Comments from Tribes and Responses

This section contains copies of comment letters from the tribes listed in Table 3-4 and responses to their comments.

Table 3-4. Tribes Providing Comments on Draft Environmental Impact Statement

Abbreviation	Tribe
HVT1	Hoopa Valley Tribe
HVT2	Hoopa Valley Tribe
YUR	Yurok Tribe

Hoopa Valley Tribe

Comments of Hoopa Tribal Fisheries offered in review of Draft EIS for The Long-Term Plan to Protect Adult Salmon in the Lower Klamath River

December 1, 2016

Introduction

The Hoopa Valley Tribe stands in support of late summer releases from Lewiston Reservoir to protect fish in the lower Klamath River against fish kills. While releases from Lewiston are but a temporary mitigation for problems arising on the Klamath River system above the Trinity River confluence, they stand as the only practicable mitigation in the immediate future. In the face of continuing climate warming, we anticipate the need for Lewiston releases will become more and not less frequent. Ultimately, solutions to the problem of lower Klamath fish kills will be the result of restoration of Klamath River flows and water quality above the confluence of Trinity River; It is imperative that we begin work immediately to address those problems. HVT1-1

Releases from the Trinity River Division may not come from volumes identified in the Trinity River Record of Decision of 2000, as those volumes were identified through long and careful effort as critical to Trinity-specific instream flow needs. The level of analysis regarding impacts to Trinity River provided in the Draft Environmental Statement (DEIS) does not accurately describe likely consequences of reallocating ROD volumes in service of Alternative 2; findings of the Trinity River Flow Evaluation Study and the ROD stand as the scientific standards of proof regarding instream flow needs in Trinity River. HVT1-2

Incorporated by reference here are the Tribe's written comments submitted over the course of Plan and EIS development, stretching back to December of 2013. Many of those comments remain pertinent, as our suggested changes to the documents have yet to be adopted. HVT1-3

General Comments

The alternatives are tactical rather than strategic in approach; the impact analyses are at turns scientifically inaccurate, failing to build on the progression of science since 2002, failing also to incorporate science of the Trinity River Restoration Program; and fall short of providing a robust analytical platform. HVT1-4

The DEIS fails to present clearly the causes of the problem, and the true solutions. Low flows and elevated water temperatures in the lower Klamath are a direct result of flow diversions, dams and land management practices in the basin well upstream from the Trinity River confluence. Flows during August and September at the mouth of the Trinity River are in fact

substantially higher than those prior to construction of the Trinity River Division of the Central Valley Project. Furthermore, the DEIS alternatives fail to establish any path to problem resolution, as the described monitoring and research needs focused on refinement of the short-term tactics for mitigation, rather than the identification of root causes. HVT1-4 (contd.) HVT1-5

As a Cooperating Agency under NEPA, the Hoopa Valley Tribe has participated throughout the development of the Plan and related environmental compliance documents. The schedule for EIS development was greatly delayed, and once underway, collaboration between Lead and Cooperating Agency was undermined by the scarcity and brevity of meetings – most of which were conducted via webinar and held to strict time limits. We see now that many of the ideas we began presenting in December 2013 have yet to be embraced by Reclamation. In our review of the Administrative DEIS, we note a number of fundamental flaws that were previously identified by us, and provided to Reclamation in the form of an Excel spreadsheet, as requested. The DEIS shows few improvements from the Administrative DEIS, and therefore draws strikingly similar criticisms. The lack of attention to the Tribe's special expertise cuts against terms of the MOU between Reclamation and the Tribe, which states, at Section 4, in regards to Reclamation's responsibility: HVT1-6 HVT1-7

> "As lead agency, Reclamation's responsibilities include:"
> "To the fullest extent possible, consistent with its responsibility as lead agency, use the data, environmental analyses, and technical studies of the Cooperator, giving particular weight to those topics on which the Cooperator is acknowledged to possess special expertise. As appropriate, ensure the Cooperator's comments, including divergent views, are appropriately documented and considered." HVT1-8

The expertise of the Tribe and its consultants has not been duly considered. Instead, Reclamation has turned away from specific technical information and recommendations relating to flow needs in the lower Klamath, substituting flows that are, at turns, of lesser magnitude and shorter duration than previously identified and triggered (or not) by criteria of questionable value. Specific comments along this line are provided in the independent review (see attached) developed by our consultant, Dr. Joshua Strange. HVT1-9

Alternatives

Reclamation has inappropriately pre-determined the efficacy of alternatives, and is failing to analyze the range of alternatives required under NEPA. Alternatives analyzed fully include use of Trinity ROD water; this would require Interior to overcome legal and administrative hurdles we believe to be insurmountable. HVT1-10

At the same time, dismissed from consideration is removal of Klamath mainstem dams; this is both reasonable and foreseeable within the 15-year timeframe of analysis. Modeling of Klamath River temperatures done in support of the Secretarial Issue Document for dam removal predicts rapid cooling of water in reaches below Iron Gate Dam during the month of September; this presents the possibility of coordinating releases from Reclamation's Klamath Irrigation Project and Trinity River Division to meet mitigation criteria developed in the DEIS for the August/September time period. HVT1-11

One or more alternatives analyzed fully in the DEIS should consider operations and facilities at Trinity River Division with potential to improve management flexibility and effectiveness in regard to coldwater reserves behind Trinity Dam. Variations to be explore would include: raising of minimum pool limit for end of season; carryover of in-Basin priority water from year to year; reconstruction of facilities at Lewiston Dam and Reservoir to eliminate heat gain in waters coursing through. HVT1-12

One or more alternative fully analyzed in the DEIS should consider use of water released from Iron Gate Dam on the Klamath River, as flows of suitable magnitude could be made available through re-allocation of water to irrigated agriculture. With the advent of dam removal, slated to commence in four years, cooler water may be available for release in September than is today possible with dams in place. HVT1-13

Technical Specifics

- The proposed criteria for flow augmentation are not supported by current science, and risk continued outbreaks of *Ich* and consequent fish kills. HVT1-14
- The design of the Long Term Plan perpetuates a fundamental flaw in the Bureau of Reclamation's management of the Klamath and Trinity Rivers identified and analyzed in *Hydrology, Ecology, and Fishes of the Klamath River Basin,* Committee on Hydrology, Ecology, and Fishes of the Klamath River Basin, National Research Council (December 2007).
  - The National Research Council found at page 8 that science in the basin was being done by bits and pieces, sometimes addressing important questions, but not linked to other important questions and their studies. The Natural Flow Study and the Instream Flow Phase II were major science and engineering investigations, but the linkage of one to the other was only partially achieved. Other studies in the basin, such as the U.S. Geological Survey's hydrologic studies in the Sprague River Basin, or the extensive research in the Trinity River Basin, seem not to have had any influence on each other or on the flow studies examined in this report. The committee found that the most important characteristics of research for complex river-basin management were missing from the Klamath River: the need for a "big picture" perspective based on a conceptual model encompassing the entire basin and its many components. As a result, the integration of individual studies into a coherent whole has not taken place. HVT1-15
- Conditions of flow, water temperature and water quality in the lower Klamath during the late summer and early fall period have been altered dramatically from historic patterns. Timing of entry to the lower Klamath by summer/fall-run Chinook and other native fishes associates with natural seasonal flow and temperature regimes; historically, the River cooled during the months of September and October, affording migrants progressively cooler water as they ascended to spawning grounds in the Klamath mainstem and its major tributaries. This pattern is unique to the Klamath River; elsewhere throughout the range of Chinook salmon, adults entering freshwater move steadily upstream to HVT1-16

spawning grounds following a brief pause for acclimatization to freshwater. Now, adult salmon entering lower Klamath during hot periods to suspend their upstream migration, and to congregate for extended periods in limited thermal refugia located below Weitchpec. Forced to pause their upstream migration, Klamath River fish are compromised by the effects of warm water plus pollutants including virulent cyanotoxins that put them at high risk of infection by endemic epizootic organisms. HVT1-16 (contd.)

- A major flaw in the DEIS is its failure to explicitly provide for a rigorous monitoring and research program directed at the root cause of lower Klamath flow, water quality and fish disease conditions. There is much to learn in regards to the biology and ecological interactions of Ich in the Klamath Basin. A framework of Adaptive Environmental Assessment and Management, such as is called for in the Trinity River Mainstem Fisheries Restoration Record of Decision and EIS, will be essential to discovery of solutions. HVT1-17

- An effective long-range plan of action to restore river health of the system, and prevent fish kills over the long term should include the following actions: HVT1-18
    - Completion of FERC proceedings on mainstem dam hydropower licenses.
    - Removal of Klamath mainstem dams.
    - Provision of year-round flows in Klamath mainstem supportive of native fish communities (implementation of recommendations in, Hardy, T.B., R.C. Addley, and E. Saraeva. 2006. *Evaluation of Instream Flow Needs in the Lower Klamath River: Phase II, Final Report.* Institute for Natural Systems Engineering, Utah State University, Logan, UT.
    - Augmentation of flows, via coordinated releases from Reclamation facilities on both Klamath and Trinity rivers, as necessary to protect fish in dry years.
    - Establishing and implementing water quality standards for agricultural return flow to meet fish needs
    - Implementation of best practices for use of agricultural and grazing lands in upper Klamath Basin.
    - Restoration of riparian and marsh habitats throughout lands draining to Upper Klamath Lake
    - Making timely, annual CVP and Klamath Project water allocations to irrigators based on surplus beyond instream flow needs and Trinity basin priorities
    - Fulfillment of the Humboldt County Contract for TRD water of not less than 50 Thousand Acre Feet (TAF) annually as a priority in-basin use of TRD water, including reserving annual unused portions of this volume for up to three years to build Trinity Reservoir carry over storage.

Responses to Comments from Hoopa Valley Tribe

HVT1-1: In Chapter 2, "Description of Alternatives" of the Draft EIS, text on page 2-13 (line 13) has been revised to clarify that although Klamath River Basin sources would not be sufficiently effective for the Proposed Action, there is justification for further study of the impacts from water diversion in the Klamath River Basin and associated water quality concerns on fishery and other resources in the lower Klamath River. These and related issues will be addressed in a future effort. See Chapter 4, "Errata" of this Final EIS.

As described in Chapter 2, "Description of Alternatives" on page 2-2, and detailed in the Analytical Tools Technical Appendix of the Draft EIS, anticipated climate change and sea-level rise have been incorporated into the analyses for the No Action Alternative and action alternatives. Please also refer to Master Response "Range of Alternatives."

HVT1-2: The Trinity River ROD allows for adjustments to the release schedule to respond to changing conditions and evolving scientific understanding. The Trinity River ROD established an Adaptive Environmental Assessment and Management Program to recommend possible adjustments to the annual flow schedule provided for in the Trinity River ROD or other measures to ensure that the restoration and maintenance of the Trinity River anadromous fishery continues based on the best available scientific information and analysis. Although Trinity River ROD flows were not originally intended to be used for late-summer flow augmentation releases, the flow augmentation releases under Alternative 2 would directly contribute to the maintenance of the Trinity River anadromous fishery. A larger proportion of Trinity River fall-run Chinook Salmon were lost in the 2002 fish die-off compared to the Klamath River run. Accordingly, returning Trinity River adult salmon are a primary beneficiary of the flow augmentation releases under Alternative 2. As described in Chapter 13, "Indian Trust Assets" of the Draft EIS, Alternative 2 would maintain average annual releases to the Trinity River.

As an implementing agency of the Trinity River Restoration Program and member of the Trinity Management Council, Reclamation fully understands and recognizes the intent and purpose of the Trinity River ROD objectives. The flow-related objectives of the Trinity River ROD, as presented in the 1999 *Trinity River Flow Evaluation Final Report*, were considered in the development of the effects analyses. In addition to the impact analyses on effects to Trinity River ROD water temperature objectives described in Chapter 5, "Surface Water Quality," the analyses presented in Chapter 7, "Biological Resources – Fisheries" and Chapter 8, "Biological Resources – Terrestrial" of the Draft EIS address effects on a number of relevant Trinity River ROD objectives potentially affected by Alternative 2. Specific Trinity River ROD objectives considered in the Chapter 7, "Biological Resources – Fisheries" analysis were listed in Table 7-2 (see pages 7-47 to 7-49), and those considered in the Chapter 8, "Biological Resources – Terrestrial" analysis were described on pages 8-35 to 8-36 of the Draft EIS.

HVT1-3: Reclamation appreciates the participation of the Hoopa Valley Tribe since 2013 and their input on the development of this project.

HVT1-4: Please refer to Master Response "Scientific Support for Flow Augmentation," Master Response "Best Available Information," and Master Response "Range of Alternatives."

HVT1-5: Chapter 2, "Description of Alternatives" of the Draft EIS specifically identifies that additional monitoring and research components will be conducted to further the scientific understanding of the causative factors of Ich infection and outbreak (page 2-6). During development of the Draft EIS, the cooperating agency workshop conducted on May 10, 2016 included a working session to identify research and monitoring components to be included in the action alternatives. Following the workshop, the information developed and refined in the workshop was shared with the cooperating agencies for further review and comment. Specifically, information developed through this effort was incorporated into the action alternatives, including monitoring and forecasting actions to inform flow augmentation trigger criteria, and potential scientific questions and research and monitoring efforts to support hypothesis and conceptual model development relating to the causes of fish die-off and the efficacy of any measures taken to reduce fish die-off due to Ich epizootic.

HVT1-6: As described in Chapter 15, "Consultation, Coordination and Compliance" Reclamation conducted three in-person workshops and two webinars with cooperating agencies during preparation of the Draft EIS. While the schedule has been compressed, Reclamation believes that participation by the Hoopa Valley Tribe as a cooperating agency has improved our understanding of the issues associated with implementation of the action.

HVT1-7: Reclamation thoroughly considered all input and comments received during the development of the EIS. Comments received from cooperating agencies throughout development of the EIS resulted in changes to the alternatives development and refinement as well as the assessment of impacts. For example, based on comments on the Administrative Draft EIS, Reclamation revised preventive base flow augmentation criteria regarding Yurok Tribal harvest criterion based on comments received from the Hoopa Valley Tribe. As requested by the Hoopa Valley Tribe, Reclamation also thoroughly explored carrying over water in Trinity Reservoir during specific year types for the purpose of providing supplemental flow release in future years.

HVT1-8: Reclamation has complied with the terms of the MOU between Reclamation and the Hoopa Valley Tribe in development of the EIS. Please refer to the responses to comments for HVT1-6 and HVT1-7. Please also refer to Master Response "Best Available Information" and Master Response "Scientific Support for Flow Augmentation."

HVT1-9: Please refer to Master Response "Scientific Support for Flow Augmentation." Please also refer to the responses to comments for HVT2-1 through HVT2-10 for responses to the comment letter authored by Dr. Joshua Strange for the Hoopa Valley Tribe.

HVT1-10: Please refer to Master Response "Range of Alternatives" and Master Response "Reclamation Authority to Release Flows."

HVT1-11: As described in Chapter 2, "Description of Alternatives" of the Draft EIS (page 2-2), removal of the four PacifiCorp dams was not included as part of the No Action Alternative since the Federal Energy Regulatory Commission (FERC) has not approved the removal of these dams. However, as described in Chapter 2, "Additional Reasonably Foreseeable Projects or Actions" in the Cumulative Effects Appendix of the Draft EIS, removal of the four PacifiCorp dams on Klamath River was included in the cumulative effects analysis.

As a preparer of the *Klamath Facilities Removal Final EIS/R*, Reclamation fully understands the temperature modeling of the Klamath River that was conducted in support of the EIS/R and Secretarial Determination. Removal of the dams is anticipated to improve water temperatures immediately downstream of Iron Gate Dam. However, these effects would decrease in magnitude with distance downstream from Iron Gate Dam, and would not be evident in the reach downstream from the Salmon River confluence (DOI and DFG 2012).The *Klamath Facilities Removal Final EIS/R* refers to a 2011 USGS report titled *Simulating Water Temperature of the Klamath River Under Dam Removal and Climate Change Scenarios* (USGS 2011) in support of the referenced *Klamath Dam Removal Overview Report for the Secretary of the Interior* temperature modeling. Pages 34-36 of this report show predicted minimal, if any, temperature effects at or downstream from the confluence of the Klamath and Trinity Rivers under a full dam removal scenario, for both historical and climate change simulations. In addition, similar temperature modeling efforts conducted for relicensing and (total maximum daily load (TMDL)) determinations—as part of the *Klamath Facilities Removal Final EIS/R*—also predict very minimal temperature effects at the Klamath and Trinity Rivers confluence as a result of the dam removals. The *Klamath Facilities Removal Final EIS/R* states on page 3.2-89, "Therefore, under the Proposed Action [full dam removal], water temperatures would not be directly affected in the lower river downstream from the confluence with the Salmon River, including the Klamath Estuary and the marine nearshore environment."

Please also refer to Master Response "Removal of PacifiCorp Dams on the Klamath River" and Master Response "Range of Alternatives."

HVT1-12: Please refer to Master Response "Range of Alternatives."

HVT1-13: Please refer to the response to comment for HVT1-11.

Please also refer to Master Response "Removal of PacifiCorp Dams on the Klamath River" and Master Response "Range of Alternatives."

HVT1-14: Please refer to Master Response "Scientific Support for Flow Augmentation."

HVT1-15: Reclamation appreciates that basin-wide ecosystem issues persist. However, as described in Chapter 1, "Introduction" of the Draft EIS (on page 1-8) the Purpose and Need for this action is specific to reducing the likelihood, and potentially reducing the severity, of any Ich epizootic event that could lead to an associated fish die-off in future years. Further, Chapter 7, "Biological Resources – Fisheries" (pages 7-14 to 7-16) in the Draft EIS identifies the primary factors, based on the best available information, that contribute to Ich infection and outbreak in adult salmon returning to the Klamath River, including background presence of Ich parasites, high water temperatures, low-flow conditions, and presence of adult salmon. The action alternatives were specifically developed to address the Purpose and Need, including the ability to address one or more of the causative factors.

HVT1-16: Please refer to Master Response "Scientific Support for Flow Augmentation."

HVT1-17: Chapter 2, "Description of Alternatives" of the Draft EIS specifically identifies that additional monitoring and research components will be conducted to further the scientific understanding of the causative factors of Ich infection and outbreak in the lower Klamath River

(page 2-6). As described on pages 2-6 and 2-7, adaptive management principles and processes will be utilized to further the understanding of causative factors and to refine flow augmentation trigger criteria. Additions to Table 2-3 have been made in response to various comments (see Chapter 4, "Errata" of the Final EIS). Other key questions may arise during implementation that will be considered for monitoring or research.

Please also refer to the response to comment for HVT1-5.

HVT1-18: Please refer to Master Response "Removal of PacifiCorp Dams on the Klamath River" and Master Response "Range of Alternatives."

Hoopa Valley Tribe

HVT2

Sweet River SCIENCES

November 30th 2016

Reclamation's Public Draft EIS on Long-Term Plan to Protect Adult Salmon in the Lower Klamath River

Comments on Behalf of the Hoopa Valley Tribe by Dr. Joshua Strange

Overall, Reclamation's Draft Environmental Impact Statement (Draft EIS) on the Long-Term Plan to Protect Adult Salmon in the lower Klamath River (LTP) reflects generally sound scientific elements in terms of appropriate baseflow requirements, preventative pulse flow concepts, and emergency releases protocols and associated analyses. These elements and analyses are based on a large body of evidence in the literature and from over a decade of monitoring in the lower Klamath River. The LTP and Draft EIS serve as generally solid foundational documents to guide future management actions assuming implementation of a functional adaptive management framework and selection of an alternative that doesn't increase the likelihood of diseases in adult as well as juvenile salmonids. Reclamation and its consultants should be commended on reviewing and compiling a large body of supporting evidence from which to choose the appropriate management actions to protect adult salmon in the lower Klamath River, while also balancing other water use considerations. HVT2-1

As an independent scientist with expertise in disease dynamics and salmon migration behavior in the lower Klamath River commenting on behalf of the Hoopa Valley Tribe, it's my professional assessment that only Alternative 1 provides a viable plan to protect adult salmon in the lower Klamath River while also balancing other water use considerations and not increasing diseases to juvenile salmonids. The No Action Alternative would result in an unacceptable level of risk of future disease outbreaks and mortality, in particular with global warming, and with a very high likelihood of additional fish kills such as occurred in 2002. Alternative 2 would provide protection to adult salmon but would also result in serious problems for other life-stages, in particular increased non-*Ich* diseases to juvenile salmonids migrating through the lower Klamath River (including ESA-listed SONCC coho salmon); problems that would be compounded by frequent reductions of spring flow releases as a result of more frequent adult salmon protective flows due to continued and worsening global warming in the future. HVT2-2

With these general comments and recommendations in the forefront, there are also several notable areas wherein factual errors, deficiencies in analyses, or short coming in the process need to be corrected and strengthened with recommendations provided herein. The notable areas are related to: 1) Negative impacts of Alternative 2 on juvenile salmon; 2) Characterization of factors influencing *Ich* disease dynamics and supporting HVT2-3

documentation; 3) Implementation details of protective flows; 4) Proposed adaptive management process; and, 5) Evaluation of disease risk under the No Action Alternative. Specific comments related to these five primary areas are detailed below.

HVT2-3 (contd.)

1) Negative impacts of Alternative 2 on juvenile salmon

As described in the Draft EIS, Alternative 2 would significantly reduce spring flows releases under the ROD, especially in drier water years, which would result in lower flows and warmer temperatures in the Trinity and lower Klamath River. The extensive science behind the ROD flows demonstrates that such reductions would cause substantial harm to juvenile salmonids by reducing habitat performance in the Trinity River during the critical spring-season for rearing and growth. In addition and perhaps even more importantly, juvenile salmon are suffering from serious levels of disease infection and mortality in the Klamath River from myxozoan parasites, primarily *Ceratonova shasta*, which is killing Chinook salmon and well as ESA listed SONCC coho. This includes infection and mortality for Trinity River fish during their outmigration through the lower Klamath River (Nichols et al. 2003; True et al. 2012).

HVT2-4

Alternative 2 would result in increased disease infection and mortality to juvenile salmonids originating from the Trinity River, as lower flows are correlated with higher disease levels and result in higher infectious parasite spore concentrations (NMFS and USFWS 2013; Fujiwara 2014), which is the primary variable of import for disease levels in juvenile salmon (Ray 2013). This increase in disease infection and mortality would be especially acute in the drier years when further flow reductions in the spring would be the most harmful to juvenile salmonids. Any credible effects analysis of alternatives must include this dynamic and result of Alternative 2 and as such the Final EIS should include such analysis in order to meet the requirements of NEPA, including within the Cumulative Impacts, Indian Trust Assets, Environmental Justice, and Executive Summary sections. This dynamics is a compelling reason why Alternative 2 is problematic and would open Reclamation to litigation over violations of the ESA for SONCC coho.

2) Characterization of factors influencing *Ich* disease dynamics and supporting documentation

The discussion of the "Current understanding of fish disease processes in the lower Klamath River" has several notable factual errors, misleading statements, and disingenuous implications, primarily related to the omission or obfuscation of the importance of low flows and stagnant conditions as a critical primary factor contributing to Ich outbreaks and disease risk via benefits to Ich theronts.

HVT2-5

The Draft EIS provides the following summary [emphasis added]:

> "The primary factors currently thought to contribute to infection dynamics and outbreaks of Ich disease in adult salmon returning to the Klamath River are:

• A background presence and reservoir of Ich parasites carried by the resident freshwater fishes of the lower Klamath River, primarily Speckled Dace (*Rhinichthys osculus*) and, perhaps other fish species including Klamath Smallscale Sucker (*Catostomous rimiculus*), with background levels varying from year-to-year but may be higher in years 10 following large-scale outbreaks of Ich, even when disease or pre-spawning mortality of salmon does not result (Belchik 2015, Strange 2015, Foott et al. 2016).

• High water temperatures in the lower Klamath River, ≥73.4°F, during late summer into early fall that can result in thermal barriers that slow or delay migration of adult salmon. Salmon that arrive from the ocean and encounter these elevated temperatures can congregate in limited thermal refuge habitats, slowing migration through the lower Klamath River as they experience elevated physiological stress, contributing to high replication rates of the Ich parasites (Guillen 2003, DFG 2004, Strange 2010a, 2010b and 2012, USFWS and NMFS 2013, Belchik 2015).

• Low-flow conditions, which are often associated with high water temperatures, can result in limited areas of holding habitat and slowed migration for adult salmon in the lower Klamath River, where they stage until conditions for continuing migration improve, leading to abundant congregations of fish in these limited staging areas, especially near cooler temperature refuges at the mouths of tributaries (DFG 2004, Strange 2012, Belchik 2015).

HVT2-5 (contd.)

• Presence of adult salmon in the lower Klamath River. In particular, large run size and high abundance of fall-run Chinook Salmon in the lower Klamath River generally increases the density of holding fish in the lower river that, in turn, can favor transmission and infectivity of the Ich parasite due to the close proximity of fish in limited holding habitats, leading to outbreaks of infection. However, adult salmon tend to congregate in close proximity to each other (schooling behavior) even with smaller runs or low fish abundance, and outbreaks can still occur during smaller run sizes if other variables are favorable to Ich transmission (Foott 2003, DFG 2004, Belchik 2015, Strange 2015).

The combination and convergence of these factors contribute to prime conditions for infections and transmission of the Ich parasite between fish. When densities of the host fish are high, the likelihood of the infectious tomite stage finding a host is high. When the temperature is high, parasite reproduction rate is increased and heavy parasite loads and burdens in fish can result…"

First and foremost, nowhere in this summary is the reader informed of the fundamental and primary role that low flows, and associated decreased water velocities and turnover rates, play in the risk of an Ich outbreak by facilitating successful transmission of the short-lived, free-swimming infectious theront life-stage of Ich (Bodensteiner et al. 2000;

Dickerson 2006). This is fundamental aspect of Ich biology and management that must be included in any accurate summary or discussion of Ich disease processes and the state of current knowledge of disease processes in the lower Klamath River. The fact that this fundamental aspect of Ich biology and management is not included in this key summary as well as the Executive Summary gives the appearance of incompetence or intentional obfuscation and bias, especially when the role of stagnant conditions is stated in other less prominent sections of the Draft EIS in addition to cited publications.

Contrary to claims made in the Draft EIS, adult Chinook salmon migrate slowly and stage in pools in the lower Klamath River at a variety of flows in the absence of thermal barriers (Strange 2012) with temperatures favorable to Ich life cycle dynamics every-year What is significant for Ich risk is that low river discharge (e.g., < 2,500 cfs) creates stagnation which favors the transmission of the short-lived, free-swimming infectious theront stage (Strange 2010a), which is made worse by elevated background levels of Ich, higher fish densities, and higher temperatures that increase the developmental rate of Ich (Strange 2010a, 2015). The importance of this stagnation is not reflected in this summary even though it is stated in other sections in the document and concluded in cited studies (Strange 2010a, 2015), which creates the distinct impression of intentional bias in an attempt to minimize and obfuscate the role of flows as the primary contributing factor to Ich risk in the lower Klamath River.

HVT2-5 (contd.)

This impression is emphasized by not citing key scientific literature that support the importance of flows in controlling and preventing Ich infections (e.g., Bodensteiner et al. 2000; Dickerson 2006) or by misleading representation of cited studies that also support the importance of flows. For example, Strange (2010a) states:

> "Klamath and Trinity basin adult fall-run Chinook salmon are especially vulnerable to *Ichthyophthirius multifiliis* (Ich) infections due to their tendency to hold and congregate extensively in the lower Klamath River (i.e. below the confluence of the Trinity River) under all river flow conditions…
>
> The key to understanding the 2002 fish kill in the lower Klamath River lies not in the biology of the fish, but in the biology of the parasites, particularly Ich. The key aspect of Ich biology is the probability that its infectious free-swimming life stage can encounter and successfully attach to a fish host during the 72 hour period it can survive without being in a host.
>
> The risk of Ich epizootic fish kills are primarily determined by three probabilities:
>
> - The probability an infectious free-swimming stage of Ich will locate and attach to a fish within 72 hours;
> - The probability of susceptibility of that fish to infection and the resulting severity;
> - The probability and rate of infection spreading to other fish.

Those three probabilities are in turn are strongly affected by four primary variables: 1) river flow; 2) run size; 3) residence time of the fish in the infectious zone; and, 4) water temperature....

The key with higher flows is not greater water volume per se but the associated increased water velocities and higher turnover rates of water in holding areas, which disrupts Ich's ability to find and attach to a host fish during its free swimming infectious stage [theront]."

Also, Strange (2015) emphasizes:

"Ich consists of three primary life-stages: 1) the free-swimming infectious theront; 2) the parasitic and pathogenic trophont; and, 3) the reproductive tomont (Figure 1). The free-swimming theront is the most vulnerable life-stage because it is not embedded in a host fish like trophonts, nor encysted and attached to substrates like tomonts, and it also must find a suitable host within 22.5 hours at 20°C or it will perish from starvation (McCallum 1982).

According to noted microbiologist, fish immunologist, and Ich expert Dr. Harry Dickerson, the simplest treatment for Ich infections is to break the infectious cycle by "reduction or removal of theronts" (Dickerson 2006; pg. 142). Increased flow is a common treatment in flow-through fish culture settings because it impacts the vulnerable theront life-stage (Bodensteiner et al. 2000; Dickerson 2006) and has been used with apparent success in preventing Ich outbreaks and mass mortality from Ich in the Klamath River as evidence by 2002 versus 2013 and 2014 (Belchik 2015; Hetrick and Polos 2015)....

It should be noted that high host density (McCallum 1982; Bodenstiener et al. 2000) and warm water temperatures (Traxler et al. 1998) are not necessary for an outbreak to occur, but will significantly contribute to the risk and resulting severity of an outbreak."

HVT2-5 (contd.)

The impression of intentional bias in an attempt to minimize and obfuscate the role of flows as the primary contributing factor to Ich risk in the lower Klamath River is also created by statements acknowledging this role in less prominent sections of the Draft EIS.

For example, from the Draft EIS pg. 7-57:

"The pathogens involved in the 2002 fish die-off are always present in the lower Klamath River, and water temperatures are normally very warm (≥ 70°F) and at optimal levels for high rates of pathogen replication in the late-summer when fall-run Chinook Salmon begin spawning migrations into the river. Therefore, a disease outbreak could occur anytime conditions exist that facilitate pathogen infection and transmissivity. High

densities of adult salmon staging in the lower Klamath River for an extended period of time is thought to be an important primary risk factor contributing to Ich disease outbreaks (Guillen 2002, DFG 2004, USFWS and NMFS 2013, USFWS 2015b). High densities of adult salmon staging in the lower Klamath River can result from moderate to large annual run sizes, low river flows that restrict holding habitat areas, and high water temperatures (≥ 73.4°F) that cause a thermal behavioral barrier to migrating adult salmon. Low water velocities are also thought to contribute to the successful transmissivity and infection of host fish by the free-swimming infectious life stage of the Ich parasite (Strange 2015). So, it is thought that in years with higher late-summer river flows (and associated higher water velocities) in the lower Klamath River, transmissivity and infection rates of Ich may be reduced. "

HVT2-5 (contd.)

Draft EIS, pg. 7-68:

"The potential effects of increases in the late-summer flows in lower Klamath River under Alternative 1 include an increase in average cross-sectional area of inundated river channel, increases in average water velocities in the channel, and changes in water temperature— all thought to be important in the disruption of infectivity and virulence of the Ich parasite."

Draft EIS, pg. 7-73:

"The effect of increased water velocities on disrupting and reducing the ability of the free- swimming infectious life-stage of the Ich parasite has been reported as being an important function of late-summer flow augmentation in the lower Klamath River (Strange 2015, USFWS 2015, USFWS and YTFP 2016)."

"...given the potential of the proposed action's preventative base flow of 2,800 cfs, and the preventative and emergency pulse flows of 5,000 cfs, to affect increases in cross-sectional channel area to expand habitat space to some degree, increase water velocities that can reduce efficacy of Ich parasites from finding and attaching to adult salmon hosts, and potentially provide migration cues to further disperse adult salmon and reduce densities in the lower Klamath River, conditions under Alternative 1 would be expected to result in some level of reduced risk of Ich infection, epizootic outbreaks and consequent fish die-offs. In addition, reduction in the frequency of year-to-year parasite carryover effect may be reduced."

Secondly, it is erroneously suggested that thermal barriers to migration are the cause of slowed migration among fall run Chinook salmon in the Klamath River, which is not true. While it is true that temperatures in excessive of the upper thermal limits to migration can force adults into limited thermal refuge "holding areas" at the confluences of cool-water tributaries (Strange 2010b) and would be cause for concern if this occurred in the

HVT2-6

midst of the fall run, the fall-run generally avoids this by arriving after seasonal cooling begins and as such they have not been documented making much use of limited thermal refuge habitats (Strange 2012). Fall run Chinook salmon have been consistently observed migrating slowly and holding in non-stratified pools and runs throughout the lower Klamath River (i.e., primarily from Blue Creek to Weitchpec) in wide variety of flow and temperature conditions, including during fall flow releases (Strange 2012). Pools in the lower Klamath River are not a "limited holding habitat". Again, it's highly inappropriate and misleading to cite my published studies (or by other authors) while failing to accurately characterize their findings and conclusions. For example, the study cited to support the misleading claim that thermal barriers to migration are the cause for slowed migration and increased Ich disease risk in fall run Chinook salmon (Strange 2012) states:

> "Chinook salmon populations with fall-run timing generally avoid summer high water temperatures and display steady migration to spawning grounds with minimal delay en route (Goniea et al. 2006). Given these generalities, it was surprising that Klamath fall-run fish displayed slowed migration and extensive holding at the beginning of their freshwater migration, which occurred in all years regardless of date under a variety of river temperature and flow conditions (including large pulsed flows), with no thermal blocks to migration and negligible thermal refuge use."

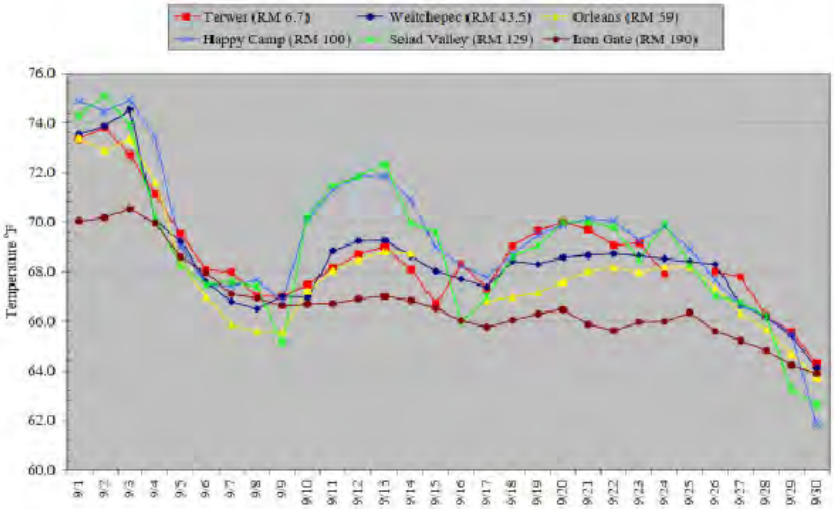
HVT2-6 (contd.)

Further, thermal barriers to migration and use of thermal refuges among fall run Chinook salmon have not played a role in the two most significant Ich outbreaks in the lower Klamath River, in 2002 and 2014, as evidenced by river temperature records and fish observations. In 2002, water temperatures dropped below the upper thermal limits to migration (~23°C/73.4°F, Strange 2010b) starting on September 3rd and in 2014 this occurred on August 23rd (see first two figures below). The fall Chinook salmon run entered the river after these dates in those years and was not observed using limited thermal refuges.

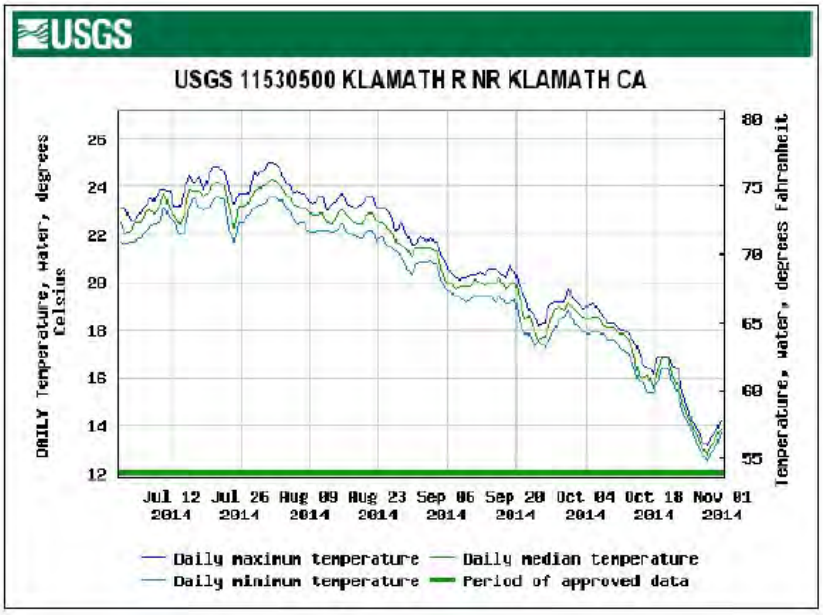
In general, temperatures in excesses of the upper thermal limit to migration (e.g., see third figure below) for adult Chinook salmon rarely occur during the period when fall run Chinook salmon typically enter and migrate through the lower Klamath River (Strange 2012).

In summary, revisions are needed to the Draft EIS to correct these critical factual errors and misleading statements and conform to the best available science regarding Ich and salmon biology and management in relation to the lower Klamath River as well as conform to accepted scientific conventions for citing literature and summarizing research findings.

Comments on Reclamation's LTP Draft EIS on behalf of the Hoopa Valley Tribe
Dr. Joshua Strange, Principal Biologist, Sweet River Sciences



HVT2-6 (contd.)



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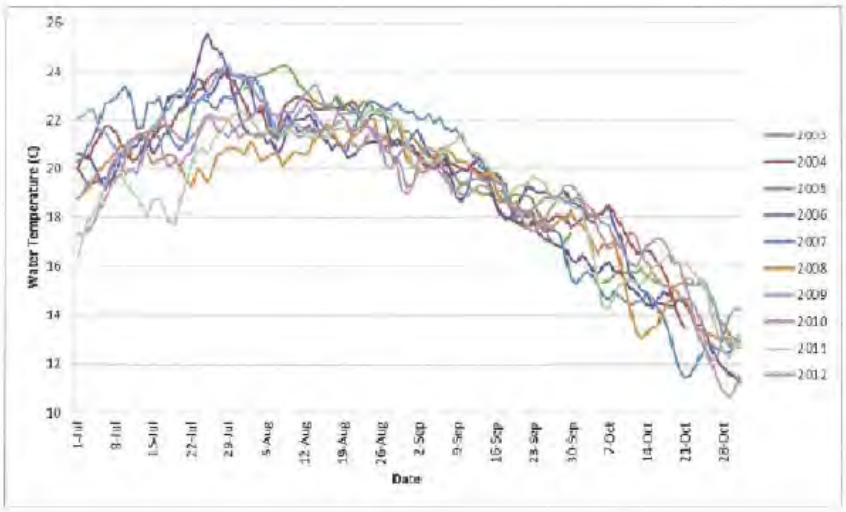
HVT2-6 (contd.)



3) Implementation details of protective flows

The implementation details of protective flows as described for Alternative 1 would benefit from additional refinement. Notably the implementation timeline, which is important and useful, would benefit from a specific decision date in relation to preventative base flow augmentation. A date no later August 22nd is specified as the start date to commence preventative base flows, and working backwards from that, a date no later than should be specified for making a decision on whether or not to release preventative base flows based on the first two criteria (flows and infections). In recent years, a decision as to whether or not to release preventive flows has not been made until the day or so before flow releases, which creates problems for coordinating resources and public safety. It would be highly beneficial to make a decision on releasing preventative base flow three weeks prior to the August 22nd no later than date, which would be approximately August 1st. While there is uncertainty in advanced predictions of summer base flow, real-time flows can be used to make a decision by or near the first of August. In the severe drought years of 2014 and 2015, base flows were way below 2,800 cfs well before August 1st but even in the augmented releases years of 2013 and 2016 base flows dropped to or below the 2,800 cfs threshold by August 1st (see figures below). This decision date should be added to the implementation timeline table and in other relevant sections in the EIS.

HVT2-7

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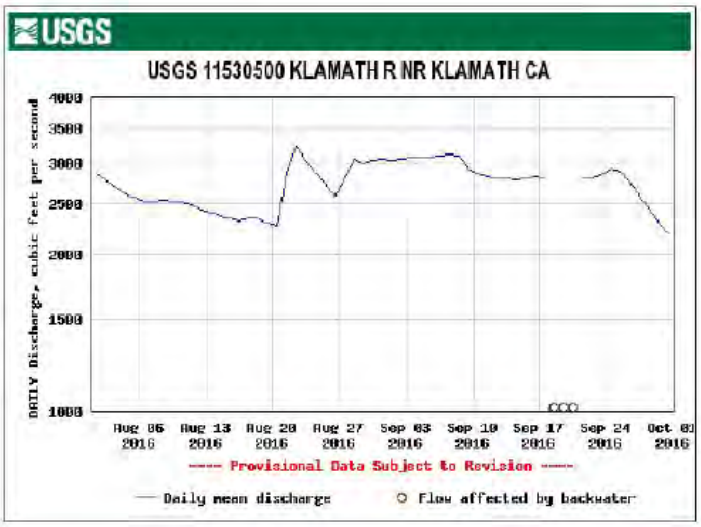

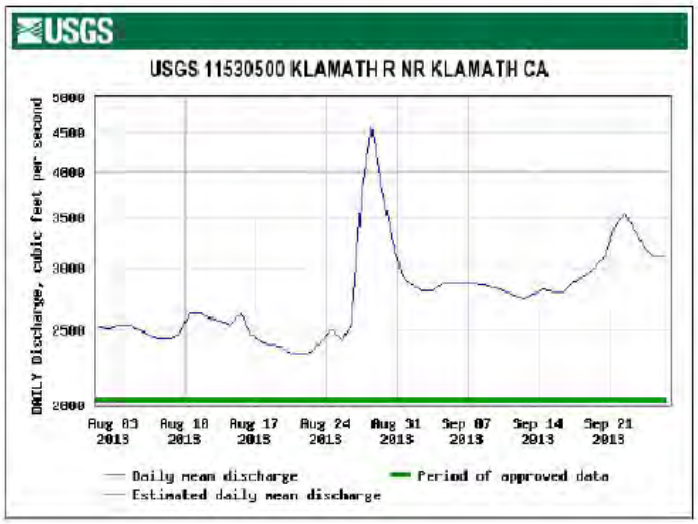

HVT2-7 (contd.)

The preventative pulse flow component of the protective flows would also be improved by additional details and specific decision making guidance.

HVT2-8

According to the Draft EIS, for the preventive pulse flow, "During the preventive base flow period, a preventive pulse flow targeting a rate of 5,000 cfs for one 24-hour period at the Klamath, California gage would occur when the peak fall-run migration (typically the first or second week of September) is identified in the lower Klamath River, as

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indicated by fish density.... Conditional release of this pulse flow requires low-level infections of Ich (less than 30 Ich per gill arch), confirmed on three fall-run adult salmon (of a maximum sample size of 60 fish), captured in the lower Klamath River in one day during this time of typical peak migration, subject to LTP Technical Team review."

However, in 2016 Reclamation's Ich criteria to trigger the release of the preventative pulse flow was met on 9/6/2016 but did not result in such a release as Reclamation disingenuously claimed it was uncertain if the peak of the run was occurring or had already occurred. This claim was made despite the fact that the peak of the run cannot be ascertained real-time given uncertainty and error in run-size forecasts and the lack of baseline data for fish densities, a fact adamantly ignored by Reclamation even under direct questioning, a line of questionably highly relevant to real-time adaptive management as proposed. Reclamation staff claimed that this issue would be addressed through the EIS process and yet the Draft EIS contains the same false claim that peak of the run can be determined real time through fish density even though no details are offered. Further, historic run-timing data shows that the peak of the fall-run occurs within the first two weeks of the September almost without exception (Strange 2012) and such an approach was sufficient for determining the August 22nd no later than date for preventative base flows (USFWS and NMFWS 2013). HVT2-8 (contd.)

Further, the infection requirement of 3 infected fish confirmed in one-day is overly restrictive, and based monitoring data from past years, would result in this criteria not being met until the criteria was also met for an emergency release, which defeats the purpose of the preventative flow, which is to help prevent the need for an emergency release while using less water.

It is recommended that the following changes be made to the preventative pulse flow in order to address these deficiencies: "During the preventive base flow period, a preventive pulse flow targeting a rate of no-less-than 5,000 cfs for one 24-hour period at the Klamath, California gage would occur when the peak fall-run migration (typically the first or second week of September) is identified in the lower Klamath River by the LTP Technical Team.... Conditional release of this pulse flow requires low-level infections of Ich (less than 30 Ich per gill arch), confirmed on three fall-run adult salmon (of a maximum sample size of 60 fish) captured in the lower Klamath River in one day during this time of typical peak migration, or as determined is warranted by the LTP Technical Team."

4) Proposed adaptive management process

Reclamation is proposing to use an adaptive management framework to guide future refinements to protective flows and associated trigger criteria, and to aid in-season decision making in conjunction with the LTP technical team. This is defined in the Draft EIS (pg. 2-6) as follows: HVT2-9

> "...Based on the concept of adaptive management, and utilizing additional scientific information on the causative factors, Reclamation may refine trigger criteria of the three flow components (e.g., preventive base flow augmentation, preventive pulse flows, and emergency pulse flow augmentation) to further reduce the likelihood—and potentially the

severity—of any Ich epizootic event. The process for potential refinement of flow component trigger criteria will be based on adaptive management principles, as follows:

- Develop hypotheses and conceptual models to identify potential causative factors (e.g., identification of relationships between salmon and environmental conditions—including pathogens—to ecological processes and potential management actions).

- Develop and refine performance measures related to reducing the likelihood of Ich epizootic events and associated fish die-offs.

- Collect and evaluate relevant data and other information pertaining to physical and biotic components of the Klamath River system, salmon performance, pathogen presence, and Ich infestation.

- Propose modifications to flow augmentation trigger criteria that would decrease the likelihood—and potentially the severity—of Ich epizootic outbreaks.

- Recommend implementation of additional monitoring and research programs to examine how selected management actions meet performance measures....

HVT2-9 (contd.)

This monitoring process would be administered by Reclamation with input from the LTP Technical Team. Participants would typically convene several times a year; including late-fall, to review outcomes from the previous year's activities; and spring to make recommendations concerning the coming year's preventive base flow augmentation, preventive pulse flow and emergency flow augmentation actions, and related monitoring. Refinement of the trigger criteria for the flow components could result in minor modifications to preventive base flow augmentation, preventive pulse flow, and emergency flow augmentation actions described in this EIS.

The purpose of adaptive management is to allow for mid-course corrections that can be employed to better manage flow as new information becomes available. For example, the flow target of 2,800 cfs could be modified through an adaptive management approach, as could the frequency of flow augmentation actions. While it is likely that adjustments in flow may lead to using less water as causative factors become better understood, it is also possible that additional flow may be necessary. Reclamation would prepare supplemental environmental documentation, as necessary, as changes to the flow augmentation actions are contemplated based on new information gained through adaptive management."

While this is certainly advisable, and beneficial in theory, my experience thus far as a participant is that this process under Reclamation's leadership has fallen well short of a functional adaptive management process, which relies on responding to factual evidence

in an unbiased manner. Rather, I have observed in Reclamation's process thus far a consistent pattern of ignoring new evidence that supports flow releases, being slow to respond to emerging hypotheses or establish facts regarding Ich and salmon behavior that supports flow releases, and biasing decisions and interpretation of data in way that results in reductions in the amount of water being released and increasing the risks of Ich outbreaks and the resulting severity.

The adaptive management process within Reclamation's multi-party technical team has thus far consisted of polling the opinion of participants with mixed levels of qualifications in lieu of discussions of the evidence that supports or refutes competing hypotheses while allowing for statements of unsupported claims and speculation. Meetings were schedule such that no time was allowed for scientific discussions with the necessary depth and no meetings have been scheduled to discuss and evaluate findings at the end of season nor far enough in advance of the decision point. As one example, in 2016 the trigger criteria was met to release the preventative pulse flow, however, Reclamation claimed that the peak of the fall Chinook salmon run had not yet occurred in the lower Klamath River despite the fact there is currently no way to determine the peak of run until well after it has occurred, which was and will be after the action window for preventative flows. The peak of the run was never determine during the action window in 2016 and the preventative flows were never released, which increased disease risk. While the Ich outbreak did not progress to lethal levels, the preventative pulse flow would have further suppressed the outbreak, likely resulting in lower background levels of Ich in 2017. Reclamation ignored repeated verbal and written requests to clarify how the peak of the run could be determined within the decision window or why a no-later-than-date approach was not being used (parallel to the August 22nd no-later-than-date used for the preventative base flows). Instead of responding to these basic and fundamental scientific and management questions, Reclamation deferred to further analysis in the EIS. However, there is no further analyses contained in the Draft EIS on this topic and the "peak fall-run migration (typically the first or second week of September) is identified in the lower Klamath River, as indicated by fish density" is still included as the trigger criteria for the preventive release even though it can be proven that it is impossible to determine the when the peak is occurring during the season with existing data and monitoring tools, including the use of ARIS sonar or snorkel surveys of thermal refuges. This is a matter of well-established and basic fishery science.

HVT2-9 (contd.)

In sum, the arbitrary and capricious adaptive management and technical team process used to date by Reclamation has undermined the credibility of the adaptive management process, increased the likelihood and severity of Ich outbreaks, and served to consistently reduce the amount of water released for augmentation. This is contrary to assertions in the Draft EIS that adaptive management will be use to refine trigger criteria "to further reduce the likelihood—and potentially the severity—of any Ich epizootic event", which may result in the use of more or less volumes of water.

Unfortunately this fits the pattern as noted by other analysts (McLain and Lee 1996; Walters 2007; Westgate et al. 2012) wherein adaptive management fails in fisheries because of inadequate monitoring, poor leadership, and political or special interest bias in decision making or used as convenient label without achieving any management relevance. For the proposed adaptive management process to work, and to avoid legal

vulnerabilities, these issues will need to be remedied. Fortunately, these issues can remedied with an improved process, and ultimately, using the best available science in an unbiased fashion is in the best interest of all parties to ensure adequate protection of fisheries resources while balancing other water uses.

HVT2-9 (contd.)

5. Evaluation of disease risk under the No Action Alternative

In places, the Draft EIS underestimates disease risk or claims an inability to predict relative levels of disease risk under the No Action Alternative due to a lack of certainty. For example, on pg. 7-56 of the Draft EIS:

> Although the potential risk, frequency, and magnitude of future fish die-offs occurring in the lower Klamath River during the late-summer under the No Action Alternative cannot be predicted with certainty, at this time, it is currently thought that low flows and warm water temperatures in the lower Klamath River—combined with high densities of adult salmon and steelhead in the river during August and September—contributes to the risk of disease outbreaks that could cause large-scale mortality of salmon (DFG 2004, Strange 2010a and 2015, USFWS 30 and NMFS 2013). It is more certain that a large level of pre-spawning salmon mortality can potentially have a disproportionate effect on sub-basin stocks, which, in fact, occurred for Trinity River Hatchery fall-run Chinook Salmon in the 2002 event (DFG 2004). High levels of pre-spawning mortality, including that caused by disease epizootics, can affect salmon reproduction levels and, consequently, the age-class structure of subsequent generations for a number of years beyond the year in which the mortality event occurs. Any disproportionate effects of future fish die-offs, from any cause, on Trinity River salmon stocks would impact natural and hatchery spawning escapement goals for the TRRP, as well as commercial, sport, and tribal harvest allocations.... The potential frequency for future fish die-offs under the No Action Alternative cannot be predicted with certainty at this time."

HVT2-10

This statement is in contrast to other statements in the Draft EIS that claim a certain continued risk of Ich mortality. For example, on pg 7-139:

> "...there is a continued risk of a fish die-off from an *Ichthyophthirius multifiliis* (Ich) epizootic in the lower Klamath River under the No Action Alternative. A fish die-off, regardless of apparent causes, would be devastating for the tribal trust fisheries in the Klamath and Trinity Rivers. The Hoopa Valley Tribe and the Yurok Tribe both depend on the salmon harvest for subsistence, ceremonial, and commercial needs to maintain a moderate standard of living. These Tribes have fished these rivers for thousands of years and tribal culture is deeply connected to the river and the salmon. Without the harvest, these Tribal communities would be greatly impacted. These conditions, combined with the potential of Ich

presence in the river, lead to a continued risk for a fish die-off in the lower Klamath River under the No Action Alternative. Fish die-offs would adversely affect tribal trust fisheries.

Importantly, the Draft EIS correctly acknowledges that the risk of Ich outbreaks and mortality events will increase in the future (i.e., the frequency is likely to increase) due to lower summer flows and higher temperatures with climate change, pg. 7-115:

> "For Klamath Basin rivers, reduced snowpack due to climate change would shift flow patterns to an earlier and shorter spring runoff period, reducing flows during summer months. During summer months, lower flows and increased temperature conditions, due to increased ambient temperatures, would likely increase the potential for Ich epizootic events and related fish die-offs."

HVT2-10 (contd.)

Based on the occurrence of outbreaks and the frequency of the need to release augmented flows over the last decade and a half, combined with global warming outcomes, it can be conclude that there is an unquantified but significant risk of Ich outbreaks and mortality occurring under the No Action Alternative within the next decade. It can also be concluded that it is more likely than not that the frequency will increase with continued global warming in the coming decades. The Draft EIS should reflect these more accurate characterization of the risks and likely frequency of Ich outbreaks and relate mortality under the No Action Alternative throughout the document.

Literature Cited

Bodensteiner LR, RJ Sheehan, and PS Wills. 2000. Flowing water: an effective treatment for Ichthyophthiriasis. Journal of Aquatic Animal Health 12: 209-219.

Dickerson HW. 2006. *Icthyophthirius multifiliis* and *Cryptocaryon irritans* (Phylum Ciliophora). Pages 116-153 *in* PTK. Woo, editor. Fish Diseases and Disorders, Volume 1: Protozoan and Metazoan Infections, Second Edition. CABI, Cambridge, MA.

Fujiwara, M. 2014. Dynamics of infection of juvenile Chinook salmon with *Ceratomyxa shasta*. Fisheries and Aquaculture Journal. 5: 089.

McLain RJ and RG Lee. 1996. Adaptive management: promise and pitfalls. Environmental Management 20:437-448.

NMFS and USFWS (National Marine Fisheries Service and U.S. Fish and Wildlife Service). 2013. Biological opinions on the effects of the proposed Klamath Project Operations from May 31, 2013, through March 31, 2023 on five Federally Listed Threatened and Endangered Species. 607pp.

Nichols K, D Therry, and S Foott. 2003. Trinity River Fall Chinook Smolt Health Following Passage through the Lower Klamath River, June – August 2002.

Ray RA. 2013. Modeling abiotic influences on disease dynamics for the complex life cycle of the myxozoan parasite *Ceratomyxa shasta*. PhD Dissertation, Oregon State University. 198 pp.

Strange JS. 2010a. Summary of scientific evidence to guide special flow releases to reduce the risk of adult fall Chinook salmon mass disease mortality in the lower Klamath River. Yurok Tribal Fisheries Program. 17pp.

Strange JS. 2010b. Upper thermal limits to migration in adult Chinook salmon: evidence from the Klamath River Basin. Transactions of the American Fisheries Society 139:1091–1108.

Strange JS. 2012. Migration strategies of adult Chinook salmon in response to diverse environmental conditions in the Klamath River Basin. Transactions of the American Fisheries Society 141:1622–1636.

Strange JS. 2015. Scientific Rationale and Evidence for Elevated Background Levels of Ich in 2015. Memorandum to Whom It May Concern. Stillwater Sciences, Arcata, California.

True K, A Bolick, and S Foott; 2012, Prognosis of *Ceratomyxa shasta* and *Parvicapsula Minibicornis* Infections in Klamath River Coho and Trinity River Chinook Salmon

USFWS and NMFS. 2013. 2013 Fall flow release recommendation. Memorandum from I. Lagomarsino and N. Hetrick to B. Person.

Walters, CJ. 2007. Is adaptive management helping to solve fisheries problems? Ambio 36:304-307

Westgate MJ, GE Likens, DB Lindenmayer. 2012. Adaptive management in biological systems: a review. Biological Conservation 158:128-139.

Responses to Comments from Hoopa Valley Tribe

HVT2-1: Please refer to Master Response "General Comment."

HVT2-2: Please refer to Master Response "General Comment."

HVT2-3: Please refer to the responses to comments for HVT2-4 through HVT2-10.

HVT2-4: Reclamation recognizes that it is important to address fish diseases when managing salmon protection and recovery efforts in the Klamath Basin, as summarized in Chapter 7, "Biological Resources – Fisheries" pages 7-14 to 7-17 of the Draft EIS, and as reflected by its ongoing support and involvement with the fish health monitoring and research that occurs each year in the Klamath Basin. As the commenter states, Trinity River origin outmigrant juvenile salmon are known to be infected by the myxozoan parasite *C. shasta* in the lower Klamath River; however, it's observed that infection rates are far lower in this reach than for Klamath River juvenile salmon originating in reaches upstream from the Trinity River confluence. The interaction of river flows, water temperature, and parasite infectivity rates of salmon in the Klamath River is dynamic, and virulence of *C. shasta* is acknowledged to be generally higher at lower flows and warmer temperatures.

For the purposes of the impacts analysis presented in the Draft EIS, disease processes—including that for *C. shasta*—are assumed as a factor affecting survival and growth of juvenile salmon, which, in combination with a variety of factors, is related to flow-dependent habitat and water temperature suitability. The differential effects of the alternative actions analyzed are disclosed in the *Impacts Analysis* section of Chapter 7, "Biological Resources – Fisheries" of the Draft EIS, which distinguishes that Alternative 2 would result in a reduction of suitable to marginal salmon smolt rearing and outmigration conditions for Trinity River juvenile salmon for up to two weeks in the spring as compared to Alternative 1 and the No Action Alternative. Cumulative impacts are discussed for Alternative 2 on page 7-116. Indian trust assets are discussed in Chapter 13, "Indian Trust Assets." Environmental justice is discussed in Chapter 14, "Environmental Justice."

HVT2-5: In Chapter 7, "Biological Resources – Fisheries" of the Draft EIS, text on page 7-15 (lines 27-30) and page 7-16 (line 36) has been revised, adding a description of the important and documented relationship of water velocity and life cycle turnover rates in the relationship of Ich parasite infection of adult fish to the summary of understanding of fish disease processes. Appropriate attribution of key scientific report citations has also been added as part of this revision and to the *References* section of Chapter 7, "Biological Resources – Fisheries." See Chapter 4, "Errata" of this Final EIS.

Reclamation agrees with the commenter that this is important background information. The relationship of water flow velocities to river flows, and the ability of higher water velocities to disrupt the free-swimming infectious life-stage of the Ich parasite, was considered and discussed in the impacts analysis of the Draft EIS. With this revision, the analyses for the Trinity and Klamath River fish throughout the *Impact Analysis* section of Chapter 7 "Biological Resources – Fisheries" (pages 7-56 and 7-57 (lines 40 to 43 and 1 to 37), 7-67 to 7-68 (lines 24 to 43 and 1 through 7), 7-73 (lines 1 to 20), 7-97 (lines 7 to 20)) better conforms to the description of the

disease processes in the *Current Understanding of Fish Disease Processes in the Lower Klamath River* section (see pages 7-14 to 7-17).

See also Master Response "Scientific Support for Flow Augmentation."

HVT2-6: In Chapter 7, "Biological Resources – Fisheries" of the Draft EIS, text on page 7-16 (lines 13-25) was revised to clarify and add a descriptive factor concerning the slow salmon migration, regardless of flow level and water temperature, and potential involvement of lower water velocity and turnover rates in the Ich disease dynamics observed in the lower Klamath River. This revision provides more complete and accurate background information, which better conforms to the impacts discussion presented in the Draft EIS. See Chapter 4, "Errata" of this Final EIS.

The text revisions made in response to this comment do not change the impact analysis presented in Chapter 7 of the Draft EIS (see pages 7-42 to 7-116). These text revisions simply clarify the basis for the resulting impact analysis.

HVT2-7: In the Executive Summary and Chapter 2, "Description of Alternatives " of the Draft EIS, text on page ES-4 (lines 21-23) and page 2-3 (line 22) has been revised to reflect that August 22 is the typical date that conditions are likely to warrant initiation of preventive base flow augmentation releases. The decision to release preventive base augmentation flows needs to be informed by real-time biological and environmental conditions (i.e., flow, temperature, fish density). As described in Chapter 2 (on page 2-3), Reclamation will implement flow augmentation components in coordination with the LTP Technical Team, including the Hoopa Valley Tribe. See Chapter 4, "Errata" of this Final EIS.

HVT2-8: Chapter 2, "Description of Alternatives" (page 2-3) in the Draft EIS specifies that Reclamation would implement flow augmentation components in coordination with the LTP Technical Team. During implementation of flow augmentation actions, Reclamation considers the input of all LTP Technical Team members and real-time environmental and biological conditions. The flow augmentation trigger criteria, including the criteria for preventive pulse flows, is based on the best available information (see Master Response "Scientific Support for Flow Augmentation"). Further, as also described in Chapter 2 of the Draft EIS (page 2-6), flow augmentation criteria may be refined annually, in coordination with the LTP Technical Team, utilizing additional scientific information developed through monitoring and research efforts. Chapter 2 also contains the proposed monitoring and research program (see pages 2-6 to 2-9) which has been enhanced in response to comments on the Draft EIS (see Chapter 4, "Errata" of the Final EIS).

HVT2-9: Reclamation appreciates the expertise that the Hoopa Valley Tribe has contributed to past flow augmentation actions. The Hoopa Valley Tribe and other local tribes have actively participated in these flow actions (see Chapter 1, "Introduction" pages 1-1 to 1-8 in the Draft EIS). However, the technical team working in coordination with Reclamation has been comprised of multiple Federal and State fisheries resource agencies and other tribes. When implementing flow augmentation actions, Reclamation considers input from all parties.

As part of the action alternatives, Reclamation has defined monitoring and research actions and identified the process to further refine flow augmentation criteria based on adaptive management concepts (see Chapter 2, "Description of Alternatives" pages 2-5 to 2-7 in the Draft EIS). Please also see the response to comment for HVT2-8.

HVT2-10: In Chapter 7, "Biological Resources – Fisheries" of the Draft EIS, text on page 7-56 (lines 25-39) has been revised to state that there would be a continuing risk of recurring Ich outbreaks and related fish mortality—especially with respect to changes in summer flow and water temperature conditions with global climate change—under the No Action Alternative. See Chapter 4, "Errata" of this Final EIS

Yurok Tribe

YUR

Comments of the Yurok Tribe

on the

The Bureau of Reclamation Long-Term Plan to Protect Adult Salmon In the Lower Klamath River Draft Environmental Impact Statement (Oct. 2016)

Submitted to:

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Bureau of Reclamation
Northern California Area Office
16349 Shasta Dam Blvd.
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Via Email: BOR-SLO-sha-ltpeis-public-comments@usbr.gov

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December 5, 2016

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Re: Comments of the Yurok Tribe on Bureau of Reclamation Long-Term Plan to Protect Salmon in the Lower Klamath River Draft EIS – October 2016

Dear Ms. Long,

On behalf of the Yurok Tribe, we thank you for the opportunity to comment on the Bureau of Reclamation's ("Bureau") Draft Environmental Impact Statement (DEIS) on the Long-Term Plan to Protect Adult Salmon in the Lower Klamath River.

First, the Yurok Tribe strongly supports the Proposed Alternative (Alternative 1)—the Bureau's proposal to provide supplemental water releases to the Lower Klamath River to protect the health of migrating adult salmon. The Tribe is most encouraged and supportive of the adaptive management component of the Proposed Alternative as a way to improve our understanding of *Ich* and the most appropriate responses given the conditions present on the river. YUR-1

Second, the Yurok Tribe strongly opposes Alternative 2—which proposes to use water reserved to the Trinity River under the 2000 Record of Decision (ROD) to provide for increased water flow releases in the fall for the lower Klamath River. The ROD describes annual instream flow volumes below Lewiston Dam according to the recommendations provided in the Trinity River Mainstem Fishery Restoration Final EIS/Environmental Impact Report (EIR). The ROD flows have specific objectives related to restoring natural processes of the Trinity River, such as the geomorphic maintenance of an alluvial river, as well as supplying suitable conditions for various life stages of salmonids, including water temperature. The ROD was never intended to serve as a prophylactic measure to protect Lower Klamath River Salmon and cannot be used to do so without impairing the ROD purposes. YUR-2

I. The Yurok Tribe

The Yurok Tribe is a sovereign federally recognized Indian tribe whose reservation is located on the Lower Klamath River in northern California. With more than 6,100 members, the Yurok Tribe is the largest Indian tribe in California. The tribe dedicates a significant share of its financial and human resources to manage and regulate Klamath River fisheries.

Yurok has an existential interest in protecting its federally reserved fishing rights due to its cultural and spiritual reliance on the Klamath fishery, including coho and Chinook salmon. Yurok people are fishing people who have lived on the Klamath River since time immemorial. The Tribe's ancestral territory includes the Klamath River and the lands surrounding it to the north and south. The original Klamath River Reservation, which included the lower portion of the Yurok Reservation, was created by Executive Order on November 16, 1855. The present-day Yurok Reservation, established by the 1988 Hoopa-Yurok Settlement Act, 25 U.S.C. § 1300i *et seq.*, enlarged the original reservation and extends for one mile each side of the Klamath River from the mouth at the Pacific Ocean approximately 44 miles upriver just upstream of the confluence of the Klamath and Trinity Rivers, bordering the Hoopa Indian Valley Tribe's Reservation. YUR-3

The Executive Orders that created the Yurok Reservation vested the Yurok Tribe with "federally reserved fishing rights." *Parravano v. Masten*, 70 F.3d 539, 541 (9th Cir. 1996). Federally reserved fishing rights in Yurok trust fish species are integral to the Yurok way of life for subsistence, commercial, and cultural purposes. Yurok trust species include, but are not limited to, Coho and Chinook salmon, steelhead trout, lamprey, sturgeon, and eulachon.

The Klamath River and its fishery are central to the Yurok way of life. The Klamath River fishery is "not much less necessary to the existence of the [Yurok] than the atmosphere they breathe[.]" *Blake v. Arnett*, 663 F.2d 906, 909 (9th Cir. 1981) (quoting *United States v. Winans*, 198 U.S. 371, 381 (1905)). The Tribe has a constitutional obligation to protect the natural resources of the reservation and "to restore, enhance and manage the tribal fishery [and] tribal water rights." Yurok Constitution, Preamble. The Yurok Tribe is currently engaged in litigation over Trinity and Klamath River federal water projects that threaten the Tribe's fishery resources.

II. The Proposed Alternative (Alternative 1)—including the Adaptive Management Provisions—is the Best Proposal for Protecting the Health of Adult Migrating Salmon

Yurok strongly supports the Proposed Alternative to provide supplemental water releases to the Lower Klamath River to protect the health of migrating adult salmon. The Tribe is most encouraged and supportive of the adaptive management component of the Proposed Alternative as a way to improve our understanding of *Ich* and the most appropriate responses given the conditions present on the river. The Tribe supports a collaborative approach that will help guide decisions that affect not only salmon populations, but also the physical river characteristics. YUR-4

2

It is critical the adaptive management component of Alternative 1 provides for:

1. Assessing real-time conditions on the river with regard to risk of an *ich* outbreak or fish kill;
2. Ensuring that unintended effects or consequences to the Upper Trinity River are properly monitored and assessed, and;
3. Understanding the river conditions and ecological factors responsible for the increased observations of *ich* and fish kills in the past 15 years.

YUR-4 (contd.)

As the DEIS notes, adaptive management may in some years alter the 2800 cfs target and the frequency of supplemental releases, but the Tribe supports that the 2800 cfs target is the best measure absent clear, scientifically agreed upon river and fishery conditions that warrant such deviations. The Tribe is committed to working with the Bureau and other parties in making these assessments.

III. Alternative 2 is an Inappropriate Proposal Because the ROD Flows Are Critical for Restoring the Natural Processes of the Trinity River, Not for Supporting Lower Klamath River Fishery Health

The Yurok Tribe strongly opposes Alternative 2 and cautions the Bureau against considering it as a viable alternative. The ROD flows have specific objectives related to restoring natural processes of the Trinity River, such as the geomorphic maintenance of an alluvial river, as well as supplying suitable conditions for various life stages of salmonids, including water temperature. The actions proposed by Alternative 2 would provide substantially less flow to meet the objectives that were identified in the 2000 ROD, thereby compromising our ability to meet the objectives of the ROD. Specifically, it is concerning that the analyses contained within this DEIS fails to assess geomorphic effects and riparian recruitment in the Upper Trinity River, both primary ROD objectives.

YUR-5

Another concern with using ROD water for fall flow augmentation is that recent monitoring conducted for the Trinity River Restoration Program (TRRP) indicates that ROD flows are resulting in less gravel transport than initially predicted by the EIR (GMA 2012). Current ROD water volumes have also not been sufficient to meet temperature targets in all years (TRRP 2016). While Alternative 2 suggests accelerated ramping rates for the descending limb of hydrographs, over the last several years the TRRP has deliberately decelerated ramping rates in wet, extremely wet, and normal years to encourage riparian plant growth (Krause 2012), a key objective of the EIR. The reduced ramping rates are necessary so that root growth can keep up with receding ground water (TRRP 2012). These actions were validated in ground surveys to evaluate their impacts (HVTFD and McBain and Associates 2014). Additionally, preliminary data analysis by the USFWS and NOAA has shown that additional water volumes released in the months of April, May, and June are positively correlated with Chinook smolt production and hatchery steelhead trout survival. Removing water volumes from objectives identified in the ROD, as suggested by Alternative 2, would hinder the success of the TRRP at meeting the

multiple objectives identified in the ROD.

YUR-5 (contd.

Further, there is scant existing legal support for the use of ROD flows to be used for the Lower Klamath River fishery. The ROD established a flow regime and TRD operating criteria and procedures for Trinity River fishery flows pursuant to the Central Valley Project Improvement Act ("CVPIA") section 3406(b)(23). The CVPIA's purpose is to protect and restore fish and associated habitats "in the Central Valley and Trinity River basins," § 3402(a), while the 1955 Act includes both the Trinity and Klamath Rivers. CVPIA section 3406(b)(23) is, therefore, narrower than the 1955 Act and focuses on the Trinity River fishery. Consequently, ROD flows are intended to meet specific physical and biological management targets in the Trinity River mainstem, not the Lower Klamath River. The stated goal driving the ROD FEIS/EIR was restoration and maintenance of a healthy Trinity River mainstem. The ROD guides federal decisions for the restoration and maintenance of "the anadromous fishery resources of the Trinity River" and "the Trinity River fishery," and the ROD FEIS/EIR addressed only those issues and impacts associated with "restoration of the *natural production* of *anadromous* fish on the Trinity River *mainstem*." The ROD FEIS/EIR preferred alternative was directed at the federal government's statutory and trust obligations for Trinity River fishery resources, not the Klamath.

YUR-6

Alternative 2 is, therefore, an inappropriate measure to accomplish the protection of Lower Klamath River migrating salmon because the purpose of the ROD and FEIS/EIR was directed at only Trinity River basin resources. Thus, the Lower Klamath River fishery is outside the scope of the ROD.

IV. Other Comments

a. Legal Authorities

Yurok agrees that the Trinity River Division Central Valley Project Act of 1955 (PL84-386)—both Proviso 1 and Proviso 2—provides the principal authorization for implementing the Proposed Alternative (p. 1-15). Yurok alleges that the federal trust obligation owed to the Yurok Tribe is also a source of independent authority for Proposed Alternative as it provides water to protect not only the tribal trust resources in the Lower Klamath River, but also that the water supports the well-being of the Yurok people.

YUR-7

b. Specific Comments

Specific comments are provided on the following pages. Also, relevant publications and sources are provided.

YUR-8

c. Conclusion

The Yurok Tribe thanks the Bureau for the opportunity to comment on draft alternatives to protect the Lower Klamath River/Yurok fishery through supplement flow releases to combat the fish disease *Ich*. The Tribe supports the Proposed Alternative and the potential to work collaboratively with the Bureau and other parties to utilize adaptive management practices to implement the best measures to promote fishery and river health. The Tribe also must reiterate its

YUR-9

strong disapproval of Alternative Two for its failure to support the purposes and objectives of the Trinity River ROD.

YUR-9 (contd.)

If you have any questions or clarifications on these comments, please do not hesitate to contact our staff directly. Mr. Dave Hillemeier, the Fisheries Department Director, may be reached at (707) 482-1350 x.1315, or at dave@yuroktribe.nsn.us.

Sincerely,

Thomas P. O'Rourke
Chairman, Yurok Tribe

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Specific Comments on Draft EIS.
Specific Comments by the Yurok Tribe on the LTP EIS for Trinity Fall Flow Augmentation (NOTE: When copying and pasting text from the DEIS, line numbers were often inadvertently pasted into text – they should be ignored).

Comment Number	Location	Relevant Text	Comment	
1	2-6, lines 27-30	1 Potential Additional Monitoring and Research Actions and Flow Component Trigger 2 Criteria Refinement As part of the Proposed Action (Alternative 1), additional monitoring and 3 research actions would be conducted to further scientific understanding of causative factors of 4 Ich infection and outbreak in the lower Klamath River. Based on the concept of adaptive...	Recommend the following be added as additional focus of research and monitoring: "....to further scientific understanding of causative factors of Ich infection and outbreak in the lower Klamath River, additional management measures to minimize fish disease outbreaks, potential ecological ramifications of management measures implemented to minimize disease outbreaks, and criteria associated with triggering management measures to minimize disease outbreaks."	YUR-10
2	Table 2-1	March – May timeframe, bullet #5.	Should add the Yurok and Hoopa Tribes to those to be coordinated with.	YUR-11
3	2-5 Under heading titled "Monitoring and Research"	***Monitoring and Research*** 3 Monitoring and research efforts will include both essential monitoring actions.....	*3* ***Monitoring and Research*** Change to: "Reclamation will fund monitoring and research efforts that will include both essential...."	YUR-12
4	2-6	*Fish Health Monitoring (Ich)* Monitoring and assessment of salmon and steelhead for the 8 presence of Ich would be conducted along the lower Klamath River during the late-summer and 9 fall months (July through	Recommend removing the list of those that will conduct this monitoring along the Lower Klamath River (on the Yurok Reservation).	YUR-13

1

		October) by the Yurok, Hoopa and Karuk Tribes, or resource agencies.		YUR-13 (contd.)
5	2-6	**Potential Additional Monitoring and Research Actions and Flow Component Trigger** 27 **Criteria Refinement** As part of the Proposed Action (Alternative 1), additional monitoring and 28 research actions would be conducted to further scientific understanding of causative factors of 29 Ich infection and outbreak in the lower Klamath River. Based on the concept of adaptive 30 management, and utilizing additional scientific information on the causative factors, Reclamation 31 may refine trigger criteria of the three flow components (e.g., preventive base flow 32 augmentation, preventive pulse flows, and emergency pulse flow augmentation) to further reduce 33 the likelihood—and potentially the severity—of any Ich epizootic event.	**Replace with following text:** "**Potential Additional Monitoring and Research Actions and Flow Component Trigger** 27 **Criteria Refinement** As part of the Proposed Action (Alternative 1), additional monitoring and research actions would be conducted to further scientific understanding of causative factors of Ich infection and outbreak in the lower Klamath River, and the ecological impacts of management actions taken to minimize ich. Based on the concept of adaptive management, and utilizing additional scientific information on the causative factors, Reclamation may refine trigger criteria of the three flow components (e.g., preventive base flow augmentation, preventive pulse flows, and emergency pulse flow augmentation) to further reduce the likelihood—and potentially the severity—of any Ich epizootic event and minimize potential impacts to the Basin's ecosystem.	YUR-14
6	2-7	Propose modifications to flow augmentation trigger criteria that would decrease the 4 likelihood—and potentially the severity—of Ich epizootic outbreaks.	Propose modifications to flow augmentation trigger criteria or management actions that would decrease the likelihood—and potentially	YUR-15

2

			the severity—of Ich epizootic outbreaks and minimize potential ecological impacts.	YUR-15 (contd.)
7	2-7	This monitoring process would be administered by Reclamation with input from the LTP 15 Technical Team.	This monitoring process would be administered and funded by Reclamation with input from the LTP 15 Technical Team.	YUR-16
8	Table 2-2	Under the heading "Adult Salmon Abundance in Estuary/Lower Klamath River"	Add another bullet: "Sonar counts at thermal refugia and/or index sites"	YUR-17
9	Table 2-3	1st column reads: "What are the key dynamics and metrics for determining Ich (and other pathogens) infectivity and pathogenicity?"	Under 2nd column, add bullets: - What are appropriate levels of ich per gill arch, and % of fish infected, to trigger preventative flow releases, preventative pulse flow releases, and emergency flow releases. - How quickly can ich progress from low levels of infection to a chronic infection? -	YUR-18
10	Table 2-3	1st column reads: "What are salmon responses to late-summer flow augmentation?"	Under 2nd column, add bullets: - What is effect to Klamath basin fish (Shasta, Scott, etc...) from flow releases that reduce Lower Klamath temperature to below migration thresholds, if temperature above Trinity confluence is above migration threshold? - What is the appropriate time period to reduced temperatures in the Lower Klamath below migration thresholds? - What effect does estuary	YUR-19

3

			dynamics (e.g. lack of tidal fluctuation when sand bar limits connectivity with ocean) have upon fish behavior and ich dynamics? -	YUR-19 (contd.)
11	Table 2-3	1st column reads: "What are the potential inadvertent or unanticipated adverse effects of late-summer flow augmentation that may require monitoring and mitigation?"	Under 2nd column, add bullets: - Are there genetic consequences to the salmon population from having minimum lower Klamath fall flows of 2,800 cfs? Where it reads: "Impacts to Hoopa Tribal fishery (net-fouling)" Replace with: "Impacts to Hoopa and Yurok Tribal fisheries (net-fouling)"	YUR-20
12	Table 2-3	Add another row to the first column: "What has caused host (fish)/parasite (ich) relationship to be out of balance in the Lower Klamath/"	- What is role of dams, flow management, water temperatures?	YUR-21
13		First column reads: "What potential techniques are available, and can effective monitoring and assessment techniques for Ich be used as part of annual management? "	Add other bullets: - What effect do spring Chinook congregations in thermal refugia such as Blue Hole, Estuary, early in summer (e.g. July) have upon ich dynamics in the Lower Klamath during the fall? - What effect does temperature early in summer (e.g. July) have upon fish congregations and	YUR-22

4

			subsequent ich dynamics in the Lower Klamath during the fall?	YUR-22 (contd.)
14	Page 4-8	Last paragraph reads: ".....Downstream from the Trinity River 14 confluence, the Klamath River flows through Humboldt and Del Norte counties and through the 15 Hoopa Valley Indian Reservation, Yurok Indian Reservation, and Resighini Indian Reservation 16 within Humboldt and Del Norte counties (DOI and DFG 2012)."	This is not correct and should read: "....Downstream from the Trinity River 14 confluence, the Klamath River flows through Humboldt and Del Norte counties and through the ~~Hoopa Valley Indian Reservation~~, Yurok Indian Reservation, ~~and Resighini Indian Reservation 16~~ within Humboldt and Del Norte counties (DOI and DFG 2012).	YUR-23
15	Page 7-81	Spring-run Chinook Salmon, which have a very low spawning population in the Sacramento 13 River, could experience 100 percent mortality in 2 critical water years, however, that is 14 compared with No Action Alternative productions of 10 and 32 juveniles. In 4 other critical 15 water years, they could experience a decrease in production ranging from 7 to 64 percent relative 16 to the No Action Alternative. In one critical year, they could experience an increase in 17 production of nearly 24 percent compared to the No Action Alternative. Populations of 500 or 18 more spawning Chinook Salmon are considered necessary for accurate results using SALMOD 19 because it is a deterministic model that relies on the "law of large numbers." When populations 20 are *low* (an arbitrary	Spring-run Chinook Salmon, which have a very low spawning population in the Sacramento River, are not appropriate for analysis using SALMOD. Populations of 500 or more spawning Chinook Salmon are considered necessary for accurate results using SALMOD because it is a deterministic model that relies on the "law of large numbers." When populations are *low* (an arbitrary term), such as in the Sacramento River, mean responses are quickly affected by environmental stochasticity 21 and individual variability.	YUR-24

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		term), mean responses are quickly affected by environmental stochasticity 21 and individual variability.		YUR-24 (contd.)
16	Page 13-2	Multiple court rulings have established the important "Indian purpose" for the Hoopa Valley 5 Indian Reservation. In addition, the Yurok Indian Reservation is to reserve tribal rights to harvest 6 fish from the Klamath and Trinity Rivers. The Hoopa Valley Indian Reservation is located on the 7 Trinity River. The Yurok Indian Reservation is on the Klamath River at its confluence with the 8 Trinity River.	Multiple court rulings have established the important "Indian purpose" for the Hoopa Valley and Yurok Indian Reservations. In addition, the Yurok Indian Reservation is to reserve tribal rights to harvest fish from the Klamath and Trinity Rivers. The Hoopa Valley Indian Reservation is located on the Trinity River. The Yurok Indian Reservation is on the Klamath River, extending from two miles upstream of the confluence with the Trinity River (inclusive of the lowest mile of the Trinity River), to the Pacific Ocean.	YUR-25
17	Page 7 - 86	***Trinity River Record of Decision Flow Rescheduling Alternative (Alternative 2)***	The entire section regarding Alternative 2 fails to address some of the primary benefits of spring flows, even though this Alternative is based upon using a portion of spring flows in the late/summer fall. In particular, there is no analysis this looks at the lost geomorphic benefits from implementing alternative 2, nor is there an analysis of the effects upon riparian recruitment.	YUR-26
18	Executive Summary; page 4 line 1-2	a one-day 5,000 cfs preventive pulse flow 2 to be used as a secondary measure	Replace text with: "a one-day pulse flow to raise Lower Klamath flows to 5,000 cfs,"	YUR-27
19	Executive	a five-day, 5,000 cfs 4 emergency pulse	Replace text with: "a five-day	YUR-28

6

	Summary; page 4 line 3-4	flow	emergency pulse flow to raise Lower Klamath flows to 5,000 cfs"	YUR-28 (contd.)
20	Executive Summary; page 4 line 26-35	Line 26-35	Is this suggesting that if the preventative base flow occurs the preventative pulse follow with no additional triggers? If so I think that should be changed to respond to defined triggers	YUR-29
21	Executive Summary; page 5 line 15	Annual implementation schedule table.	August through September should include "Implement monitoring to assess ecological impacts in Trinity River and Lower Klamath to inform adaptive management."	YUR-30
22	Executive Summary; page 6 line 1-5		Should include language "Implement monitoring and research to assess ecological impacts in Trinity River and Lower Klamath to inform adaptive management."	YUR-31
23	Executive Summary; page 7 line 1-2		Add additional bullet "Monitor and research impacts to Klamath estuary, Lower Klamath River, and Trinity River ecosystem due to actions implemented."	YUR-32
24	Executive Summary; page 8 line 8	Figure ES-2	Legend for solid lines should reflect "No Action Alt or Alt 1"	YUR-33
25	Executive Summary; page 9 line 24-27	Both alternatives could lead to water temperature changes in the mainstem of the Trinity River, with Alternative 1 having effects primarily in July through December while Alternative 2 would have effects on water temperature in April through July.	Replace text with: "Both alternatives could lead to water temperature changes in the mainstem of the Trinity River, with Alternative 1 having effects primarily July through December, while Alternative 2 would have effects on water temperature in April through December."	YUR-34

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26	Chapter2; page 5 line 2	Annual implementation schedule table.	August through September should include "Implement monitoring to assess ecological impacts in Trinity River and Lower Klamath to inform adaptive management."	YUR-35
27	Chapter 2; page 5 line 4-7	Monitoring and research efforts will include both essential monitoring actions (e.g., monitoring 5 required to measure the flow augmentation component triggers, such as Ich infestation level) as 6 well as additional monitoring and research actions, to inform potential refinement of flow 7 augmentation trigger criteria.	Suggest changing text to: "Monitoring and research efforts will include both essential monitoring actions (e.g., monitoring required to measure the flow augmentation component triggers, such as Ich infestation level) as well as additional monitoring and research actions, to inform potential refinement of flow augmentation trigger criteria and assess impacts of action on ecosystems of the Trinity River and Lower Klamath Rivers including the estuary."	YUR-36
28	Chapter 2; page 7 line 6-7		Add additional bullet "Monitor and research impacts to Klamath estuary, Lower Klamath River, and Trinity River ecosystem due to actions implemented."	YUR-37
29	Chapter 2; page 10 line 29-32	For extremely wet, wet, normal, and dry year types, the ramping rate would be accelerated following the peak spring flows (e.g., rate of flow curtailment on falling limb would be accelerated). For these four year types, the duration of spring peak flows and the magnitude of the spring peak flows would be maintained.	This is disturbing text considering what the program has found over the course of the last several years. The program has actually decelerated ramping rates in extremely wet, wet, and normal years to encourage riparian plant growth. The reduced rates are necessary so that root growth can keep up with dropping ground water. This takes much more volume of water and could prevent the ability to maintain the magnitude of spring peaks in these waters years were alternative 2	YUR-38

8

			implemented.	YUR-38 (contd.)
30	Chapter 2; page 10 line 34-39	The Trinity Management Council will continue to guide the Adaptive Environmental Assessment and Management Program and will recommend possible adjustments to the annual flow schedule (within the designated flow volumes provided in Table 2-4) to ensure that the restoration and maintenance of the Trinity River anadromous fishery continues, based on the best available scientific information and analysis.	It is our opinion that Alternative 2 would limit the ability of the TMC to manage ROD water volumes to meet objectives. It has been documented that less gravel transport is occurring due to ROD flows than was predicted (GMA 2012). Current ROD water volumes have also not been able to meet temperature targets in all years (TRRP 2016). Additionally, preliminary data analysis by the USFWS and NOAA has shown that water volumes released in the months of April, May, and June are positively correlated with Chinook smolt production and hatchery steelhead survival.	YUR-39
31	Chapter 7; page 45 line 6-10	To compare the operational flow regime and evaluate the potential effects on habitat for anadromous species inhabiting streams, it was necessary to determine the relationships between streamflow and habitat availability or key flow thresholds affecting habitat attributes for each life stage of these species in the rivers in which flows may be altered by CVP operations.	Currently the program is moving from using physical habitat definitions or WUA to using a capacity metric developed for the SSS fish production model. This is telling us significantly different results than using physical habitat. Suggest that analysis is re-run using capacity metric.	YUR-40
32	Chapter 7; page 53 line 1-2	Two different models were used to assess changes in salmonid production potential: 2 (1) SALMOD	The TRRP has develop Stream Salmonid Simulator fish production model. This model uses the capacity metric that is currently thought to be a better predictor of effects on fish production due to change in flow	YUR-41

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Responses to Comments from Yurok Tribe

YUR-1: Please refer to Master Response "General Comment."

YUR-2: The Trinity River ROD allows for adjustments to the release schedule to respond to changing conditions and evolving scientific understanding. The Trinity River ROD established an Adaptive Environmental Assessment and Management Program to recommend possible adjustments to the annual flow schedule provided for in the Trinity River ROD, or other measures to ensure that the restoration and maintenance of the Trinity River anadromous fishery continues based on the best available scientific information and analysis. Although Trinity River ROD flows were not originally intended to be used for late-summer flow augmentation releases, the flow augmentation releases under Alternative 2 would directly contribute to the maintenance of the Trinity River anadromous fishery. A larger proportion of Trinity River fall-run Chinook Salmon were lost in the 2002 fish die-off compared to the Klamath River run. Accordingly, returning Trinity River adult salmon are a primary beneficiary of the flow augmentation releases under Alternative 2. As described in Chapter 13, "Indian Trust Assets" of the Draft EIS, Alternative 2 would maintain average annual releases to the Trinity River.

As an implementing agency of the Trinity River Restoration Program and member of the Trinity Management Council, Reclamation fully understands and recognizes the intent and purpose of the Trinity River ROD objectives. The flow-related objectives of the Trinity River ROD, as presented in the 1999 *Trinity River Flow Evaluation Report*, were considered in the development of the effects analyses of the Draft EIS. In addition to the impact analyses on effects to Trinity River ROD water temperature objectives described in Chapter 5, "Surface Water Quality," the analyses presented in Chapter 7, "Biological Resources – Fisheries" and Chapter 8, "Biological Resources – Terrestrial" address effects on a number of relevant Trinity River ROD objectives potentially affected by Alternative 2. Specific Trinity River ROD objectives considered in the Chapter 7, "Biological Resources – Fisheries" analysis are listed in Table 7-2 (see pages 7-47 to 7-49), and those considered in the Chapter 8, "Biological Resources – Terrestrial" analysis are described on pages 8-35 and 8-36 of the Draft EIS.

YUR-3: Please refer to Master Response "General Comment."

YUR-4: The adaptive management program can be found in Chapter 2, "Description of Alternatives" on pages 2-6 to 2-9. Please refer to responses for various specific adaptive management comments, including: YUR-10, YUR-12, YUR-14, YUR-15, YUR-17, YUR-18, YUR-19, YUR-20, YUR-21, YUR-31, and YUR-36.

YUR-5: As described in response to comment YUR-2, the objectives of the Trinity River ROD were considered in the development of the effects analyses in the Draft EIS.

Gravel transport is driven by the spring peak flows identified in the Trinity River ROD as well as Safety of Dams releases from Lewiston Dam (e.g., spills). As described in Chapter 2, "Description of Alternatives" (pages 2-10 to 2-12) of the Draft EIS, the duration and magnitude of the spring peak flows would be maintained for extremely wet, wet, normal and dry year types, maintaining flows for gravel distribution. As presented in Table 8.2 of the *Trinity River Flow Evaluation Final Report* (USFWS and Hoopa Valley Tribe 1999), geomorphic objectives did not include gravel transport as an objective for critically dry years. Accordingly, the reduced

duration of spring peak flows (1,500 cfs) in critically dry years under Alternative 2 would not affect gravel transport. As described in Chapter 4, "Surface Water Supply and Management" (pages 4-34 and 4-77) of the Draft EIS, both Alternative 1 and Alternative 2 would reduce spills in some winter months during wetter year types, although Alternative 1 would have greater reductions in spills than Alternative 2.

Chapters 5, "Surface Water Quality" (pages 5-66 to 5-81) and Chapter 7, "Biological Resources – Fisheries" (pages 7-87 to 7-100) of the Draft EIS describe the effects of Alternative 2 on water temperatures in the Trinity River, including objectives identified in the Trinity River ROD. Chapter 8, "Biological Resources – Terrestrial" (pages 8-41 to 8-43) describes the effects of Alternative 2 on terrestrial resources, including riparian habitats. Reclamation understands that, as part of the adaptive management process for the Trinity River Restoration Program, spring hydrographs are being modified from those identified in the Trinity River ROD. It should be noted that these hydrographs are being modified to both increase and decrease the receding limb of the spring hydrograph (see Figure 3-1 below) to address multiple Trinity River ROD objectives. As described in Chapter 2, "Description of Alternatives" (page 2-10), under Alternative 2, the Trinity Management Council will continue to guide the Adaptive Environmental Assessment and Management Program, and will recommend possible adjustments to the annual flow schedule to ensure that the restoration and maintenance of the Trinity River anadromous fishery continues, based on the best available scientific information and analysis.

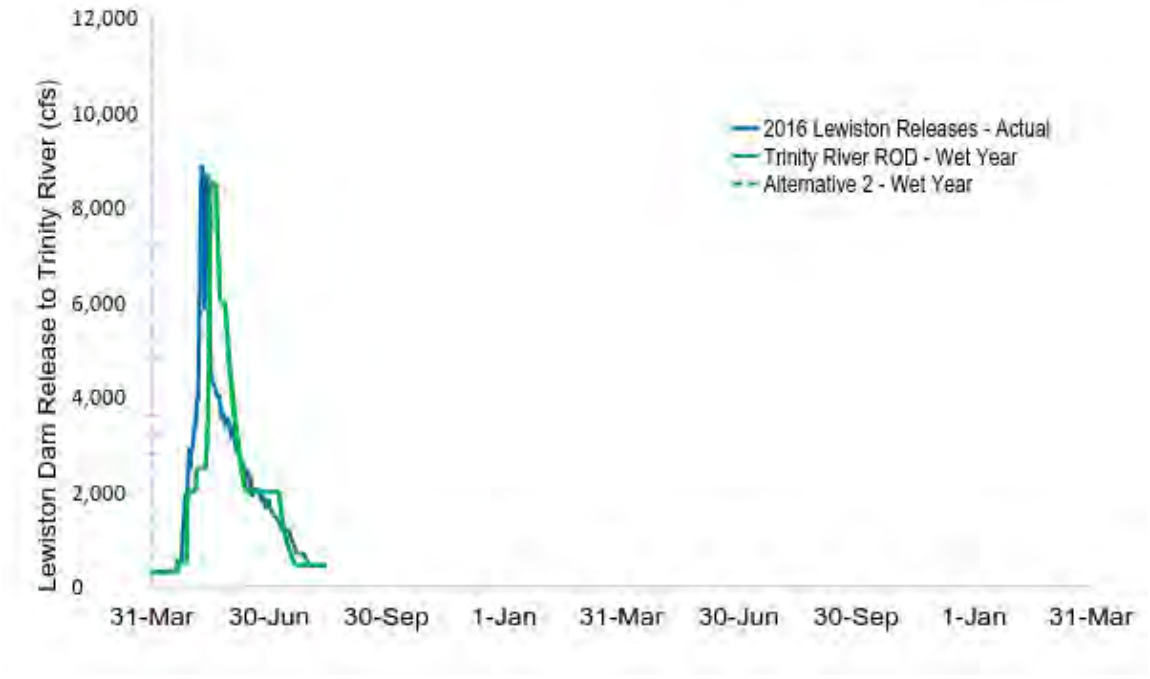

Figure 3-1. 2016 Actual Lewiston Releases Compared to Trinity River ROD and Alternative 2 Identified Flows

YUR-6: The CEQ regulations direct agencies to include "reasonable alternatives not within the jurisdiction of the lead agency" 1502.15. It is noted that the District Court for the Eastern District

of California recently issued a decision that held that Central Valley Project Improvement Act (CVPIA) section 3406(b)(23) (including the 2000 Trinity River ROD) and Proviso 1 of the 1955 Trinity River Division Central Valley Project Act (1955 Act) are limited to the Trinity River Basin, and thus, did not provide Reclamation authority to implement the flow augmentation releases in 2013, similar to those that are the subject of this EIS. The decision of the District Court is on appeal, and if this decision is overturned, then Alternative 2 would fall within the scope of these authorities. While the 2000 Trinity River ROD may have been designed to limit its implementation to the Trinity River Basin, section 3406(b)(23) and Proviso 1 of the 1955 Act do not expressly set such a limitation.

YUR-7: Please refer to Master Response "Reclamation Authority to Release Flows."

YUR-8: Please refer to the response to comments for YUR-10 through YUR-41.

YUR-9: Please refer to Master Response "General Comment."

YUR-10: In Chapter 2, "Description of Alternatives" of the Draft EIS, text on page 2-6 (line 30) has been revised to clarify that monitoring and research actions would also be conducted to further the understanding of ecological effects resulting from the implementation of the action alternatives. See Chapter 4, "Errata" of this Final EIS.

YUR-11: In the Executive Summary and Chapter 2, "Description of Alternatives" of the Draft EIS, Table ES-1 (on page ES-5) and Table 2-1 (on page 2-5) have been revised to clarify that as part of annual implementation of the proposed action during March through May, Reclamation will coordinate with the Yurok Tribe, and the Hoopa Valley Tribe in addition to NMFS, USFWS, and California Department of Fish and Wildlife (CDFW). See Chapter 4, "Errata" of this Final EIS.

YUR-12: As described in Chapter 2, "Description of Alternatives" monitoring and research efforts include both essential monitoring actions (specific to flow augmentation trigger criteria) as well as additional monitoring and research (see pages 2-5 to 2-7). Most of the data from essential monitoring actions are part of established, on-going programs. For example, flow and water temperature at the Klamath, California gage are part of established Federal programs (i.e., U.S. Geological Survey National Streamflow Information Program). Fish health monitoring will include information from the KFHAT that is comprised of 18 Federal, State, and local agencies, tribes, and organizations. Reclamation, with input from the LTP Technical Team, will establish additional monitoring and research priorities based on available funding.

YUR-13: In Chapter 2, "Description of Alternatives" of the Draft EIS, text on page 2-6 (line 10) has been revised in consideration of comment. The lower Klamath River flows through the Yurok Reservation and any monitoring activities on the Reservation would be in coordination with the Yurok Tribe. See Chapter 4, "Errata" of this Final EIS.

YUR-14: In Chapter 2, "Description of Alternatives" of the Draft EIS, text on page 2-6 (line 30) has been revised to clarify that monitoring and research actions would also be conducted to further the understanding of ecological effects resulting from the implementation of the action alternatives. See Chapter 4, "Errata" of this Final EIS.

YUR-15: Chapter 2, "Description of Alternatives" in the Draft EIS identifies additional monitoring and research actions that would be conducted to further the understanding of the causative factors of Ich infection and outbreak in the lower Klamath River, and to refine trigger criteria for the three flow components (see page 2-6). Refinement of the trigger criteria could include changes to the identified timing, duration, and magnitude of flow augmentation components. The commenter identifies the addition of "other management actions," but does not specify the type of management actions nor any specific information for consideration.

YUR-16: Please refer to the response to comment for YUR-12.

YUR-17: In Chapter 2, "Description of Alternatives" of the Draft EIS, Table 2-2 (on page 2-8) has been revised to add additional monitoring of adult salmon by sonar counts at thermal refugia or index sites. See Chapter 4, "Errata" of this Final EIS.

YUR-18: In Chapter 2, "Description of Alternatives" of the Draft EIS, Table 2-3 (on page 2-9) has been revised to add additional monitoring and research topics related to Ich infestation levels to trigger flow augmentation components, improving understanding of how rapid Ich infestation levels can change from low to chronic. See Chapter 4, "Errata" of this Final EIS.

YUR-19: In Chapter 2, "Description of Alternatives" of the Draft EIS, Table 2-3 (on page 2-9) has been revised to add: additional research topics related to effects of flow augmentation actions on Klamath River fish migration above the Trinity River confluence (above migration thresholds), the timing and duration to reduce temperatures in the lower Klamath River, and the effect of estuary dynamics upon fish behavior and Ich infectivity. See Chapter 4, "Errata" of this Final EIS.

YUR-20: In Chapter 2, "Description of Alternatives" of the Draft EIS, Table 2-3 (on page 2-9) has been revised to add additional research topics related to inadvertent effects of late-summer flow augmentation on salmon populations genetics and Yurok Tribal fisheries. See Chapter 4, "Errata" of this Final EIS.

YUR-21: Chapter 2, "Description of Alternatives" (page 2-7) in the Draft EIS describes that Table 2-3 provides potential key scientific questions and related research and monitoring efforts. Additions to Table 2-3 have been made in response to various comments (see Chapter 4, "Errata" of the Final EIS). Other key questions may arise during implementation that will be considered for monitoring or research.

YUR-22: Please refer to the response to comment for YUR-21.

YUR-23: In Chapter 4, "Surface Water Supply and Management" of the Draft EIS, text on page 4-8 (line 16) has been revised per comment to clarify that the Klamath River downstream from the Trinity River does not flow through the Hoopa Valley Indian Reservation or the Resighini Indian Reservation. See Chapter 4, "Errata" of this Final EIS.

YUR-24: In Chapter 7, "Biological Resources – Fisheries" of the Draft EIS, Table 7-13 (on page 7-82) and Table 7-24 (on page 7-104) were revised by adding notes to clarify the unreliability of using a population under 500 for starting populations in the SALMOD simulations. Reclamation concurs that using SALMOD for populations lower than 500 is unreliable, however, the starting

population used for spring-run Chinook Salmon was 489 spawning adults. Additionally, SALMOD is currently the only model available to evaluate operational effects on spring-run Chinook Salmon in the Sacramento River. See Chapter 4, "Errata" of this Final EIS.

YUR-25: In Chapter 13, "Indian Trust Assets" of the Draft EIS, text on page 13-2 (lines 5-9) has been revised per comment to clarify the tribal rights of and the extent of the Yurok Indian Reservation. See Chapter 4, "Errata" of this Final EIS.

YUR-26: Please refer to the responses to comments for YUR-2 and YUR-5.

YUR-27: In the Executive Summary of the Draft EIS, text on page ES-4 (line 1) has been revised to clarify that preventive pulse flows target 5,000 cfs in the lower Klamath River. See Chapter 4, "Errata" of this Final EIS.

YUR-28: In the Executive Summary of the Draft EIS, text on page ES-4 (line 3) has been revised to clarify that emergency pulse flows target 5,000 cfs in the lower Klamath River. See Chapter 4, "Errata" of this Final EIS.

YUR-29: Chapter 2, "Description of Alternatives" (page 2-7) of the Draft EIS describes that preventive pulse flows would be released, in coordination with the LTP Technical Team, based on confirmed low-level infections of Ich in the lower Klamath River on three fall-run adult salmon in one day.

YUR-30: In the Executive Summary and Chapter 2, "Description of Alternatives" of the Draft EIS, Table ES-1 (on page ES-5) and Table 2-1 (on page 2-5) have been revised to clarify that as part of annual implementation of the action alternatives in August and September, effects of flow augmentation action in the Trinity River and lower Klamath River will be monitored and researched to inform adaptive management. See Chapter 4, "Errata" of this Final EIS.

YUR-31: In the Executive Summary and Chapter 2, "Description of Alternatives" of the Draft EIS, text on page ES-6 (lines 2-5) and page 2-5 (lines 4-7) has been revised to clarify that monitoring and research actions will also assess effects of flow augmentation actions on Trinity River and lower Klamath River ecosystems. See Chapter 4, "Errata" of this Final EIS.

YUR-32: Tables 2-2 and 2-3 in Chapter 2, "Description of Alternatives" (pages 2-8 and 2-9) of the Draft EIS describe monitoring and research actions related to effects of flow augmentation actions in the Trinity and Klamath Rivers.

YUR-33: In the Executive Summary and Chapter 2, "Description of Alternatives" of the Draft EIS, Figure ES-2 (on page ES-8) and Figure 2-1 (on page 2-12) have been updated to reflect that the targeted Trinity River ROD releases would be identical in the No Action Alternative and Alternative 1. See Chapter 4, "Errata" of this Final EIS.

YUR-34: In the Executive Summary of the Draft EIS, text on page ES-9 (lines 24-27) has been revised to clarify that both alternatives could lead to changes in meeting water temperature objectives for the mainstem of the Trinity River, with Alternative 1 having effects primarily in July through December, while Alternative 2 would have effects on water temperature in April through July. See Chapter 4, "Errata" of this Final EIS.

YUR-35: Please refer to the response to comment for YUR-30.

YUR-36: In the Executive Summary and Chapter 2, "Description of Alternatives" of the Draft EIS, text on page ES-6 (lines 2-5) and page 2-5 (lines 4-7) has been revised to clarify that monitoring and research actions will also assess effects of flow augmentation actions on Trinity River and lower Klamath River ecosystems. See Chapter 4, "Errata" of this Final EIS.

YUR-37: As described above for the response to comment YUR-14, text on page 2-6 (line 30) in the Draft EIS has been revised to clarify that monitoring and research actions would also be conducted to further the understanding of ecological effects resulting from the implementation of the action alternatives. See Chapter 4, "Errata" of this Final EIS.

The process for refining flow augmentation criteria, based on adaptive management principles, inherently includes evaluation of effects of flow augmentation actions. Specifically, performance measures can include consideration of effects of implementing flow augmentation actions.

YUR-38: Please refer to the responses to comments for YUR-2 and YUR-5.

YUR-39: Please refer to the responses to comments for YUR-2 and YUR-5.

YUR-40: Reclamation is aware of the various fish habitat and production models used in support of the development of the Trinity River ROD, and current modeling efforts being applied to various channel rehabilitation design and evaluation processes for the Trinity River Restoration Program. While the potential use of applicable and available hydraulic-habitat models was considered early on, such a modeling effort and analysis was not considered necessary to determine the relative level of impacts to Trinity River fisheries resources, once the range of alternatives to be evaluated in the Draft EIS was identified. Because the primary difference between the alternatives analyzed in the Draft EIS is the timing (and in critically dry years the duration) of spring-time flow recessions—not changes to the magnitude of Trinity River ROD peak flows and other functional flow levels—the focus of the impacts analysis is on changes to water temperature-mediated habitat conditions affected by an earlier flow reduction schedule of Alternative 2, compared to Alternative 1 and the No Action Alternative.

Additionally, several monitoring reports prepared by the USFWS—addressing juvenile salmonid stranding and salmon redd dewatering, since implementation of the Trinity River ROD—were used to inform the evaluation of Trinity River fishery impacts and are included in the *References* section of Chapter 7, "Biological Resources – Fisheries" (pages 7-116 to 7-136) in the Draft EIS.

The analytical approach for evaluating potential impacts to fish habitat conditions and fishery resources in the Trinity River was discussed and vetted with cooperating partners early in the development of the Draft EIS. During development of the Draft EIS, the cooperating agency workshop conducted on May 10, 2016, reviewed the proposed analytical framework, including proposed analytical tools/models to be applied for resource evaluations, and the methodology for impact analyses for Trinity River fisheries. Specifically, a handout titled *Preliminary Framework and Potential Methodology for Impact Analyses* specified that effects to Trinity River fisheries would be evaluated based upon modeling outputs from CalSim II and RBM10. Following the workshop, the information developed and refined in the workshop was shared with the cooperating agencies for further review and comment. In addition, the cooperating agency

webinar conducted on June 6, 2016, further reviewed the proposed analytical framework, including proposed analytical tools/models to be applied for resource evaluations. Cooperating agencies did not suggest an alternative impact methodology for Trinity River fish habitat evaluations. Reclamation's rationale for using water temperature and flow statistics as primary evaluation criteria to discriminate between the relative impacts to these key fish habitat factors among alternatives is described in Attachment 1 – Selection of Analytical Tools (pages 6 and 7) in the Analytical Tools Technical Appendix of the Draft EIS.

YUR-41: Please refer to the response to comment for YUR-40.