively.[48] The biological opinion could not identify the origin of these strays. Other studies have found the percentage of hatchery steelhead that stray to be greater than 5 percent.[49]

These numbers are significantly higher than the 5 percent goals of straying in the draft assessment. The table italicized strays where the release sites were unknown, but we found the table unclear as to whether the straying was into a subbasin from one of the other six listed or the straying was within that subbasin. If the straying is from one subbasin, the 5% goal is untenable. If straying integrates hatchery salmon from a diversity of subbasins, this highlights a situation where significant impacts could result. Either way, this should be analyzed in an EIS.

Additionally, you conclude that "Although the SF Clearwater and Upper Salmon River areas have a higher estimated stray pHOS, the SF Clearwater population and the Upper Salmon River population are both designated as maintained in the current recovery scenario, and are close to the recommendation provided by the HSRG for maintained populations."[50] What does the biological opinion mean by stating that the populations are designated as "maintained"? Are you counting abundance without counting the origin of that abundance, thus implying that the outstanding hatchery-origin of that proportion is acceptable? Are you suggesting that the current abundance of wild fish is at an acceptable number? This statement is unclear and we would appreciate an explanation with sound logic.

The biological opinion also inappropriately minimizes potential impacts by stating "This does not necessarily mean that these fish spawned, and is likely an overestimate of pHOS [proportion of hatchery fish on spawning grounds]."[51] There is no citation to any science that would indicate how much of an "overestimate" this might be, or discusses the expected number of hatchery fish to spawn and the wild number in that same stream. The average found in the biological opinion, which the authors admit that they cannot resolve to the population level, is

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[45] Keffer, M.L. & Caudill, C.C. 2012. *A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations*, Technical Report 2012-6, prepared for the U.S. Army Corps of Engineers (Walla Walla District), p. 6

[46] Keffer, M.L. & Caudill, C.C. 2012. *A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations*, Technical Report 2012-6, prepared for the U.S. Army Corps of Engineers (Walla Walla District), p. 6

[47] Keffer, M.L. & Caudill, C.C. 2012. *A Review of Adult Salmon and Steelhead Straying with an Emphasis on Columbia River Populations*, Technical Report 2012-6, prepared for the U.S. Army Corps of Engineers (Walla Walla District), p. 6

[48] Nine Snake River Steelhead Hatchery Programs and One Kelt Reconditioning Program in Idaho, pdf p. 57.

[49] Schroeder et al 2001. Origin and Straying of Hatchery Winter Steelhead in Oregon Coastal Rivers, Transactions of the American Fisheries Society, 130:3, 431-441, DOI: 10.1577/1548-8659(2001)130<0431:OASOHW>2.0.CO;2

[50] Nine Snake River Steelhead Hatchery Programs and One Kelt Reconditioning Program in Idaho, pdf p. 57.

[51] Nine Snake River Steelhead Hatchery Programs and One Kelt Reconditioning Program in Idaho, pdf p. 57.

that hatchery fish in the South Fork Clearwater comprise about 37 percent of the fish detected, and for the Upper Salmon River that percentage was even higher (over half).

One thing the EA seems to be missing is a discussion of hatchery fish that *do not* stray, or if NOAA counts straying and non-straying hatchery-origin fish together when it discusses "percent hatchery-origin fish on the spawning grounds" (pHOS). There is uncertainty with where non-straying hatchery-origin fish are returning and to what frequency with which they are spawning with the wild population. Technical memos published for NOAA explain that hatchery-origin fish will home, or return to, either the place where they were born and reared or where they were released.[52] In the EA, on pages 2-4 and 2-6 (pdf pp. 20, 22), there are release sites in locations distinguishable from the hatcheries. For example, in the case of the Clearwater River, while steelhead are reared at the Clearwater Fish Hatchery steelhead could be released in Meadow Creek or Newsome Creek.[53] If hatchery steelhead home to either where they were reared or where they were released, these steelhead would return to Newsome Creek or Meadow Creek without NOAA accounting them as straying, and they could spawn there. The hatchery-born steelhead pose the genetic risks already described. So, NOAA must analyze this issue quantitatively. According to the biological opinion on steelhead, a total of 2.1 million smolts are released at four locations in the Clearwater Basin: 1.2 million directly from Dworshak Hatchery; 200,000 from Lolo Creek; 300,000 to Clear Creek, and 400,000 in the South Fork of the Clearwater.[54] What are the numbers that return to these creeks annually and what are the numbers of wild fish that return to these creeks annually? What is the likelihood that the hatchery mate with the natural? Have there been any genetic testing in these streams to determine the genetic parentage? If not, why not?

In addition to straying hatchery steelhead in streams and non-straying hatchery steelhead in streams, you need to consider the declining number of wild steelhead. Because this biological opinion was released in 2017, how have the recent steelhead runs impacted these calculations, specifically the populations "designated as maintained in the current recovery scenario"? Because of straying hatchery fish, because there are hatchery fish that do not "stray" in returning to the streams they were released from, because there are gaps in information as to what numbers of hatchery fish are spawning naturally, and because wild steelhead returns are an even smaller fraction of declining runs, the agency must analyze its section 4(d) determination in an environmental impact statement.

IV. The potential environmental impacts of limit 5 determinations

IV.A. References to HGMPs

The Idaho Steelhead Proposed Evaluation Pending Determination (Idaho Steelhead PEPD) refers to hatchery management plans, so the document itself is not an HGMP. But, not all HGMPs are listed on this webpage. For example, in the Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination, the applicants stated that "performance indicators [] would be used to gauge compliance with each objective" and "are described in section 1.10 in each

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[52] Quinn, T. 1995. *Homing, Straying, and Colonization*. NOAA Tech Memo NMFS NWFSC-30: Genetic Effects of Straying of Non-Native Hatchery Fish into Natural Populations.
[53] EA pdf pp. 20, 33-34.
[54] Nine Snake River Steelhead Hatchery Programs and One Kelt Reconditioning Program in Idaho, Biological Opinion, pdf p. 48.

HGMP."[55] But, on your website, there is no HGMP for the South Fork Clearwater steelhead hatchery program.[56] In fact, there are only four hatchery and genetics management plans out fifteen in the EA, so there are no performance indicators for the other programs. An EIS should weigh the risks of a hatchery with no performance indicators against the benefits of off-setting fish numbers, especially amidst declining total populations for steelhead and the population trends for other salmonids.

The HGMP for the South Fork Clearwater hatchery program was not on the website where NOAA posted materials for the 4(d) determination for the Snake River basin hatchery programs.[57] If there was an HGMP for the South Fork Clearwater hatchery program, by failing to put it on the website where you have located the biological opinions and the other hatchery management plans, the agency has not disclosed the highest quality information to the public, which is a procedural NEPA violation and has prejudiced us from considering that hatchery plan and its potential impacts on listed species. If you have not listed a program like the South Fork Clearwater hatchery program because it propagates a non-local broodstock that is not listed and not subject to limit (5) requirements, this program is also not subject to exemptions from the prohibitions on take, and there needs to be an in-depth analysis as to whether running this program jeopardizes the listed species, which science suggests it does.

IV.A. Hatchery criteria (Limit (5)(i)(A))

In the Idaho steelhead proposed evaluation pending determination, the authors list the general goals of the program, which is to first mitigate lost natural-origin fish production, and secondly aid in recovery of the ESA species.[58] There are several hatchery programs *only* exist to mitigate lost natural-origin fish production. Because of the science on hatcheries and non-local broodstock, NOAA must evaluate jeopardy to the species with the science on genetic impacts above. We've described problems that, minimally, render impacts uncertain or controversial, so more analysis should be done through an EIS to ascertain if you can conclude that it won't threaten the continued existence of steelhead.

IV.B. Hatchery criteria (Limit (5)(i)(I))

Gleaning what we could from the EA, the South Fork Clearwater hatchery program does not provide for evaluating monitoring data. Limit 5 criteria require this, yet there is no reported budget for the South Fork Clearwater Steelhead program.[59] In fact, four of these programs NOAA is evaluating do not appear to have budgets for monitoring or evaluation.[60] If there is one thing Friends of the Clearwater has learned from the United States Forest Service about monitoring, it is that if there is no funding to monitor, monitoring will not occur. And that

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[55] Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination, p. 5.
[56] NOAA website, Snake Basin Hatchery Plans https://www.westcoast.fisheries.noaa.gov/hatcheries/SRHatcheries/snake16_hatch_rvw.html
[57] NOAA website, Snake River Hatcheries, *available at* https://www.westcoast.fisheries.noaa.gov/hatcheries/SRHatcheries/snake16_hatch_rvw.html
[58] Idaho Steelhead Hatcheries Proposed Evaluation Pending Determination, p. 4. Although the document cross-references section 1.7 and states the general goals are described there, these are only two programs and not the remaining hatcheries under this application.
[59] EA, Chapter 3, page 48.
[60] EA, Chapter 3, page 48.

becomes a huge uncertainty in any determination about impacts to listed species. For this reason, NOAA should prepare an EIS.

V. Unclipped fish

"Masking occurs when unmarked hatchery-origin salmon and/or their offspring are included when making population estimates (e.g., abundance, productivity) of natural-origin fish because hatchery-origin salmon cannot be distinguished from the natural-origin fish."[61] But then, the EA goes onto claim that "[m]ost smolts from...steelhead...hatchery programs would continue to be marked...therefore...masking is unlikely to occur under any alternative for...steelhead...."[62] However, recent projections from IDFG illustrate that "most," is a percentage and still problematic. In a recent news article, IDFG expected "770 unclipped hatchery fish" and "665 wild fish" to return in 2019.[63] Over half of the fish expected back are masked. Masking is likely to occur, as some fish hatcheries do not mark all fish and this appears to be a practice in Idaho.[64] Unclipped or otherwise unmarked hatchery fish are problematic because it underestimates officials' estimation of the percent of hatchery-origin fish on the spawning grounds. For example, steelhead fishermen are only allowed to keep fish with adipose fins clipped, so they would presumably return unclipped hatchery fish to the stream, guaranteeing these fish will continue to head towards spawning grounds. Why is this practice happening?

For these reasons, the agency must discuss the impacts from this practice in an EIS, such as the uncertainty it creates in reliable information about wild runs.

VI. Cumulative effects

The hatcheries enable state-based recreational fisheries—the fisheries cannot exist without the hatcheries. Even catch-and-release fishing will inflict mortality on wild B-run steelhead, which are expected only in the hundreds this year. There aren't numbers on the B-run steelhead, but IDFG reports an *estimated* average mortality at 801 fish. How reliable is this estimation given the science on catch-and-release mortality and is that impacted by the fact IDFG does not require single hooks or fishermen to keep wild steelhead in the water at all times?[65] Upon what science is this estimation based? While that includes the A-run steelhead, note that it is higher than the number of B-run steelhead (665) expected to return this year. For these reasons, the cumulative effects have a degree of highly controversial and uncertain impacts that must be analyzed in an EIS.

Additionally, IDFG has approved a new fall chinook season. Chinook fishermen with their bait will overlap with steelhead fishing this year. Steelhead will become bycatch to another fishing season, raising the estimated mortality in a declining population. While the steelhead bag and possession limits have been reduced to one per day, three in possession, and no steelhead 28 inches or longer on the Clearwater or Snake Rivers,[66] the new fall Chinook season will increase

[61] EA Chapter 3, p. 19 (pdf p. 66).
[62] EA, pdf p. 112.
[63] Barker, E. (Jul 26, 2019). "Idaho steelhead forecast remains poor." The Spokesman Review
[64] Barker, E. (Jul 26, 2019). "Idaho steelhead forecast remains poor." The Spokesman Review
[65] Please see FOC's December 2018 FMEP comments for a cumulative effects discussion on this point and the science that supports those comments, all included in this submission.
[66] IDFG website, Steelhead fishing rules, *available at* https://idfg.idaho.gov/fish/steelhead/rules.

the frequency of fishing when steelhead are present. The Chinook fall season allows six fish per day; while there is a possession limit of eighteen adult fall Chinook salmon, there is not a season limit because anglers are allowed to purchase an additional permit.[67] Steelhead bycatch will significantly increase, and so will the mortality from being caught and released as highlighted by Friends of the Clearwater's FMEP comments and science cited in the discussion about catch-and-release fishing.[68] Given the greater proportion of wild steelhead returns in comparison to the hatchery returns, this new fishing season could have a skewed impact to the wild steelhead, thus reducing their abundance to a level where harm to the diversity from hatcheries will have a bigger impact. Currently, the impact is very uncertain, and NOAA would have at least a minimal amount of information if it prepares an environmental impact statement this fall. Additionally, this extra impact was not considered by the hatchery applications and not by the biological opinion. It is imperative this potential impact is considered here. For these reasons, hatchery operations should minimally be addressed in an EIS.

VII. Conclusion

There are tremendous amounts of uncertainty and controversy associated with hatchery programs. Because of the uncertainty, because of the scientific controversy, and because of the cumulative effects, NOAA must prepare an EIS that addresses the best science and the most recent fish numbers to determine whether there will be an impact that could threaten steelhead. This comment highlights the specific issues with steelhead, but the issues we describe generally should be abstracted and asked of the other salmonid species in the Snake River Basin in accordance with NOAA's reasoning for combining these analyses together.

We sincerely hope to see a forthcoming EIS on these hatchery programs and a hard look into their impacts for this section 4(d) determination.

Sincerely,

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[67] IDFG 2019. Idaho Fall Chinook Salmon Seasons and Rules.
[68] Included with this comment.

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ABBREVIATIONS

CEQ =	Council on Environmental Quality
C.F.R. =	Code of Federal Regulations
EA =	Environmental Assessment
EIS =	Environmental Impact Statement
FEIS =	Final Environmental Impact Statement
ESA =	Endangered Species Act
HGMP =	Hatchery Genetic Management Plan
IDFG =	Idaho Fish and Game
NEPA =	National Environmental Policy Act
NOAA =	National Oceanic Atmospheric Administration
PEPD =	Proposed Evaluation Pending Determination
pHOS =	Proportion of hatchery fish on spawning grounds
SF =	South Fork