From:	Jake Crawford
To:	Wr401program; lower_klamath_project_license@swrcb18.waterboards.ca.gov
Cc:	Mark Sherwood; Conrad P. Gowell; Kurt Beardslee; Jamie Glasgow; Hans Cole; Charles Gehr; Stanford, Jack; Matt Stoecker; bruce@worldsalmonforum.org; Amy J. Bricker
Subject:	NFS Group Comments on Lower Klamath Project License Surrender State Clearinghouse No. 2016122047
Date:	Tuesday, February 26, 2019 10:09:04 AM
Attachments:	Native Fish Society Group Comments on Draft Environmental Impact Report for Lower Klamath Project.pdf 1091244_2.pdf Final - NFS Group Comments for Draft Water Quality Certification - Lower Klamath Project No. 14803.pdf

Dear Ms. Michelle Siebal,

Please see the following three attachments with comments concerning the Lower Klamath Project License Surrender No. 2016122047. Thank you for the opportunity to submit the following comments.

1. Native Fish Society Group Comments on Draft Environmental Impact Report for the Lower Klamath Project License Surrender No. 2016122047. These comments are submitted in support of the below document.

2. Shute, Mihaly, & Weinberger, LLP comments representing Native Fish Society on the Draft Environmental Impact Report for the Lower Klamath Project License Surrender (State Clearinghouse No. 201622047).

3. Group Comments previously submitted during the project scoping dated July 23, 2018.

Finally, supporting literature for the referenced documents are included in this dropbox folder, and we will mail a thumb-drive of the supporting materials to the State Water Resources Control Board office.

Please confirm receipt of this email, and contact me directly with any questions or further discussion.

Respectfully,
Jake

JAKE CRAWFORD
River Steward Program Director | Native Fish Society
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Native Fish Society Group Comments on Draft Environmental Impact Report for The Lower Klamath Project License Surrender No. 2016122047

February 26, 2018

To: Ms. Michelle Siebal
State Water Resources Control Board
Division of Water Rights – Water Quality Certification Program
P.O. Box 2000
Sacramento, California 95812-2000
WR401Program@waterboards.ca.gov

From: Jake Crawford, River Steward Program Director, Native Fish Society
Conrad Gowell, Fellowship Program Director, Native Fish Society
Mark Sherwood, Executive Director, Native Fish Society
Kurt Beardslee, Executive Director, Wild Fish Conservancy
Jamie Glasgow, Science and Research Director, Wild Fish Conservancy
Yvon Chouinard, Owner, Patagonia Inc.
Hans Cole, Director of Environmental Campaigns and Advocacy, Patagonia Inc.
Charles Gehr, Destination Manager, Fly Water Travel
Jack Stanford, Professor Emeritus, Flathead Biological Station, University of Montana
Matt Stoecker, Principal Biologist, Stoecker Ecological
Bruce McNae, Chairman and Founder, World Salmon Forum

Re: NFS Group Comments on Draft Environmental Impact Report for the Lower Klamath Project License Surrender (State Clearinghouse No. 2016122047)

Dear Ms. Siebal,

Thank you for the opportunity to provide comments on the Draft Environmental Impact Report for the Lower Klamath License Surrender Project ("Project").

We are submitting the following comments that fully support the proposed decommissioning of all four Lower Klamath Project dams and the license surrender, which will improve the biological conditions in the Klamath watershed to benefit sensitive and threatened wild, native fish species, as well as the human and environmental communities who depend on the health of these iconic fish species. Our coalition of scientists, businesses, and conservation groups stress support for decommissioning the four Lower Klamath Dams (Iron Gate, Copco 1 & 2, and J.C. Boyle). Decommissioning all four dams is critical to the recovery and long-term protection of these iconic fish species that provide important subsistence for tribal fisheries, economies for commercial and sport fishing communities along the California and Oregon coast, and sustains the many plants and animals dependent on the return of marine nutrients that contribute to overall watershed health.

Our concerns are centered on the significant environmental impacts that would result from the Project's proposed hatchery operations, and the lack of description for how the proposed hatchery operations would contribute to the recovery of the watershed's imperiled fish species. As noted in the DEIR No Hatchery Alternative, the proposed hatchery operations post-dam decommissioning would be detrimental to imperiled Chinook and recovering coho populations and could jeopardize their ability to respond to the benefits of dam decommissioning. As stated in the DEIR, "In the long term, removal of the Lower Klamath Project dams under the No Hatchery Alternative would increase habitat availability, restore a more natural flow regime and seasonal variation in water temperature, improve water quality, and reduce the likelihood of fish disease and algal toxins" which will be beneficial to fall-run Chinook, spring-run Chinook, and coho salmon in the Klamath basin (see DEIR 4-301-324).

Under the No Hatchery Alternative, ceasing hatchery operations along with decommissioning all four Lower Klamath Dams is the superior environmental alternative that will contribute to the long-term restoration of wild salmon and steelhead that are able to benefit from the newly accessible habitat and improved river conditions without the competition from hatchery releases. Importantly, the No Hatchery Alternative is feasible and environmentally superior to the proposed Project, and meets all the Project objectives.

In light of these and the following concerns, we offer our support of the attached comments submitted by SHUTE, MIHALY & WEINBERGER LLP represented by the Native Fish Society, and urge the State Board to consider and adopt the No Hatchery Alternative. Together, we have a keen interest in the certification and decommissioning of the Project, and our collective organizations, members, partners, and clients have been deeply involved in past and ongoing wild salmon and watershed restoration projects in California, Oregon, and Washington.

Native Fish Society is a 501(c)3 conservation non-profit, dedicated to utilizing the best available science to advocate for the protection and recovery of wild, native fish and promote the stewardship of the habitats that sustain them. NFS has 3,300 members and supporters and 89 River Stewards that help safeguard wild fish in their homewaters across the Pacific Northwest. NFS has five River Stewards that live, work, and recreate in the Klamath watershed in both California and Oregon. Furthermore, NFS River Stewards, Staff, and Supporters live, work, and recreate in the Klamath basin who are interested in the recovery of threatened and sensitive populations of wild, native fish.

Wild Fish Conservancy is a 501(c)3 non-profit that is dedicated to the recovery and conservation of the region's wild fish ecosystems. Through science, education, and advocacy, WFC promotes technically and socially responsible habitat, hatchery, and harvest management to better sustain the region's wild-fish heritage.

Patagonia is an outdoor clothing and gear company dedicated to using business to inspire and implement solutions to the environmental crisis. This includes a 40-year history supporting grassroots campaigns and local groups working to remove dams, restore habitat and protect wild rivers and wild fish.

Fly Water Travel is a team of fishing and travel experts exclusively dedicated to arranging trips to the world's finest fishing destinations. Fly Water supports fishing businesses in the Klamath basin and clients who travel to the Klamath watershed to experience healthy runs of wild, native fish and the clean water necessary for their survival.

Jack Stanford is a Professor Emeritus at the Flathead Lake Biological Station with the University of Montana, where for over 45 years his research focused on the ecology of Pacific Rim salmon rivers.

Stoecker Ecological is a biological consulting firm that specializes in salmon and steelhead restoration across the West Coast.

World Salmon Forum is bringing together a coalition of scientists, advocates, and foundations dedicated to sustaining wild salmon in response to the dramatic declines in Atlantic and Pacific wild salmon populations facing the imminent risk of extinction.

In conclusion, we submit our comments in support for the Lower Klamath Project decommissioning and license surrender, but remain concerned about the environmental impacts of the proposed Project's hatchery operations at Iron Gate and Fall Creek. We offer our support for the comments submitted by SHUTE, MIHALY, & WEINBERG, LLC represented by Native Fish Society, and urge the State Water Board to consider and adopt the No Hatchery Alternative.

For any follow up, please contact Jake Crawford, Native Fish Society by phone at 503-344-4218 or email: jake@nativefishsociety.org

Respectfully Submitted,

Jake Crawford, River Steward Program Director, Native Fish Society

Conrad Gowell, Fellowship Program Director, Native Fish Society

Mark Sherwood, Executive Director, Native Fish Society

Kurt Beardslee, Executive Director, Wild Fish Conservancy

Yvon Chouinard, Owner, Patagonia Inc.

Hans Cole, Director of Environmental Campaigns and Advocacy, Patagonia Inc.

Charles Gehr, Destination Manager, Fly Water Travel

Jack Stanford, Professor Emeritus, Flathead Lake Biological Station, University of Montana

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February 26, 2019

Via Electronic Mail

Ms. Michelle Siebal
State Water Resources Control Board
Division of Water Rights – Water Quality
Certification Program
P.O. Box 2000
Sacramento, California 95812-2000
WR401Program@waterboards.ca.gov

Re: Comments on Draft Environmental Impact Report for the Lower Klamath Project License Surrender (State Clearinghouse No. 2016122047)

Dear Ms. Siebal:

This firm represents the Native Fish Society on matters relating to the proposed Lower Klamath License Surrender Project ("Project"). On behalf of our client, we have reviewed the Draft Environmental Impact Report ("DEIR") and respectfully submit these comments to help ensure that agency decision-makers fully comply with the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 *et seq.*, and the CEQA Guidelines, California Code of Regulations, Title 14, § 15000 *et seq.* ("Guidelines"). This letter follows a comment letter dated July 23, 2018 submitted by the Native Fish Society together with a coalition of scientists, conservation groups, and interested business entities on the Project scoping document. This letter incorporates those July 23, 2018 comments as if fully set forth herein, as well as the references cited therein.

As discussed in those prior comments, the Native Fish Society supports the proposed decommissioning and license surrender, which will improve the biological conditions in the Klamath watershed to benefit sensitive and threatened wild, native fish species. However, it remains concerned about the significant environmental impacts that would result from the Project's proposed hatchery operations and seeks to ensure that those impacts are eliminated or mitigated to the extent feasible, as required by CEQA.

We are pleased to see that the State Water Resources Control Board ("State Board") has taken our client's prior comments into consideration such that the DEIR reveals many of the environmental impacts of the proposed hatchery operations and also considers a "No Hatchery Alternative." However, the DEIR should be corrected and/or augmented to reflect important information regarding hatchery operations, as set forth below. But even based on the information the DEIR currently reveals, it is clear that the proposed Project's hatchery operations would result in significant impacts that can and should be avoided by eliminating those hatchery operations. The No Hatchery Alternative is clearly feasible and environmentally superior to the proposed Project, and meets all the Project objectives. Therefore, the Native Fish Society urges the State Board to consider and adopt the No Hatchery Alternative.

I. The DEIR's Project Description Lacks Necessary Detail Regarding the Project's Hatchery Operations.

CEQA's most fundamental requirement is that an EIR contain an accurate, complete, and consistent project description. *See County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185; *see also* CEQA Guidelines § 15124. Moreover, CEQA defines a "project" as "the whole of an action." CEQA Guidelines § 15378. As explained in *McQueen v. Board of Directors of the Midpeninsula Regional Open Space District* (1988) 202 Cal.App.3d 1136, "'[p]roject' is given a broad interpretation in order to maximize protection of the environment." *Id.* at 1143. As the Supreme Court has explained, this rule ensures "that environmental considerations do not become submerged by chopping a large project into many little ones—each with a potential impact on the environment—which cumulatively may have disastrous consequences." *Bozung v. Local Agency Formation Comm.* (1975) 13 Cal.3d 263, 283-84. Without a complete and consistent project description, an agency and the public cannot be assured that all of a project's environmental impacts have been revealed and mitigated.

While the DEIR provides some information regarding proposed hatchery operations, the information is incomplete and at times confusing. To begin, it is unclear the role the hatchery operations are playing with respect to the decommissioning Project. The DEIR reveals that the hatchery operations were initially incorporated as mitigation for dam's blockage of fish passage and habitat. DEIR at 3-247. While hatchery operations may have been adopted for such a mitigation purpose while the dams were in place, those purposes no longer exist when the dams are removed and, as the DEIR recognizes, the hatchery operations can work at cross-purposes to re-establishing a long-term viable native fish population. *See, e.g.*, DEIR at 4-304, 4-305 ("Negative hatchery effects due to competition, leading to displacement and lower growth, are well documented."), 4-307 ("[H]atchery returning adults can have substantial detrimental effects on native populations. As such, a reduction in hatchery returns … would be a benefit for fall-run Chinook salmon over the long term.”). Thus, the hatchery operations do not appear to meet any of the current Project objectives, and in fact would likely hinder most of those objectives, which are to:

1. Improve the long-term water quality conditions associated with the Lower Klamath Project in the California reaches of the Klamath River, including water quality impairments due to Microcystis aeruginosa and associated toxins, water temperature, and levels of biostimulatory nutrients.

2. Advance the long-term restoration of the natural fish populations in the Klamath Basin, with particular emphasis on restoring the salmonid fisheries used for subsistence, commerce, tribal cultural purposes, and recreation.

3. Restore volitional anadromous fish passage in the Klamath Basin to viable habitat currently made inaccessible by the Lower Klamath Project dams.

4. Ameliorate conditions underlying high disease rates among Klamath River salmonids.

DEIR at 2-1.

The DEIR alludes to the hatchery operations as on-going mitigation, but largely addresses them as part of the proposed Project. The DEIR should clarify whether hatchery operations are intended as on-going mitigation and, if so, which Project impacts the hatchery operations are intended to mitigate. Because, as discussed further below, hatchery operations result in potentially significant impacts in many areas including water quality, aquatic resources, and tribal cultural resources, they are not appropriate mitigation. Alternatively, if the hatchery operations are considered part of the proposed Project, the DEIR should clarify which Project purpose or objective they fulfill, as the record shows hatcheries do not further any of the listed Project objectives.

Furthermore, the DEIR lacks necessary detail regarding the hatchery operations themselves. For example, the DEIR states, “[i]t is currently unclear whether the Iron Gate Hatchery facility would be decommissioned in place, demolished, or partly or fully repurposed after the eight-year operational period.” DEIR at 2-78. The same uncertainty is identified for the facilities at the Fall Creek Hatchery. DEIR at 2-82. Each of these potential outcomes would result in differing and potentially significant environmental impacts. Therefore, the DEIR should be clear as to what will happen to the hatchery facilities at the end of the eight year period, and what the decommissioning, demolition, or repurposing would entail. Given that the hatchery operations are proposed to continue only for eight years after decommissioning (DEIR at 2-77 to 2-78), there is no reason that the ultimate outcome could not be identified now. Moreover, given the identified significant impacts of hatchery operations, should hatchery operations for any reason not cease after eight years, as analyzed in the DEIR, the State Board and/or other responsible agencies would need to conduct further environmental review and could no longer rely on the EIR's analysis. *See* Public Resources Code § 21166.

Likewise, the DEIR lacks detail about the location, construction, and operation of hatchery operation facilities, including the diversion, pumps, filtration system, and spawning building for Iron Gate Hatchery, and all the Fall Creek powerhouse and hatchery infrastructure. *See* DEIR at 2-78 to 2-83. Instead, the DEIR gives only approximations and/or guesses as to these components, and also as to the procedures to be followed if there is not enough surface water to divert for hatchery operations. Additional detail is necessary for an accurate analysis of the facilities' environmental impacts, including to water supply, aquatic resources, and tribal cultural properties that exist in and around the Project area.

The EIR should be revised to provide these necessary details so that the public and decision-makers can adequately assess the Project's impacts.

II. The State Board Should Adopt the "No Hatchery Alternative," Which Is a Feasible, Environmentally Superior Alternative.

An EIR's central purposes are to identify a project's significant environmental effects and to evaluate ways of avoiding or minimizing them. Public Resources Code §§ 21002.1(a), 21061. Thus, the alternatives analysis lies at "[t]he core of an EIR." *Citizens of Goleta Valley v. County of Santa Barbara* (1990) 52 Cal.3d 553, 564; CEQA Guidelines § 15126.6. As the Supreme Court has explained, "Without meaningful analysis of alternatives in the EIR, neither the courts nor the public can fulfill their proper roles in the CEQA process." *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404 (*Laurel Heights I*). Furthermore and critically, CEQA prohibits public agencies from approving projects as proposed if a feasible alternative would substantially lessen their significant environmental effects. *Berkeley Keep Jets Over the Bay Committee v. Board of Port Com'rs* (2001) 91 Cal.App.4th 1344, 1354 (quoting Public Resources Code § 21002).

Here, the DEIR's alternatives analysis properly includes a "No Hatchery Alternative," which is the proposed Project without the eight years of hatchery operations at Iron Gate Hatchery and Fall Creek Hatchery, and would include the removal of the Iron Gate Hatchery. Further, the DEIR properly concludes that the No Hatchery Alternative is feasible and meets Project purposes and objectives. *See* DEIR at 4-2.

However, the DEIR includes some equivocal language, which should be corrected. In the Executive Summary, the DEIR states:

> The No Hatchery Alternative would further the underlying purpose and objectives, although the alternative would not meet Objective 2 (to advance the *long-term restoration* of the *natural* fish population in the Klamath Basin, with particular emphasis on restoring the salmonid fisheries used for subsistence, commerce, tribal cultural purposes, and recreation) *as quickly as under the Proposed Project*.

DEIR at ES-20 (emphasis added); *see also* DEIR at 4-6 ("The [No Hatchery] alternative would further the underlying purpose and most of the project objectives, although it is not clear at a screening level the extent to which the alternative would meet Objective 2."). However, elsewhere the DEIR clearly states that the No Hatchery Alternative would be more beneficial and quicker than the proposed Project in achieving long-term survival and recovery of native fish species. *See, e.g.*, DEIR at 4-304 to 4-311, 4-319; *see also* Native Fish Society *et al.*, July 23, 2018 Comments on Project Scoping Document. For example, the DEIR states that the No Hatchery Alternative "would likely *increase the rate* at which Chinook salmon develop traits adapted to their new habitats upstream of Iron Gate Dam (Goodman et al. 2011). This could increase survival of natural-origin Chinook salmon at a *faster rate* than with continued hatchery operations under the Proposed Project." DEIR at 4-307 (emphasis added). Likewise, the DEIR states "ending hatchery operations as part of dam removal may result in *a more rapid increase* in the adult coho salmon population as compared with the Proposed Project." DEIR at 4-311 (emphasis added). Indeed, a scientific paper reviewing the most recent science from NOAA/ National Marine Fisheries Service regarding hatcheries found that there are "no clear-cut examples in which a reintroduction employing hatchery releases yielded a self-sustaining naturalized population." Anderson *et al.* (2014), "Planning Pacific Salmon and Steelhead Reintroductions Aimed at Long-Term Viability and Recovery," *North American Journal of Fisheries Management* 34:72–93, at p. 85. Thus, the No Hatchery

Alternative clearly meets Objective 2, and would be superior to the proposed Project with respect to this Objective. The DEIR should be amended to reflect this fact.[1]

As set forth more fully below, the DEIR properly reveals that the No Hatchery Alternative would reduce the Project's significant impacts. As discussed below, the No Hatchery Alternative would likely reduce the Project's impacts even further than analyzed in the DEIR. However, even based on the DEIR's analysis alone, it is clear that, because the No Hatchery Alternative is a feasible alternative that would substantially lessen the Project's significant impacts, the State Board cannot approve the Project as proposed and should instead consider and approve the No Hatchery Alternative.

The table below summarizes the DEIR's comparison of environmental impacts between the No Hatchery Alternative and the proposed Project with continued hatchery operations at Iron Gate and the start up of hatchery operations at Fall Creek. As shown, the No Hatchery Alternative reduces or eliminates the Project's significant impacts in numerous impact categories, including water quality, aquatic resources, phytoplankton and periphyton, terrestrial resources, air quality, greenhouse gas (GHG) emissions, tribal cultural resources, aesthetics, recreation, traffic, and noise. Except for one short-term impact discussed below, the No Hatchery Alternative produces the same impacts as the proposed Project in all other impact categories, thereby rendering the No Hatchery Alternative an environmentally superior alternative overall.

<u>Summary of the DEIR's Reported Environmental Impacts of the Project (with Hatchery Operations) as Compared with the No Hatchery Alternative ("NHA")</u>

Environmental Impact	**Impact Comparison**
Water Quality	The NHA would *reduce* impacts relative to the Proposed Project, as it would eliminate effluent discharges from Iron Gate Hatchery.* The NHA would *eliminate a significant and unavoidable impact* of the proposed Project for water temperature and dissolved oxygen in Fall Creek downstream of the proposed Fall Creek Hatchery (Impact 3.2-17). DEIR at 3-171, 4-304.

[1] In any event, an alternative need not meet every Project objective to be feasible. *See Preservation Action Council v. City of San Jose* (2006) 141 Cal.App.4th 1336, 1357.

Environmental Impact	Impact Comparison
Aquatic Resources	The NHA would *reduce* impacts to aquatic resources by eliminating a source of the spread of fish disease, removing well-documented competitive pressure between hatchery-derived and natural origin fish, reducing straying, and increasing the sustainability of natural spawning fish populations. The NHA would also *eliminate* any potential impacts to aquatic resources from diversions from Bogus Creek and Fall Creek necessary for hatchery operations. DEIR at 4-304 to 4-313.
Phytoplankton and Periphyton	The NHA would *reduce* impacts to phytoplankton and periphyton conditions relative to the Proposed Project, as it would cease nutrient discharges from Iron Gate Hatchery and would not start discharges from Fall Creek hatchery.* DEIR at 4-313.
Terrestrial Resources	Same. Any short term loss of hatchery fish under the NHA could be offset by alternative food sources and would not significantly impact wildlife; long-term benefits of the NHA "would result in an increased prey base and would be *beneficial*" to terrestrial resources. DEIR at 4-315 to 4-316.
Flood Hydrology	Same
Groundwater	Same*
Water Supply/Water Rights	Same
Air Quality	"[U]nder the No Hatchery Alternative, operational emissions from the hatcheries would be *lower (zero)* than those under existing conditions," and would eliminate proposed operational emissions.* DEIR at 4-317 (emphasis added).

Environmental Impact	**Impact Comparison**
Greenhouse Gas Emissions	Same regarding construction impacts; for operational impacts the *NHA emissions would be lower (zero)* than the proposed Project/ existing conditions.* DEIR at 4-318.
Geology, Soils, and Mineral Resources	Same
Historical Resources and Tribal Cultural Resources	The NHA would (1) be *beneficial* relative to the proposed Project by returning the Iron Gate Hatchery to more natural conditions in the short term (2) *eliminate potential significant impacts to tribal cultural resources* from construction of Fall Creek Hatchery (Impact 3.12-1), (3) result in a short term reduction in the fishery and substantial short-term restriction of tribal access to the fishery relative to existing conditions,* and (4) would result in an *increase* in an availability of salmon species for tribes and thus *beneficial* in the long-term. DEIR at 4-318 to 4-319.
Paleontological Resources	Same
Land Use and Planning	Same
Agriculture and Forestry Resources	Same
Population and Housing	Same*
Public Services	Same
Utilities and Service Systems	Same
Aesthetics	The NHA is *beneficial* relative to the Proposed Project, as it would return/keep areas to/in natural conditions. DEIR at 4-321.
Recreation	Same. Any short term loss of hatchery fish under the NHA would not significantly impact recreational opportunities; the NHA would result in "*long-term beneficial effects* on the scenic quality, recreation, fisheries and wildlife of the

Environmental Impact	**Impact Comparison**
	California Klamath River wild and scenic river segment." DEIR at 4-322.
Hazards and Hazardous Materials	Same*
Transportation and Traffic	The NHA would result in *reduced traffic* compared with the proposed Project because there would be no traffic from construction at Fall Creek or hatchery operations. DEIR at 4-323.
Noise	The NHA would result in *reduced noise* compared with the proposed Project because there would be no noise from construction at Fall Creek or hatchery operations. DEIR at 4-323.

DEIR 4-301 to 4-323.
*As explained below, the DEIR likely understates the benefits of the NHA as compared to the proposed Project and/or overstates any short-term impacts of the NHA.

The benefits of the No Hatchery Alternative are likely even greater than revealed in the DEIR (and as summarized above). This is because the DEIR does not quantify many of the impacts of the existing hatchery operations, which would be eliminated under the No Hatchery Alternative. For example, the DEIR concludes that Iron Gate's hatchery discharges under existing conditions have a less than significant impact on water quality and phytoplankton and periphyton conditions, but does not quantify the relevant factors. DEIR at 4-304, 4-313. Elsewhere, the DEIR admits that "Iron Gate Hatchery currently exceeds its TMDL allocation of zero net discharge of nitrogen, phosphorous and biological oxygen demand" (DEIR at 3-164), but does not specify by how much. According to the State Board's Investigative Order R1-2017-0051, "Review of current hatchery sampling data shows that the Facility discharges approximately 2,500 lbs of nitrogen per year, 500 lbs of phosphorus per year and 14,000 lbs of organic matter per year measured as Biochemical Oxygen Demand (BOD). This represents 0.03% of the overall loading of nitrogen and phosphorus and 0.02% of the overall loading of organic matter to the Klamath River every year." Available at https://www.waterboards.ca.gov/northcoast/board_decisions/adopted_orders/pdf/2017/17_0051_IronGate_13267.pdf.

Likewise, the DEIR fails to recognize that hatcheries use a substantial amount of formalin and other chemicals in hatchery operations. Thus, by eliminating hatchery operations, the No Hatchery Alternative would result in reduced impacts from hazards and hazardous materials. "The chemicals and aquaculture drugs the Facility uses, or can use, for the treatment and control of disease include oxytetracycline, florfenicol, formalin, providine-iodine complex, hydrogen peroxide, potassium permanganate, and sodium chloride. Chemicals and aquaculture drugs used for anesthesia include MS-222/Finquel, and carbon dioxide." *Id.*

The DEIR also fails to quantify operational GHG or other air pollutant emissions from Iron Gate Hatchery. DEIR at 4-317 to 4-318. Further, the DEIR fails to analyze the relationship of water diversions for hatchery operations to groundwater levels (DEIR at 4-316) and fails to recognize population and housing impacts that may stem from operating the two hatcheries for eight additional years (DEIR at 4-320).

The DEIR should be augmented to include this additional information. Were the DEIR to fully detail the impacts of current and proposed hatchery operations, the benefits of the No Hatchery Alternative would undoubtedly be even more apparent. However, even the analysis the DEIR now contains demonstrates the environmental superiority of the No Hatchery Alternative.

It also appears evident that the No Hatchery Alternative is feasible, which is defined by CEQA as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." Guidelines § 15364. Because the Project calls for only eight years of hatchery operations, ceasing those operations upon decommissioning instead would not seem to pose any additional economic, legal, social, or technological impediments, and the DEIR does not reveal any. Indeed, hatchery operations can be costly and thus ceasing such operations sooner would have economic benefits.

Further, as discussed, the No Hatchery Alternative is environmentally beneficial. The only potential negative impact the DEIR notes for the No Hatchery Alternative that would not be present with the proposed Project is a *short-term* loss of catch that could impair tribal access to the fishery relative to existing conditions. DEIR at 4-319. However, this potential short-term impact should not render the alternative infeasible for at least two reasons. First, CEQA considers a project to have a significant environmental impact if it "achieve[s] short-term, to the disadvantage of long-term, environmental goals." Public Resources Code § 20183(b)(1). As discussed, the DEIR here makes clear that removing hatchery operations is superior to the proposed Project in achieving the long-term stability of the fishery. DEIR at 4-319; *supra* pp. 5-6. Thus, the

State Board should not jettison an alternative that is clearly environmentally superior over the long-term due to one potential *short-term* impact. Second, it is not clear that the impact should be considered significant even in the short-term. The DEIR elsewhere finds that any short-term impacts from the loss of hatchery fish would be offset by improved conditions for native fish from hatchery removal, including less mortality from disease, less competition, less straying, and better adaptation. *See, e.g.*, 4-304 to 4-313. The DEIR fails to explain why any short-term impacts would not similarly be offset for tribes accessing the fishery.

In sum, the No Hatchery Alternative is clearly environmentally superior to the proposed Project, meets every Project objective, and is feasible. The State Board should therefore consider this Alternative for adoption. If for any reason the Board should determine that the No Hatchery Alternative is infeasible, the agency must explain the reasons for this determination in detailed findings, which must be both legally accurate and supported by substantial evidence. Public Resources Code §§ 21081(a)(3), 21081.5; CEQA Guidelines §§ 15091(a)(3), (b).

III. At a Minimum, the EIR Should Evaluate Additional Mitigation to Reduce or Avoid the Significant Environmental Impacts of Hatchery Operations.

If the agency determines and makes adequate legal findings that the No Hatchery Alternative is infeasible, it must also then consider any and all feasible mitigation measures to lessen or avoid the significant impacts stemming from the Project's proposed hatchery operations. For every mitigation measure evaluated, the agency must demonstrate either that the mitigation measure: (1) will be effective in reducing a significant environmental impact; or (2) is ineffective or infeasible due to specific legal or "economic, environmental, social and technological factors." *Friends of Oroville v. City of Oroville* (2013) 219 Cal.App.4th 832, 842-44; Public Resources Code §§ 21002, 21061.1; CEQA Guidelines §§ 15021(b), 15364.

If an agency ultimately determines that mitigation proposed in the EIR is infeasible, it may decline to adopt the measure. However, in that event, as with alternatives to the Project, CEQA requires that the agency explain the reasons for this determination in detailed findings, which must be both legally accurate and supported by substantial evidence. Public Resources Code §§ 21081(a)(3), 21081.5; CEQA Guidelines §§ 15091(a)(3), (b); *Village Laguna of Laguna Beach, Inc. v. Bd. of Supervisors* (1982) 134 Cal.App.3d 1022, 1032-35. And if the project's impacts will remain significant even after mitigation, the agency must issue an additional statement of overriding considerations, also supported by substantial evidence, demonstrating that the project's benefits outweigh its effects. Public Resources Code § 21081(b); *see* CEQA Guidelines §§ 15091(f), 15093.

In additional to these procedural requirements, CEQA also has substantive "teeth." The lead agency must *actually adopt* any feasible mitigation that can substantially lessen the Project's significant environmental impacts. Public Resources Code § 21002; CEQA Guidelines § 15002(a)(3); *City of Marina v. Board of Trustees of California State University* (2006) 39 Cal.4th 341, 368-69. In addition, the agency must "ensure that feasible mitigation measures will actually be implemented as a condition of development, and not merely adopted and then neglected or disregarded." *Federation of Hillside and Canyon Assns. v. City of Los Angeles* (2000) 83 Cal.App.4th 1252, 1261 (italics omitted); CEQA Guidelines § 15126.4(a)(2).

An EIR generally may not defer evaluation of mitigation until a later date. Guidelines § 15126.4(a)(1)(B). Rather, an EIR must evaluate each mitigation proposal that is not "facially infeasible," even if such measures would not completely eliminate an impact or render it less than significant. *Los Angeles Unified School Dist. v. City of Los Angeles* (1997) 58 Cal.App.4th 1019, 1029-31 ("*LA Unified*").

Here, the DEIR identifies several significant and unavoidable impacts from hatchery operations, including on water temperature and dissolved oxygen in Fall Creek downstream of Fall Creek Hatchery. *See, e.g.*, DEIR at 3-171 (Impact 3.2-17). The DEIR claims that no feasible mitigation could be employed to reduce these impacts. *Id*. However, as demonstrated by the analysis of the No Hatchery Alternative, these impacts could be reduced or eliminated by either reducing or eliminating the hatchery operations. All feasible mitigation options in this regard must be explored, including but not limited to (1) reducing operations at Iron Gate hatchery and declining to reopen Fall Creek Hatchery; and (2) operating hatcheries with solely a conservation focus. The Native Fish Society does not by this letter endorse any particular mitigation approach, but only reminds the State Board of its obligation under CEQA to consider and adopt all feasible mitigation to reduce or avoid the Project's significant impacts from hatchery operations.

IV. Conclusion

In sum, the Native Fish Society supports decommissioning and license surrender, but remains concerned about the environmental impacts of the proposed Project's hatchery operations at Iron Gate and Fall Creek. While the DEIR recognizes many of the detrimental effects of hatchery operations, it should be revised to incorporate the additional information identified in this letter. Further, CEQA requires that the State Board reduce or avoid the significant impacts of hatchery operations and construction to the extent feasible. Therefore, the Native Fish Society urges the State Board to adopt the No Hatchery Alternative or, at a minimum, to consider and adopt all feasible mitigation to reduce or avoid the significant impacts from hatchery operations and construction.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Amy J. Bricker

cc: Jake Crawford, River Steward Program Director, Native Fish Society
Conrad Gowell, Fellowship Program Director, Native Fish Society
Mark Sherwood, Executive Director, Native Fish Society
Kurt Beardslee, Executive Director, Wild Fish Conservancy
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Hans Cole, Director of Environmental Campaigns and Advocacy, Patagonia Inc.
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NFS Group Comments on Draft Water Quality Certification for Klamath River Renewal Corporation's Lower Klamath Project No. 14803.

July 23, 2018

To: Ms. Michelle Siebal
State Water Resources Control Board
Division of Water Rights – Water Quality Certification Program

From: Jake Crawford, River Steward Program Director, Native Fish Society
Conrad Gowell, Fellowship Program Director, Native Fish Society
Mark Sherwood, Executive Director, Native Fish Society
Kurt Beardslee, Executive Director, Wild Fish Conservancy
Yvon Chouinard, Owner, Patagonia Inc.
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Jack Stanford, Professor Emeritus, Flathead Lake Biological Station, University of Montana
Matt Stoecker, Principal Biologist, Stoecker Ecological

Re: NFS Group Comments on Draft Water Quality Certification for Klamath River Renewal Corporation's Lower Klamath Project No. 14803.

Dear Ms. Michelle Siebal,

Thank you for the opportunity to provide comments on the draft Water Quality Certification for the Klamath River Renewal Corporation's Lower Klamath Project – No. 14803 ("The Project"). We support the Project decommissioning that will improve the biological conditions in the Klamath watershed to benefit sensitive and threatened wild, native fish species, and understand that this action is critical to their recovery and long-term protection.

The Native Fish Society (NFS) is a 501(c)3 conservation non-profit, dedicated to utilizing the best available science to advocate for the protection and recovery of wild, native fish and promote the stewardship of the habitats that sustain them. NFS has 3,300 members and supporters and 89 River Stewards that help safeguard wild fish in their homewaters across the Pacific Northwest. NFS has five River Stewards that live, work, and recreate in the Klamath watershed in both California and Oregon. Furthermore, NFS River Stewards, Staff, and Supporters live, work, and recreate in the Klamath basin who are interested in the recovery of threatened and sensitive populations of wild, native fish.

Wild Fish Conservancy is a 501(c)3 non-profit that is dedicated to the recovery and conservation of the region's wild fish ecosystems. Through science, education, and advocacy, WFC promotes technically and socially responsible habitat, hatchery, and harvest management to better sustain the region's wild-fish heritage.

Patagonia is an outdoor clothing and gear company dedicated to using business to inspire and implement solutions to the environmental crisis. This includes a 40-year history supporting grassroots campaigns and local groups working to remove dams, restore habitat and protect wild rivers and wild fish.

Fly Water Travel is a team of fishing and travel experts exclusively dedicated to arranging trips to the world's finest fishing destinations. Fly Water supports fishing businesses in the Klamath basin and clients who travel to the Klamath watershed to experience healthy runs of wild, native fish and the clean water necessary for their survival.

Jack Stanford is a Professor Emeritus at the Flahead Lake Biological Station with the University of Montana, where for over 45 years his research focused on the ecology of Pacific Rim salmon rivers.

Stoecker Ecological is a biological consulting firm that specializes in salmon and steelhead restoration across the West Coast.

We are writing with serious concerns and opposition over components of the draft water quality certification related to "Condition 12. Hatcheries" and the Licensee's plan to "construct, operate, and maintain the Fall Creek and Iron Gate Hatcheries, as presented in the Licensee's June 1, 2018 submittal of updates to Section 7.8 of the *Administrative Draft of the Definite Plan for Decommissioning*".

We are submitting these comments because we have a keen interest in the certification and decommissioning of the Project, and our collective organizations, members, partners, and clients have been deeply involved in past and ongoing wild salmon and watershed restoration projects in California, Oregon, and Washington. We submit the following comments opposing certification and approval for infrastructural investments to Iron Gate Hatchery and Fall Creek Hatchery in order to maintain hatchery salmonid releases in the Klamath, which will undoubtedly compromise and undermine the recolonization and restoration of the river's native fish who would otherwise benefit from decommissioning.

Furthermore, we respectfully request a response to our concerns that address the overwhelming scientific consensus that hatcheries pose significant risks to wild fish. We bring these questions forward now so that together we can take advantage of this unique opportunity to identify an effective path forward to restore wild salmon in the Klamath River. It is imperative that such a plan does not rely on the artificial production of native fish. Time and again, the scientific literature and empirical experience (as documented in this letter) has shown that the use of artificial production in recovery strategies has failed to restore self-sustaining populations. Utilizing such a method on the Klamath will compromise the recolonization of wild anadromous fish with historic habitat following Project decommissioning.

Iron Gate Hatchery was built in 1962 as mitigation for the loss of upstream spawning and rearing habitat for anadromous salmon and steelhead between Iron Gate Dam and Copco 2 Dam. We see no reason for the continuation of a mitigation hatchery program and investment in new hatchery infrastructure, particularly for Chinook salmon, following the removal of the four lower Klamath dams, especially given that anadromous salmonids will now be able to volitionally access this important historically accessible habitat.

The negative effects of salmonid hatcheries on wild fish have been well documented across the Pacific Northwest, and importantly, the negative effects of Iron Gate Hatchery on wild anadromous salmonids in the Klamath basin have been documented in recent peer reviewed scientific literature - See Quiñones et al. (2013)[1]. Given this research and the volumes of peer-reviewed articles documenting issues with the impacts of hatchery production on wild populations, we question the utility of investing in the construction, operation, and maintenance of Iron Gate Hatchery and Fall Creek Hatchery, particularly if after eight years, as stated in the Definite Plan, the hatcheries will be decommissioned. Any hatchery releases following Project decommissioning will further perpetuate ongoing problems identified in the scientific literature, jeopardizing wild fish recolonization into upstream habitat, and leaving populations more vulnerable to human development and climate change in the basin. The extensive scientific literature shows that continued hatchery operations in the Klamath basin will result in a loss in reproductive success and local adaptation by wild fish along with decreases in genetic and phenotypic diversity. These impacts can be expected to have acute effects on wild fish recovery in the basin given the ongoing and projected climatic changes to the area.

Despite a century and a half of use, fish hatcheries remain an unproven method to sustain the viability and biodiversity of native fish populations, preserve the culture of commercial and recreational fishing, and uphold treaty obligations and subsistence fishing for indigenous peoples and sovereign nations. There is an overwhelming scientific consensus that fish hatcheries have a myriad of direct negative consequences for fish including **infrastructural**, **ecological,** and **genetic** impacts, although these categories interact considerably. There is also a growing public awareness of the **indirect** impacts fish hatcheries cause within the socio-ecological interface within watersheds and socio-economic dimensions of fisheries.

In the Klamath River watershed there are three populations of native fish species that are listed under the Endangered Species Act: Southern Oregon Northern California Coast Coho salmon, Lost River sucker, and Shortnose sucker. The Upper Klamath – Trinity River Chinook salmon and Klamath Mountain Province steelhead trout are currently on the Forest Service Sensitive Species list. A petition to list spring Chinook salmon in the Upper Klamath – Trinity River ESU is currently under review.

The negative impacts resulting from fish hatcheries can occur within facilities at the species level, on the natural environment within and beyond the fish hatchery, and to ecosystems far beyond where those hatchery fish are reared and released. The negative effects of hatchery fish are severe enough that courts have recognized "stray [hatchery] fish as low as one or two percent...may pose unacceptable risks to natural populations"[2].

In light of the condition of the Klamath's threatened and sensitive salmon and steelhead, and the continued impacts fish hatcheries cause, we request that the California State Water Resources Control Board certifies they are following all applicable environmental laws when taking action, including, but not limited to the:

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[1] Quiñones R., M. L. Johnson, and P.B. Moyle 2013. Hatchery practices may result in replacement of wild salmonids: adult trends in the Klamath basin, California. Environmental Biology of Fish. DOI 10.1007/s10641-013-0146-2

[2] Native Fish Soc'y, 992 F. Supp. 2d at 1104 (quoting the administrative record) (internal citations omitted).

- Endangered Species Act,
- National Environmental Policy Act,
- California Environmental Quality Act,
- Administrative Procedure Act,
- Clean Water Act.

Within these policies there is a clear standard to incorporate the best available science and to consider cumulative impacts, socioeconomic, and environmental justice concerns. In light of the following considerations we recommend the California State Water Resources Control Board consider these following comments, which outline the numerous documented negative effects of hatchery operations on wild populations and remove the condition of maintaining hatchery operations as part of the certification.

In particular, the California State Water Resources Control Board must consider the project's potentially significant environmental impacts pursuant to the California Environmental Quality Act ("CEQA"), Cal. Pub. Res. Code § 21000 et seq. and the CEQA Guidelines, 14 Cal. Code Regs. §15000 et seq. We understand that the California State Water Resources Control Board is preparing an Environmental Impact Report ("EIR") for the project. The EIR must include a detailed analysis of the impacts to the environment from the hatchery operations that will occur as part of the project. Additionally, because, as described below, these impacts will be significant, CEQA requires the California State Water Resources Control Board to consider project alternatives and feasible mitigation (such as discontinuing hatchery operations) that will reduce these impacts to less than significant levels. See Pub. Res. Coe § 21002.1.

Further, because Section 9 of the Federal ESA prohibits take of listed species, multiple documents have been submitted by California Fish and Wildlife Department and PacifiCorp to the National Marine Fisheries, including a Habitat Conservation Plan with Incidental Take Permit for Interim Operations for Coho Salmon submitted in March of 2012, and a Hatchery Genetic Management Plan in September 2014, which has not been approved. We question whether authoriziation of a Water Quality Certification for operating Iron Gate Hatchery will contribute to the unlawful take of an Endangered Species Act listed species following the decommissioning of the Project.

In these comments we detail impact/risk categories that have been previously recognized, studied, and reviewed. Within each of these areas, we also detail subcategories and cite specific examples of how those impacts have contributed to increased extinction risk for fish and to impacts on the people who depend heavily on these species.

1. Infrastructural impacts

Infrastructural impacts arise from the captive rearing of fish in a hatchery setting including the (a.) *physical location of the facility*, (b.) *operation and resource consumption of the facility*, (c.) *potential for general facility failure,* and (d.) *demographic and collection impacts*.

(a.) Often fish hatcheries are located in or adjacent to important floodplain habitat, causing ongoing impacts to fluvial geomorphological processes including preventing active channel migration. Many fish hatcheries also rely upon weirs, traps, or other infrastructure within the stream channel that negatively impacts downstream habitats, impedes aquatic organism migration and negatively effects spawning and rearing behavior.

(b.) In order to rear fish, hatcheries withdraw water from the stream channel or local groundwater sources to use in the facility. Factors such as flow reductions, displacing other stream-dwelling organisms crucial to the aquatic food web, and dewatering the spawning and rearing areas can all occur from extracting water from the environment surrounding the artificial propagation infrastructure. If water is returned to the stream, effluent discharges consisting of modified water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the receiving stream's mixing zone can all negatively affect the fish (Kendra 1991)[3]. It is also possible for bacteria, parasites, and viruses to be introduced through this effluent discharge. Fish hatchery operations are required to comply with the Clean Water Act and specifically be covered under a National Pollutant Discharge Elimination permit. The Clean Water Act accomplishes this regulation by requiring a permit for each and every point source discharge, with effluent limits based on the more stringent of technology-based standards and standards necessary to protect water quality and existing water uses. If hatcheries are permitted with an NPDES, their permits are often administratively continued and no longer reflect current federal and state water quality standards as the Clean Water Act requires. Often, it is not known how a fish hatchery impacts water quality, and often the magnitude of impacts depends upon the flow volume of the hatchery effluent relative to the total flow of the stream. In some circumstances, relatively small amounts of toxic discharges from fish hatchery effluent can cause significant harm stemming from residual chemical reagents, salts, and chlorinated water[4]. These water quality permits are intended to protect aquatic life and public health and ensure that all artificial propagation facilities adequately treat their wastewater. Regardless of the cause of water quality impairments, fish hatcheries may not exacerbate water quality problems in impaired watersheds.

(c.) Time and again, fish hatcheries have been subject of artificial propagation failures that cause massive die-offs in captive populations. Risks exist in water intake screens becoming plugged, the facility losing electrical power, or catastrophic loss of fish through environmental disaster such as fire, debris torrent, and flooding. Additionally, poor artificial propagation and facility maintenance is a common reason fish are unintentionally killed in fish hatcheries.

(d.) Injury can be caused to fish populations through the collection of fish for artificial propagation in the hatchery. Usually this impact is imposed on adult fish returning to the stream to spawn, but these impacts can also be imposed through the collection of eggs, emerging fry, and juvenile fish. By taking fish into captivity the phenology of their upstream migration and subsequent life history is disrupted. This disruption in timing occurs primarily through the use of weirs, fish traps, and seines, which contribute to wild fish falling back into less preferable spawning and rearing areas, and fish becoming injured while trying to jump barriers within and

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[3] Kendra, W. 1991. Quality of salmonid hatchery effluents during a summer low-flow season. Transactions of the American Fisheries Society120(10):43-51.
[4] Center for Environmental Law and Policy; and Wild Fish Conservancy Case 2:15-cv-00264-SMJ

mandated by the artificial propagation facility (Hevlin and Rainey 1993[5], Spence *et al*. 1996[6]). Risk is also posed to wild fish by the need to continually extract natural-origin individuals from the population to counteract domestication effects caused by the fish hatchery. This removal of individuals from the population removes nutrients from upstream reaches (Kapusinski 1997[7]) and contributes to the decline in abundance, productivity, diversity, and spatial distribution of the threatened and endangered populations.

Infrastructural impacts are often assumed to be offset through investments in equipment or changes in artificial propagation procedures. However, the physical existence of the hatchery represents a permanent, negative impact on the surrounding environment and can also pose serious harm to fish populations both in and outside of the facility. In addition, the cost it takes to offset these impacts into the indefinite future is always greater than the cost of restoring watershed function and further delays investment in the root causes of decline for natural fish.

2. Ecological Impacts

Ecological impacts occur on an inter and intraspecies basis both inside and outside the artificial production facility. Ecological interactions occur whether or not inter-breeding occurs and are magnified if resident life histories are being produced. Ecological impacts include: a.) disease, b.) competition, c.) behavioral modification, and d.) marine derived nutrients. Review papers by Pearsons (2008)[8] and Kostow (2009)[9] document numerous, serious, negative ecological consequences as a direct result of the artificial propagation of fish.

(a.) *Disease:* Common diseases within hatcheries of the Northwest include Furunculosis (*Aeromonas salmonicida), Saprolegnia spp.,* Cold Water Disease *(Flavobacterium psychrophilum), Trichodinids,* bacterial kidney disease (*Renibacterium salmoninarum),* among others. Bartholomew *et al.,* 2013[10] is often cited as a source claiming hatcheries do not pose a risk to surrounding watersheds from artificially amplifying pathogens and parasites. However, through regular monitoring conducted by state and federal agencies, we know that disease is a constant problem when artificially rearing fish in high densities (Saunders 1991[11]). Rearing

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[5] W Hevlin and Rainey S. 1993. Considerations in the Use of Adult Fish Barriers and Traps in Tributaries to Achieve Management Objectives Pages 33-40. Fish passage policy and technology. Bioengineering Section, American Fisheries Society, Bethesda, MD.
[6] Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R. P. Novitzki 1996. An Ecosystem approach to salmonid conservation. TR-4501-96-6057. Mantech Environmental Research Services Corp., Corvallis, OR 356p.
[7] Kapuscinski A.R. (1997) Rehabilitation of Pacific Salmon in Their Ecosystems: What Can Artificial Propagation Contribute?. In: Stouder D.J., Bisson P.A., Naiman R.J. (eds) Pacific Salmon & their Ecosystems. Springer, Boston, MA
[8] Pearsons, T. N. 2008. Misconception, Reality, and Uncertainty about Ecological Interactions and Risks between Hatchery and Wild Salmonids Fisheries 33(6):278-290.
[9] Kostow, K. Rev Fish Biol Fisheries (2009) 19: 9. https://doi.org/10.1007/s11160-008-9087-9
[10] Bartholomew, J. 2013. Disease risks associated with hatcheries in the Willamette River basin. Prepared 11 for the Army Corps of Engineers, Portland District. 26 pages. 12
[11] Saunders, R. L. 1991. "Potential interaction between cultured and wild atlantic salmon." *Aquaculture* 98.1-3 (1991): 51-60.

facilities expose captive fish to increased risk of carrying pathogens because of the increased stresses associated with simplified and crowded environments. It is probable that fish transferred between facilities, adult fish carcasses being outplanted into the watershed, and other fish released from hatcheries, have acted as a disease vectors to wild fish and other aquatic organisms. These diseases, amplified within the hatchery, contribute to the mortality of fish at all life stages and can travel rapidly to areas well beyond where effluent pipes are discharged. The outplanting of juvenile and adult fish can transfer disease upstream of the rearing site, and there is the potential for lateral infection through the travel of avian, mammalian, and other terrestrial predators which overlap with the distribution of artificially propagated fish.

The release of artificially produced hatchery fish into the wild also poses a risk of introducing pathogens and parasites to wild populations that can result in temporary epidemics or permanent reductions in wild populations. While this risk is more difficult to quantify than genetic and competitive effects, they are unlikely to be negligible. Even an individual fish released from a pathogen-laden hatchery environment can transfer the infection to areas where wild fish are susceptible, leading to devastating consequences. This is especially of concern with regard to local wild populations, including the majority of threatened fish populations, that are already at depressed levels of abundance. These dynamics contribute to disease driven mortality at all life stages in wild fish populations.

b.) *Competition:* In watersheds which have a diminished fish population, competition for resources limits the abundance, productivity, diversity, and spatial distribution of wild fish populations. Competition occurs when the demand for a resource for two or more organisms exceeds that which is available. Negative impacts result from direct interactions (i.e. interference of wild fish foraging by artificially propagated fish) and through indirect means (i.e. hatchery fish diminish the availability of aquatic insects available as forage to wild fish). Direct and indirect impacts may arise through competition for: food resources within the stream, juvenile rearing habitat, food resources within the estuary and ocean (Levin et al. 2001[12]) and competition for spawning sites (Buhle *et al*. 2009). These impacts are especially significant between steelhead, chinook, and coho (on an interspecific and intraspecific basis) because of the considerable overlap in habitat and foraging preferences between these species (SWIG 1984). Of great concern are the competitive ecological interactions where wild fish are displaced by artificially propagated and reared fish introduced into the same habitat.

c.) *Behavioral Modification:*

(1) *Predation by other fish & wildlife:* Fish produced in hatcheries also bear maladaptive behaviors due to the strong selection within the artificial production facility. Due to the food distribution and rearing strategies necessary to make artificial production cost effective, hatchery fish become hyper-aggressive and surface oriented, causing them to become more susceptible to predators (Hillman and Mullan 1989). Artificially produced

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[12] Levin, P.S., Zabel, R.W. and Williams, J.G., 2001. The road to extinction is paved with good intentions: negative association of fish hatcheries with threatened salmon. Proceedings of the Royal Society of London B: Biological Sciences 268(1472):1153-1158.

fish also exhibit less diversity in their behaviors and life histories, allowing for predators to key in on migration timing. Especially during *en masse* hatchery smolt releases, wild fish can be preyed upon by pinniped, avian, and other piscivorous predators attracted to the high number of hatchery fish concentrated in a given area. The modification of wild fish behavior can increase vulnerability and susceptibility to predation. This dynamic can occur during juvenile releases in the freshwater environment, during estuary rearing phases, and especially when adult hatchery fish return to spawn and congregate in restricted areas such as below dams and partial migratory barriers.

(2) *Predation by hatchery fish:* Hatchery fish have also been documented directly preying upon smaller wild fish. This direct consumption of fry and fingerlings is highest in areas where artificially produced fish and wild fish commingle. Direct predation of wild fish by hatchery fish is likely highest when artificially produced smolts encounter naturally produced, emerging fry or when they are disproportionately larger than wild fish. Cases of direct predation have been documented where hatchery fish consume wild fish ½ of their total size once they have been released (Pearsons and Fritts 1999). Hawking and Tipping (1998) observed artificially produced age 1 coho salmon and steelhead trout predating on other salmonid fry appearing to be chinook. Seward and Bjornn (1990) have also documented substantial predation impacts by artificially produced chinook preying upon their own species. In instances such as these, hatchery fish preying directly upon wild fish results in the direct take of ESA listed species.

(3) *Residualization:* In steelhead trout, and to a lesser extent within Chinook and coho, modified feeding behavior can affect residualization, meaning that they will not migrate to salt water, but will instead remain in the river as resident fish. Residualization is a common occurrence with artificially produced steelhead (Naman 2008, Hausch and Melnychuk 2012, Melnychuk *et al*. 2014). The addition of these residualized hatchery fish constitutes a significant modification to the habitat of wild salmonids. These residualized hatchery fish will harm, displace, and most likely prey upon other juvenile salmonids . In some areas of the Northwest, residualization rates are as high as 20-80% (Snow and Murdoch 2013, McMichael *et al*. 2014). Residualized hatchery fish are also not limited to the areas surrounding the hatchery, Schuck *et al*. (1998) reported residualized hatchery steelhead approximately 20 kilometers below and 10 kilometers above release sites.

d.) *Marine derived nutrients:* As noted, hatchery Chinook salmon are managed for mitigation of lost spawning and rearing habitat resulting from the construction of Iron Gate Dam and Copco 2 Dam and are not intended to provide direct conservation benefits to natural populations from intentional supplementation or captive breeding. Fisheries, which meet management objectives, will result in the harvest of as many hatchery fish as possible to limit genetic and ecological interactions. If adhering to pHOS performance targets, hatchery fish do not naturally contribute marine derived nutrients. It is estimated that just 6-7% of the marine derived nitrogen and phosphorus once delivered to rivers of the Pacific Northwest currently reach watersheds (Gresh et al. 2006). Artificial propagation has been shown to negatively influence the spatial distribution, productivity, diversity, and abundance of wild fish populations and thus also continues to exacerbate the deficit of marine derived nutrients to watersheds throughout the Northwest. The long term reliance of out-planting post-mortem hatchery fish is expensive, unable to predict and account for how nutrients are naturally distributed throughout the watershed, and constitutes a dangerous vector for hatchery borne diseases to spread. As noted in Kohler *et al.* (2013), nutrient fluxes are not always unidirectional, and especially in cases with poor juvenile survival, nutrient exports through emigration to the ocean can be greater than marine derived nutrients returning through adult anadromous fish migrations.

Overall, the ecological risk of artificial propagation is the replacement of wild fish by hatchery fish (Hilborn & Eggers 2000, Quiñones *et al.* 2013). When fish produced through artificial production interact with wild fish in a limited carrying capacity, hatchery fish may replace rather than augment wild populations (Hilborn 1992).

3. Genetic Impacts

Wild fish throughout the Northwest are defined by their sense of place, or their high fidelity to return to their birthplace. Their ability to migrate to the ocean and return to their natal stream has profound implications on population structure and has encouraged fine scale genetic adaptations to specific habitats used throughout their lifecycle and geographic range. The genetic risks that artificial propagation poses to wild populations can be broken down into: a.) *loss of genetic variability,* b.) *outbreeding and inbreeding effects,* c.) *domestication selection* and e.) *Epigenetic Impacts*. These genetic effects are caused by removing the ability of natural mate selection when gametes are artificially inseminated in the hatchery.

a.) *Loss of genetic variability:* The loss of diversity occurs both within populations and between populations. Within populations, loss of genetic diversity occurs when mass artificial insemination reduces the quantity, variety, and combinations of alleles present (Busack and Currens 1995). Genetic diversity within a wild population changes from random genetic drift and from inbreeding depression. The process of genetic drift is governed by the effective population size, rather than the observed number of breeders. Although many fish might be present on the spawning grounds the effective population size is smaller than the census size. Artificial propagation has been found to reduce genetic diversity and cause higher rates of genetic drift due to small effective population sizes (Waples *et al.* 1990). Negative impacts of artificial propagation on population diversity often manifest as changes in morphology (Bugert *et al.* 1992) and behavior (Berejikian 1995).

b.) *Outbreeding and inbreeding depression:*

(1) Inbreeding depression: the interbreeding of individuals related to one another, occurs in the wild when populations experience significant declines due to habitat destruction, overharvest, or other factors that limit the number of fish. In fish hatcheries, the practice of artificial insemination does not differentiate between related individuals during the

fertilization process, so the likelihood of inbreeding depression is increased regardless of the population size. Inbreeding depression does not directly lead to changes in the quantity and variety of alleles, but instead homogenizes the population which is then acted upon by the environment. The fish hatchery rearing environment, consisting of either concrete raceways or circular tanks, likely contrasts significantly to the natural selection in the stream environment, thus leading to an increase of deleterious alleles and a reduction in the fitness of the population (Waldman and McKinnon 1993). There is substantial data on the effects of inbreeding depression in rainbow trout (Hard and Hershberger 1995, Meyers et al. 1998) and in steelhead trout, this factor alone has been attributed to a 1-4% decline in productivity (Christie *et al*. 2013).

(2) *Outbreeding depression*, or the fitness and/or diversity loss associated with gene flow from other, genetically distinct fish populations, can also pose significant consequences for native fish. Fine-scale local adaptations occur through random genetic drift and natural selection (Taylor 1991, McElhany *et al*. 2000). Even with a high degree of homing behavior, some fish do return to spawn in watersheds other than where they were born. When fish successfully reproduce in watersheds in which they were not born, they are considered to have "strayed." Stray fish result in gene flow between populations. Outbreeding depression impacts natural fish populations when artificially produced fish stray at rates many times higher than natural fish, leading to interbreeding with distant wild population and causing their offsprings to exhibit a lower fitness in the natural environment. Outbreeding depression is exacerbated by the hatchery setting because the artificial infrastructure inhibits olfactory (Dittman et al. 2015) and geomagnetic (Putman *et al* 2014) imprinting on a home stream. Straying in native fish populations is a natural process which counteracts the loss of genetic diversity and helps to recolonize vacant habitat but usually occurs at very low levels (Quinn 2005). Fish artificially raised in hatcheries can create unnatural gene flow in terms of the sources of stray fish and the high proportion of fish that stray. The more outbreeding depression acts, associated with an increase of exogenous spawners, even if immediate consequences are concealed, populations will possess less adaptive capacity to face new environmental challenges (Gharrett *et al*. 1999). It is important to note that effects arising from the interbreeding of artificially and naturally raised individuals from within the same population arise from domestication selection, which impacts act differently than outbreeding depression.

(3) *Domestication Selection* occurs when fitness loss and changes occur due to differences between the hatchery and natural environments. The process of domestication occurs, intentionally or unintentionally, when there are changes in the quantity, variety, and combination of alleles between artificially inseminated fish and naturally produced fish as a consequence of captivity. The National Marine Fisheries Service defines domestication as the selection for traits that favor survival within a [hatchery] environment (Busack and Currens 1995). Domestication selection impacts natural fish when they interbreed with artificially produced fish adapted to the hatchery environment and suffer a reduced fitness (Ford 2002). This can occur in three principle

ways: intentional or artificial selection, biased artificial propagation, and relaxed selection.

A. Intentional or artificial selection is the attempt to change the population to meet management needs, such as spawning time, return time, out outmigration time. Natural populations are impacted when hatchery adults spawn with wild fish and the performance of the population is reduced. This is also a form of outbreeding depression.
B. Biased artificial propagation is caused during the selection and rearing of captive fish. Hatchery operations are always a source of biased sampling when groups of fish are fed, reared, sorted, and treated for disease.
C. Relaxed selection occurs through artificially high juvenile survival rates during early life stages. Hatcheries are a simplified, sheltered environment that is meant to increase survival relative to the natural environment, and allows deleterious genotypes to move into later life history stages and future generations which wouldn't otherwise be expressed.

(4) *Epigenetic change* has also recently been pinpointed as another impact causing the depletion of biological diversity associated with fish hatcheries. Epigenetics is the study of changes in organisms caused by modification of gene expression rather than alteration of the genetic code itself. It is now well-known that the vast share of any organism's DNA remains latent and unexpressed as the organism develops and lives its life. Epigenetics is the means to study which portions of an organism's DNA are in fact expressed, and what environmental, physiological, behavioral, and other factors cause differences in gene expression as organisms develop (Gavery and Roberts 2017). The DNA of the genome confers to an organism its potential capacity to express variation and range of traits; epigenetic study provides us with the tools to understand how environmental influence controls the realized expression of DNA-determined traits, thus determining the actual health, survival and fitness of the organism. Le Luyer at al. (2017) and Gavery and Roberts provided compelling evidence for epigenetic changes in hatchery-reared fish and shellfish compared to their wild counterparts.

Given the overwhelming evidence of genetic impacts hatcheries cause on wild fish, we also cite numerous studies showing the intersection between the four factors outlined above:

Reisenbichler and Rubin (1999) reference five other studies which find that hatchery programs which captively rear fish for over 1 year, (i.e. steelhead, stream-type Chinook, and Coho salmon) genetically change the population and consequently reduce survival for natural rearing. In the study, the authors found substantial genetic change in fitness resulting from traditional artificial propagation when fish were held in captivity for more than 25% of their life span.

Building off of these findings, morphological and behavioral changes were found in artificially produced, adult, spring Chinook including a reduced number of eggs relative to wild fish (Bugert *et al 1992).* (Leider *et al* 1990) reported diminished survival and reproductive success for the progeny of artificially produced steelhead when compared to naturally produced steelhead in the lower Columbia River. The poorer survival observed for the naturally produced offspring of hatchery fish was likely due to the long term artificial and domestication selection in the hatchery produced steelhead population as well as maladaptation of the fish population within the hatchery to the native stream environment. In a paper on the reproductive success of hatchery fish in the wild, it was reported that hatchery fish did not produce fish that could match the survival or reproductive success of wild fish, even with the use of predominantly wild-origin broodstocks (Christie 2014).

These findings were consistent despite differences in geographic location, study species, artificial propagation methods, and artificial rearing practices. Recent research has also documented an epigenetic impact fish hatcheries pose on wild fish through reduced recruitment on populations that consist of artificial production (Christie 2016). Even within a single generation, domestication selection altered the expression of hundreds of genes to rapidly favor the artificial spawning and rearing environment. Moreover, these traits could be passed along to wild populations if hatchery fish spawned with natural fish.

4. Indirect impacts

Because hatchery fish intersect considerably with naturally produced fish, they also pose indirect impacts from activities and decisions stemming from their presence. These impacts include: *Direct and Indirect take through fisheries*, *Monitoring, and Opportunity costs*.

a.) *Direct/Indirect take:* Fisheries directed on artificially produced fish can also harm and/or cause wild fish mortality. Depending on how the fishery is structured, the commercial and recreational pursuit of artificially produced fish can lead to a taking of wild populations in excess of what would be compatible with their minimum viability.
b.) Monitoring: Under the endangered species act, monitoring and evaluation of artificial production is mandated to ensure that activities associated with captive rearing do not limit the recovery of listed populations. Monitoring activities themselves are identified as actions associated with various levels of take on listed species.
c.) *Opportunity costs:* The opportunity costs for funding hatchery programs instead of other fish creating investments like habitat restoration continue with integrated as well as segregated broodstock programs. Ogston et al. 2015 found that habitat restoration opportunity cost in natural fish vs artificial production were comparable on a single brood year basis. However, habitat restoration then continues to naturally produce fish in subsequent generations while artificial rearing practices require indefinite, continued funding to support subsequent brood years.

Conclusion:

Continuing to operate fish hatcheries in the Klamath River adds additional biological impacts and increases risks to the health, life history, and potential recovery of threatened wild Coho salmon and sensitive Chinook salmon. Adding additional risks for these species by bombarding them with artificially mass-produced fish (which carry disease and weakened genetics) detracts from the transition towards a sustainable wild fishery, and exacerbates the ongoing inequity disadvantaged communities experience (as discussed in Phedra, Pezzullo and Sandler 2007). The financial resources fish hatchery facilities require to operate also allocates resources away from solving the root problem of species and ecosystem decline, including but not limited to, habitat restoration and pollution abatement.

Finally, we recognize that there are other diverse communties who value this public resource and the habitats that support them for non-extractive direct use (tourism), indirect values (ecosystem services), and non-use purposes (existence, intrinsic, and bequest values) who have been and continue to be displaced by the public investment in artificial fish production. We hope these issues are carefully considered in future analysis, as significant public financial resources are allocated to artificial hatchery production that only benefits a few.

In conclusion, we believe the best hatchery for wild fish is a healthy river. Mass producing fish in a hatchery setting with the goal of enhancing population health cannot operate indefinitely because of their dependence on naturally produced fish. If continued operation of the Iron Gate Hatchery program is authorized, this investment in an unsustainable, artificial fishery will set a terrible precedent in applying limited dollars towards a project that does not meaningfully benefit wild fish recovery and ecosystem restoration.

The California State Water Resources Control Board should not authorize the water certification for "Condition 12. Hatcheries" and the infrastructural investments to Iron Gate Hatchery and Fall Creek Hatchery because these practices do not meet the definition of "recovery" or "delisting" of "self-sustaining" fish populations within the Endangered Species Act and other federal and state recovery planning documents – an intended outcome of Project decommissioning. Due to the numerous impacts of the artificial production of fish and the communities they support, we encourage the California State Water Resources Control Board to conduct a thorough viability analysis to determine how threatened fish in the Klamath River are affected by the proposed action and make the analysis available to the public. At the very least, the California State Water Resources Control Board must analyze these significant impacts, and consider alternatives and feasible mitigation, in its EIR for the project.

Thank you for the opportunity to voice our concerns about this critically important issue, and this incredible opportunity to restore the Klamath River. We hope that the California State Water Resources Control Board values the comments raised in this letter and heeds our strong recommendation to develop an exit plan for artificial production facilities in the Klamath River with Project decommissioning.

Respectfully,

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Mark Sherwood, Executive Director, Native Fish Society
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