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UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

YUROK TRIBE, et al., Plaintiff, v. U.S. BUREAU OF RECLAMATION, et al., Defendants, and KLAMATH WATER USERS ASSOCIATION, et al., Defendant-Intervenors.	Case No. 3:16-cv-06863-WHO **FEDERAL DEFENDANTS' RESPONSE TO DEFENDANT-INTERVENORS' MOTION FOR RELIEF FROM JUDGMENT AND/OR STAY OF ENFORCEMENT (ECF No. 101)**

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I. INTRODUCTION

Defendant-Intervenors Klamath Water Users Association, Sunnyside Irrigation District, Ben Duval, Klamath Drainage District, Klamath Irrigation District, and Pine Grove Irrigation District (collectively, "Intervenors") have moved this Court to stay enforcement of two flows required in its March 24, 2017 Injunction (ECF No. 70): the winter-spring surface flushing flows modeled on Management Guidance 1 and the emergency dilution flows modeled on Management Guidance 4. Intervenors' Motion, ECF No. 101. Federal Defendants the United States Bureau of Reclamation ("Reclamation") and National Marine Fisheries Service ("NMFS") submit this response to advise the Court regarding Reclamation's ability to implement Management Guidance Measures 1 and 4 under the currently challenging hydrologic conditions.

As the Court may recall, the Injunction contains an internal limitation that requires the Guidance Measures to be implemented only if doing so would not "interfere with conditions necessary to protect the endangered sucker fish [Lost River suckers and shortnose suckers]." Injunction, ECF No. 70 at ¶ 3. As explained more fully below and in the attached declarations, current forecasts do not predict that sufficient water will be available in the Klamath Project in this dry water year to fully implement the Guidance Measures without causing Upper Klamath Lake (which is designated critical habitat for suckers) to drop below the threshold elevations specified in the 2013 Biological Opinion for the species' protection. *See* Designation of Critical Habitat for Lost River Sucker and Shortnose Sucker, 77 Fed. Reg. 73,739, 73,753 (Dec. 11, 2012). This is true even with a complete shutoff of irrigation deliveries during the applicable timeframes for Guidance Measures 1 and 4.

The Guidance Document upon which the Court's Injunction is based does not speak to *partial* implementation of Guidance Measures 1 or 4 with less than the full complement of water necessary to carry out those measures as they are specified in the Guidance Document. *See* Guidance Document, ECF No. 54-3. However, it is the opinion of the widely-recognized experts in *C. shasta* at the U.S. Fish & Wildlife Service ("USFWS") (authors of the four technical memorandums upon which the Guidance Document was based and whose opinions were reviewed for accuracy by Dr. Sascha Hallett, a *C. shasta* expert from Oregon State University)

that partially implementing Management Guidance 4 would increase the "uncertainties … about the potential effectiveness" of Management Guidance 4 and therefore may not would not provide the intended population-level disease benefits. *See* USFWS Technical Memorandum, Exhibit A at 5. For these reasons, Federal Defendants do not read the Injunction as requiring Reclamation to implement either Guidance Measure partially.

However, rather than foregoing the Guidance Measures, or implementing them only partially, Reclamation has developed a proposed operations plan for 2018. In this challenging water year, Reclamation's proposed operations plan best meets the goal of the Injunction and the interests of all stakeholders. Reclamation's proposal has the support of co-Defendant NMFS and non-party USFWS. Under the proposal, Reclamation would acquire enough supplemental, non-Klamath Project water voluntarily offered by USFWS and utility company PacifiCorp to allow Reclamation to fully implement Management Guidance 1, and forego Management Guidance 4. Reclamation proposes to prioritize Management Guidance 1 because the USFWS disease experts believe it is likely to be more effective than Management Guidance 4 at lowering *C. shasta* disease infection rates in coho salmon. *Id.* at 6; Simondet Decl., Exhibit B at ¶ 4. Reclamation proposes to forego Management Guidance 4 because, as noted above, USFWS experts do not believe that partially implementing it would have the intended benefit for coho salmon, and also because it would avoid a complete irrigation shutoff until as late as June 15, 2018, which would otherwise result from a requirement to partially implement Management Guidance 4.

Because Federal Defendants read the Injunction as prohibiting full implementation of the Guidance Measures in 2018 to protect suckers, they believe their proposed operations plan for 2018 is consistent with the Court's Injunction. However, because Intervenors have filed their Motion for Relief and any order on that motion could impact Reclamation's 2018 operations, Federal Defendants respectfully provide the Court with the attached proposed order for its consideration. Reclamation held separate meetings with the Hoopa Valley and Yurok Tribes on March 12, 2018 to discuss this proposed operations plan for 2018.[1] Additionally, undersigned

[1] Reclamation also was party to discussion with the Plaintiffs on the following additional dates: January 10, 2018, January 18, 2018, January 31, 2018, February 9, 2018, and February 13, 2018.

counsel met and conferred by telephone with counsel for Plaintiff on March 14, 2018. Counsel for Plaintiff indicated that Plaintiff was not willing to agree to Reclamation's proposed operations plan for 2018.

II. FACTUAL BACKGROUND

A. Hydrologic Conditions In Water Year 2018

Hydrologic conditions in the Klamath River Basin are well below average due to the limited precipitation and snow water equivalent (a measure of snowpack) that has occurred since December 2018. *See* Plaintiffs' Opposition, ECF No. 105 at 7 (discussing the dry hydrologic conditions this year and the Governor of Oregon declaring a state of drought). For example, in the Upper Klamath Basin, cumulative inflows to Upper Klamath Lake during this water year have been some of the lowest observed since 1981. Bottcher Decl., Exhibit C at ¶ 5; Hydrologic Assessment, Exhibit D at 2. In fact, 80 percent of the inflows to Upper Klamath Lake since 1981 have been greater than the inflows seen since this water year began. *Id.* Because of these low inflows, Upper Klamath Lake is projected to reach a peak elevation of only 4,142.73 feet, which is significantly below the full pool elevation of 4,143.30 feet. *Id.* To put this in perspective, that is a difference of 47,525 AF between the projected peak and full pool elevations. In addition to low inflows to Upper Klamath Lake and the resulting low lake levels, water accretions between Link River Dam and Iron Gate Dam have also been consistently low throughout the 2018 water year. *Id.* Nearly 70 percent of the accretions seen since 1981 have been greater than the accretions seen this water year. *Id.*

These hydrologic conditions, combined with the future hydrologic conditions forecasted for Upper Klamath Lake by the Natural Resources Conservation Service ("NRCS"), prevent Reclamation from fully implementing Management Guidance 1 and 4 as they are designed. As explained more fully below, implementing the Management Guidances in this dry water year would miss the conditions necessary to protect suckers contained in the 2013 Biological Opinion.

B. 2013 Biological Opinion Requirements for Suckers

In the 2013 Biological Opinion, USFWS developed a formula that calculates the end-of-month surface elevations for Upper Klamath Lake based on the cumulative inflows into the Lake

and the previous month's lake volume. BOR AR 000783-95. The end-of-month elevations "represent the extreme lower limits of elevations that should be observed in" Upper Klamath Lake during the term of the proposed action except in rare cases (defined as no more than 5 percent of the months during the term of the Biological Opinion). BOR AR 001059; BOR AR 000781; Hydrologic Assessment, Exhibit D at 1. Elevations in Upper Klamath Lake "should rarely be at these end-of-month thresholds; most of the time, end-of-month elevations should be well above the thresholds." BOR AR 001059. Whenever operation of the Klamath Project causes Upper Klamath Lake elevations "to trend downwards towards the thresholds, special scrutiny is required." *Id.* Upper Klamath Lake elevations "approaching a threshold indicate that Reclamation must identify the reasons for the unexpected elevations and consult with the Services [USFWS and NMFS] regarding implementation of potential adaptive management actions to prevent violation of the threshold." BOR AR 000782. If Upper Klamath Lake end-of-month thresholds are violated and "USFWS does not accept the rationale for the violation or mitigation of the effects [of the violation], the action will be declared to be outside of the USFWS analysis and may trigger reinitiation of consultation." *Id.*

USFWS also concluded in its 2013 Biological Opinion that, at each life stage, suckers have specific physical habitat needs that correspond with the levels in Upper Klamath Lake. *See* BOR AR 000798; Hydrologic Assessment, Exhibit D at 1. For example, Upper Klamath Lake elevations need to be at a certain level for the months of March, April, and May (biologically significant minimums) for suckers to have adequate access to spawning habitat at shoreline springs along the east side of the Lake. BOR AR 000798; BOR AR 000800-02. Reductions in Upper Klamath Lake elevations, whether because of drought conditions or management actions, reduces the amount of physical habitat available for suckers. Hydrologic Assessment, Exhibit D at 1. Reductions below end-of-month threshold lake elevations reduce the amount of physical habitat available for suckers to the point where suckers and their habitat will be, or could be, adversely affected. *See, e.g.*, BOR AR 000800-02 (concluding that Upper Klamath Lake elevations below end-of-month elevations for March, April, and May are "likely to adversely affect sucker spawning because of reduced habitat availability"); BOR AR 000782 (noting that

USFWS did not fully analyze elevations below the end-of-month thresholds because they are outside the scope of Reclamation's proposed action).Therefore, based on USFWS's conclusions in the 2013 Biological Opinion and recent discussions with USFWS regarding the needs of suckers outlined in the Biological Opinion, Reclamation has determined that any purposeful management action resulting in missing end-of-month threshold elevations would not comply with the 2013 Biological Opinion and would "interfere with conditions necessary to protect the endangered sucker fish." Injunction, ECF No. 70 at ¶ 3; Hydrologic Assessment, Exhibit D at 2; Bottcher Decl., Exhibit C at ¶ 4.

III. DISCUSSION

A. Given Dry Hydrologic Conditions, Guidance Measures 1 and 4 Cannot Both Be Implemented As They Were Designed Without Impermissibly Interfering With Conditions Necessary to Protect Endangered Suckers

The Court's Injunction requires Reclamation to implement flows modeled on the recommendations contained in a Guidance Document created by representatives of the Hoopa Valley Tribe, the Yurok Tribe, and the Karuk Tribe. *See Measures to Reduce Ceratanova Shasta Infection of Klamath River Salmonids: A Guidance Document* (Jan. 17, 2017), ECF No. 54-3.[2] Specifically, the Injunction requires Reclamation to: (1) implement a surface flushing flow in accordance with Management Guidance 1 every year; (2) implement a deep flushing flow in accordance with Management Guidance 2 every other year;[3] and (3) reserve 50,000 acre feet ("AF") of water every year by April 1 for emergency dilution flows if specific thresholds relating to spore concentrations of *C. shasta* or prevalence of infection in Chinook salmon are exceeded,

[2] The description of the Guidance Document in this brief is intended to explain what is required by the Injunction vis-à-vis the Guidance Document and should not be viewed as agreement with either the Injunction or the recommendations in the Guidance Document. While the USFWS Technical Memoranda on which the Guidance Document is based have undergone peer review, the Guidance Document itself has not. *See* ECF No. 47 at 9; 55-1 at 5. Reclamation, NMFS, and USFWS were all given the opportunity to review the Guidance Document to varying degrees, and remain concerned about the scientific basis for the recommendations contained in Management Guidance 4.

[3] Management Guidance 2 is not at issue in the current briefing. The parties to the litigation are in agreement that Reclamation made a good-faith effort, and substantially achieved, the criteria for implementing the deep flushing flow in 2017. Bottcher Decl., Exhibit C at ¶ 3 n.1.

in accordance with Management Guidance 4. Injunction, ECF No. 70 at ¶¶ 6, 7, 10, 12, 14. The Injunction states that "[i]n all other respects, the 2013 Biological Opinion on Klamath Project Operations [] and incidental take statement remain in effect pending completion of the reinitiated formal consultation." *Id.* ¶ 2. And, most relevant to the present situation, the Injunction mandates that "[i]n no event shall the mitigation measures interfere with conditions necessary to protect the endangered sucker fish." *Id.* ¶ 3. Federal Defendants read these provisions, particularly the latter provision, as placing an internal limitation on the requirement to implement the Court-ordered flows to the extent that they would require Reclamation to deviate from the protections for suckers outlined in the 2013 Biological Opinion. *Id.* at ¶¶ 3, 13; Hydrologic Assessment, Exhibit D at 2; Bottcher Decl., Exhibit C at ¶ 4.

As explained more fully below, that is the situation confronting Reclamation in this dry water year. Under current hydrologic conditions and forecasts, there will not be sufficient water available in the Klamath Project this year to fully implement either Management Guidance 1 or 4 without running afoul of conditions required in the Biological Opinion for endangered suckers—even with a complete shutoff of irrigation deliveries. Bottcher Decl., Exhibit C at ¶ 19; Hydrologic Assessment, Exhibit D at 8. It is the opinion of the widely-recognized experts in *C. shasta* at USFWS (whose opinions were reviewed for accuracy by Dr. Sascha Hallett, a *C. shasta* expert from Oregon State University), that partial implementation of Management Guidance 4 would not provide the intended population-level disease benefits intended by that measure. USFWS Technical Memorandum, Exhibit A at 5. Moreover, the Guidance Document itself does not contain recommendations for partial implementation of either Guidance Measure. Guidance Document, ECF No. 54-3 at 8-10, 12-14. For these reasons, Federal Defendants do not read the Injunction as requiring Reclamation to partially implement either Guidance Measure with less than the full complement of water that the authors of the Guidance Document believed was necessary to carry out the operations and meet the stated goals of the Measures.

1. Management Guidance 1

The Injunction states that "the Bureau shall release surface flushing flows modeled on Management Guidance #1 in every year" until reinitiated consultation is completed. Injunction,

ECF No. 70 at ¶ 6. According to the Guidance Document, the stated goal of Management Guidance 1 is to "induce the movement of fine sediments below Iron Gate Dam in order to reduce the populations of the polychaete host of *C. shasta*, thus reducing the incidence and severity of *C. shasta* in the future." Guidance Document, ECF No. 54-3 at 8. To accomplish this goal, Management Guidance 1 "[i]mplement[s] flows sufficient to move surface sediments as described in the Geomorphic Memo in Table 3 during the winter period (Nov 1-April 30)." *Id.* The Geomorphic Memo specifies a range of flows for the mobilization of surface sediment—from 5,000-8,700 cubic feet per second ("cfs"). But, the authors of Management Guidance 1 specifically prescribed "a flow of at least 6,030 cfs from Iron Gate Dam" because "that magnitude of flow would mobilize fine sediment." *Id*.

Additionally, the authors of Management Guidance 1 acknowledge that "[i]n general, a longer duration event will accomplish more of the objective than a shorter duration." *Id*. at 8. Accordingly, Management Guidance 1 calls for the 6,030 cfs flow to be implemented for a full 72 hours. Management Guidance 1 further asserts that "[i]t is [] preferable to have a gradual descending limb to the hydrograph, so that sediments can be sorted as they are deposited on the river bed." *Id.* at 9. For that reason, Management Guidance 1 recommends that the "existing guidelines for downramping as contained in the 2013 Biological Opinion [be followed] unless modified by the technical team or FASTA as necessary and supported by scientific information." *Id*. at 9-10. So, as described in Management Guidance 1 and the Injunction, Reclamation is to implement a yearly flow of at least 6,030 cfs from Iron Gate Dam for a 72 hour period, using the existing guidelines for downramping rates contained in the 2013 Biological Opinion. *Id.* at 8-10; Injunction, ECF No. 70 at ¶ 6.

As Reclamation explains in the attached declaration of Jared Botcher, Chief of the Water Operations Division at the Klamath Basin Area Office, Reclamation modeled how different management decisions (*i.e.*, implementing Management Guidance 1 alone, implementing both Guidance Measures, implementing the 2013 Biological Opinion without any additional ordered flows, and implementing Reclamation's proposal for water year 2018) would impact elevations in Upper Klamath Lake and consequently, suckers. Bottcher Decl., Exhibit C at ¶¶ 16-20;

Hydrologic Assessment, Exhibit D at 4-11. Because actual hydrology can change over time and Reclamation wanted to thoroughly assess these options against a range of predicted hydrologic conditions, Reclamation modeled each management decision using three exceedance levels for the April to September forecasted inflows into Upper Klamath Lake, provided by NRCS on March 19, 2018: 30 percent, 50 percent, and 70 percent. Bottcher Decl., Exhibit C at ¶ 17; Hydrologic Assessment, Exhibit D at 4. These exceedance levels mean that there is a 30, 50, or 70 percent chance in 2018 that inflows into Upper Klamath Lake could exceed the forecasts, respectively. *Id.*

Under all three exceedance levels, and with a complete shutoff of irrigation deliveries, the models show that fully implementing Management Guidance 1 would cause Reclamation to miss the end of April threshold elevation for Upper Klamath Lake specified in the 2013 Biological Opinion. Bottcher Decl., Exhibit C at ¶ 20; Hydrologic Assessment, Exhibit D at 8. Thus, the operation is prohibited by the Injunction's own terms. Injunction, ECF No. 70 at ¶¶ 2-3.

Hydrology would permit Reclamation to implement Management Guidance 1 only partially. According to the models, at the 50 percent exceedance level, Reclamation would be able to produce only a flushing flow of 6,030 cfs for 27 hours followed by ramp down rates that are modified from the 2013 Biological Opinion. Bottcher Decl., Exhibit C at ¶ 20; Hydrologic Assessment, Exhibit D at 8. But neither the Injunction nor Management Guidance 1 specifically call for Reclamation to implement a flow operation that is less than the magnitude (6,030 cfs) or duration (72 hours) specified in Management Guidance 1. *See* Injunction, ECF No. 70; Guidance Document, ECF No. 54-3 at 8-10. The Guidance Document chose a specific flow operation (including duration and downramping rates) that, in the authors' opinion, would "induce the movement of fine sediments below Iron Gate Dam in order to reduce the populations of the polychaete host of *C. shasta*, thus reducing the incidence and severity of *C. shasta* in the future." ECF No. 54-3 at 8. A partial flow operation was not recommended in the Guidance Document and there is no evidence in that Document that it would achieve the intended goal of Guidance Measure 1.

2. Management Guidance 4

The Injunction states that Reclamation "shall release emergency dilution flows modeled on Management Guidance #4" every year until the reinitiated consultation is complete. Injunction, ECF No. 70 at ¶¶ 10, 12. The Guidance Document states that the objective of Management Guidance 4 is to reduce spore density and *C. shasta* disease transmission through the provision of flows in the spring period. Guidance Document, ECF No. 54-3 at 12. In an effort to accomplish this, Management Guidance 4 contains four elements:

(1) Reclamation must have 50,000 AF of Reserve Water by April 1;

(2) the 50,000 AF of Reserve Water must be available for use as an emergency dilution flow as soon as one of two disease threshold criteria are met (which could be as early as April 2 and as late as June 14);

(3) if the threshold criteria are met, Reclamation must release water to achieve 3,000 cfs at Iron Gate Dam or, if flows at Iron Gate Dam have exceeded 3,000 cfs for seven days, flows must be increased to 4,000 cfs; and

(4) those flows must continue until the thresholds are no longer met, the 50,000 AF of reserved water is expended, it is June 15th, or 80% of juvenile Chinook salmon outmigration has occurred. *Id.*; Injunction, ECF No. 70 at ¶¶ 11-14.

Current forecasts and modeling indicate that hydrology will prohibit Reclamation from meeting at least three of these four elements. As it did with Management Guidance 1, Reclamation has modeled implementing Management Guidance 4, with specific assumptions detailed in the Hydrologic Assessment, to determine how the operation would impact elevations in Upper Klamath Lake and consequently, suckers. Bottcher Decl., Exhibit C at ¶¶ 16-19; Hydrologic Assessment, Exhibit D at 6-11. For the purposes of its modeling, Reclamation assumed that it had already performed a full surface flushing flow under Management Guidance 1 as required by the Injunction (using supplemental, non-Project water as explained below). Hydrologic Assessment, Exhibit D at 6. Regardless of the exceedance level (30 percent, 50 percent, or 70 percent), and with a complete shutoff of irrigation deliveries, the models show that Reclamation cannot fully implement Management Guidance 4 (*i.e.*, set aside 50 TAF on April 1

for potentially immediate use) without missing both the April and May end-of-month threshold elevations required for Upper Klamath Lake specified in the 2013 Biological Opinion. Bottcher Decl., Exhibit C at ¶ 19; Hydrologic Assessment, Exhibit D at 8. Because fully implementing Management Guidance 4, as modelled, would cause Upper Klamath Lake to fall below levels necessary for endangered suckers, that operation is prohibited by the Injunction's own terms. Injunction, ECF No. 70 at ¶¶ 2-3.

Reclamation's modeling predicts that, without violating end-of-month thresholds, it would have only enough water available to achieve 3,000 cfs for seven days at Iron Gate Dam by May 9.[4] Bottcher Decl., Exhibit C at ¶ 19; Hydrologic Assessment, Exhibit D at 8. There would not be enough water available at that time to increase the flow to 4,000 cfs for seven days if required by Management Guidance 4 within the timeframe past data indicates disease triggers would be eclipsed. *Id.* Again, this is the case even if there are no irrigation deliveries.[5] *Id.* Based on the 50 percent exceedance scenario, Reclamation would be able to implement a full 50,000 AF emergency dilution flow under Management Guidance 4 starting on May 24 and still meet subsequent end-of-month Upper Klamath Lake threshold elevations, however in only three years (2006, 2011, and 2017) of the 11 years for which Reclamation has disease trigger data were disease triggers exceeded on May 24 or later. *Id.* All three of these years were exceptionally wet years with above average precipitation (both rain and snow) and above average river flows. *Id.* In other words, it is unlikely that triggers would be eclipsed on or after May 24 this year and hence that implementing a full emergency dilution flow after May 24 would provide the intended population-level disease benefits intended.

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[4] For modeling purposes, Reclamation selected May 9, 2018 as the date for implementation of a theoretical partial emergency dilution flow after consulting USFWS's Arcata Office, concluding that spore concentrations are not likely to start to increase before three weeks after a surface flushing flow event pursuant to Management Guidance 1. Hydrologic Assessment, Exhibit D at 6.

[5] Moreover, in some modeled scenarios, the implementation of both Guidance Measures results in Upper Klamath Lake elevations dropping below 4,142 feet between March and May. Hydrologic Assessment, Exhibit D at 11. Maintaining an Upper Klamath Lake elevation above 4,142 feet from March 10 through May 20 is critical for adult sucker access to spawning areas on the east shore of Upper Klamath Lake. BOR AR 000800-02.

B. Partially Implementing Guidance Measure 4 Would Not Provide the Intended Population-Level Disease Benefits

As noted above, hydrology would permit Reclamation to implement Management Guidance 4 only partially. The Guidance Document does not recommend implementing this type of incomplete operation, however, or suggest that this incomplete operation would achieve the stated goals of Management Guidance 4. *See* Guidance Document, ECF No. 54-3 at 12-14. In fact, the experts on *C. shasta* at the USFWS's Arcata Office[6] recently opined that "there are significant questions and uncertainties about the science behind" even a full implementation of Management Guidance 4. USFWS Technical Memorandum, Exhibit A at 6. First, the effects of Management Guidance 4's dilution flow cannot be accurately predicted or assessed because of a relative lack of high flow events since disease sampling began. *Id.* at 2. Therefore, USFWS is "not yet able to predict changes in disease-related variables like prevalence of infection ('POI'), disease severity, or percent mortality in response to" flow increases. *Id.* USFWS also is unable to predict "how long any disease reductions, whether significant or minor (if realized at all) would persist following an elevated flow release or during an event's descending limb." *Id.*

Second, USFWS has expressed a "primary concern" with Management Guidance 4 that one of the disease criteria thresholds for triggering an emergency dilution flow -- the 5 spores per liter threshold -- can be triggered at *any* Klamath River sampling station, whereas the flows from Iron Gate Dam prescribed by Management Guidance 4 are fixed. *Id.* at 2-3. Therefore, the volume of water released from Iron Gate Dam "would not generate the same proportional increase in discharge (dilution) at lower river sample states as compared to sample sites" located nearer Iron Gate Dam. *Id.* at 3. NMFS agrees with USFWS that this leads to "uncertain[ty]" regarding the efficacy of the prescribed emergency dilution flows in Management Guidance 4. Simondet Decl., Exhibit B at ¶ 7.

"[A]nother concern" that USFWS has with Management Guidance 4 is that it is difficult to measure the emergency dilution flow's effectiveness for the target population (coho salmon)

[6] The Hoopa Valley and Yurok Tribes have previously acknowledged, and relied on, science and opinions provided by the experts at the USFWS's Arcata Office. *See, e.g.*, Guidance Document, ECF No. 54-3 at 1-2.

because of the non-species specific disease threshold criteria. USFWS Technical Memorandum, Exhibit A at 4. The 5 spores per liter disease criteria threshold used by Management Guidance 4 is based on non-genotype specific total spore concentration. *Id.* In other words, it encompasses both Type I spores associated with mortality in non-ESA listed Chinook salmon and Type II spores associated with mortality in the threatened coho salmon. *Id.* Therefore, it is possible for the spore disease criteria threshold to be triggered by Type I spores associated with Chinook salmon, and an emergency dilution flow implemented, even though it is not necessary for coho salmon. *Id.* Similarly, an emergency dilution flow event can be triggered when the POI of all captured juvenile Chinook salmon, not coho salmon, exceeds 20% in aggregate for the preceding week at the Kinsman Rotary Screw Trap. *Id.*

Management Guidance 4's disease threshold criteria also may not accurately indicate any pending disease risk. *Id.* 5 spores per liter and 20 percent POI in juvenile salmon, either of which can initiate an emergency dilution flow, "can indicate normal or background levels of *C. shasta* condition in the wild." *Id.* For example, these values were approached or met in 2017, a wet water year with "low *C. shasta* infection levels and no clinical signs of disease observed in any of the fish sampled in the Klamath basin." *Id.* at 4-5. (quoting True et al. 2017). The experts at USFWS state that "[a]lthough these trigger values can occur in years with or without elevated disease risk, it is important to note that . . . temperature plays an essential role in disease incidence and severity (Ray et al. 2014), and that at warmer temperatures these triggers could indicate escalating disease risk." *Id.* at 5. However, Management Guidance 4's disease threshold criteria do not incorporate water temperature, which is another "serious concern"[7] *Id.* NMFS concurs with USFWS's assessment: estimates of infection rates alone "are not necessarily a good measure of disease risks to juvenile salmon populations given the strong relationship between water temperature and disease risks to juvenile salmon." Simondet Decl., Exhibit B at ¶ 7.

USFWS's experts have determined that partial implementation of Management Guidance 4, which is all that Reclamation could accomplish because of hydrological conditions, would

[7] Please see USFWS's Technical Memorandum for a full analysis of why USFWS scientists believe there are "significant questions and uncertainties" surrounding the effectiveness of Management Guidance 4. *Id.* at 6.

amplify all of the above scientific uncertainties concerning MG4's dilution flow. USFWS Technical Memorandum, Exhibit A at 5. Specifically, "[g]iven a smaller volume of water available to implement a managed emergency dilution flow event, it would be more difficult to predict measurable disease reductions than if the full 50 TAF were available." *Id.* USFWS's opinion is supported by the observation that as the amount of water available to implement a dilution flow decreases, the managed event likely takes the form of the 2014 pulse flow event where peak discharge was elevated less than 2-fold, was held at this peak for a single day, lasted around 5 days total, but "was not expected to affect *C. shasta* mortality risk…." *Id*. at 3, 5. In fact, Reclamation has determined that for this water year in particular, Iron Gate Dam flows are projected to be 1,472 cfs just prior to implementation of a hypothetical partial emergency dilution flow. Bottcher Decl., Exhibit C at ¶ 22; Hydrologic Assessment, Exhibit D at 11. Implementation of a 3,000 cfs flow (which is all that Reclamation can accomplish due to hydrologic conditions on May 9) represents a doubling of the Iron Gate Dam flow, making it similar to the ineffective 2014 event. *Id.* In USFWS's opinion, an event mirroring the effectiveness of the 2014 pulse flow event "would not provide the intended population-level disease benefits intended" by Management Guidance 4. USFWS Technical Memorandum, Exhibit A at 5.

C. Reclamation's Voluntary Proposed Operations Plan is the Best Means of Implementing the Injunction In this Challenging Water Year

As explained above, the Injunction's own internal protections for endangered suckers will not permit Reclamation to fully implement Guidance Measures 1 and 4, as modeled, this year, and Federal Defendants do not read the Injunction as requiring partial implementation of those Measures. Moreover, the USFWS experts on *C. shasta* do not believe that partial implementation of the Management Guidance 4 would further the Injunction's goal of reducing disease infection rates. *See* USFWS Technical Memorandum, Exhibit A at 5.

Rather than foregoing both Management Guidances 1 and 4 entirely, or implementing them only partially (and likely ineffectively), Reclamation has voluntarily undertaken an effort to develop a proposed operations plan for 2018 that would meet the goals of the injunction while

benefitting all affected stakeholders and listed species. Under the proposal, Reclamation would voluntarily acquire 21,500 AF of supplemental, non-Klamath Project water to implement Management Guidance 1. Bottcher Decl., Exhibit C at ¶ 30; Hydrologic Assessment, Exhibit D at 12. This 21,500 AF of supplemental water, combined with the limited water that Reclamation does have available in the Project, would allow Reclamation to fully implement Management Guidance 1 without violating the 2013 Biological Opinion for suckers. *Id.* Non-party USFWS has volunteered to provide Reclamation with 11,000 AF of water by draining that amount from its Upper and Lower Klamath National Wildlife Refuges, which are a home and migratory stopping point for dozens of species. Letter from Paul Souza, USFWS, Exhibit E. Non-party utility company PacifiCorp has volunteered to provide an additional 10,500 AF from its Copco Reservoir. Letter from Tim Hemstreet, PacifiCorp, Exhibit F. Reclamation has agreed to repay USFWS and PacifiCorps for this water in kind by the fall/winter of 2018.

Reclamation proposes to prioritize Management Guidance 1 because the experts at USFWS and NMFS believe it is likely to be more effective than Management Guidance 4 at lowering disease infection rates in coho salmon. Bottcher Decl., Exhibit C at ¶¶ 30-32; *see* USFWS Technical Memorandum, Attachment A at 6; Simondet Decl., Exhibit B at ¶ 4. It is USFWS's expert opinion that "the science supporting the efficacy of the proposed flushing flow in [Management Guidance 1] is strong and agree that this action should be prioritized" over Management Guidance 4. USFWS's Technical Memorandum, Exhibit A at 6; *see also* Letter from Paul Souza, USFWS, Exhibit E. Similarly, it is the opinion of James Simondet, the Klamath Branch Chief at NMFS, that "[i]mplementation of [Management Guidance 1] would provide a greater reduction in *Ceratonova shasta* disease risk to juvenile salmon in the Klamath River than the emergency spore dilution flow release prescribed by [Management Guidance 4]". Simondet Decl., Exhibit B at ¶ 7. As part of its proposal, Reclamation would not implement Management Guidance 4 (in whole or in part) for disease reduction purposes for the reasons

provided by USFWS experts in their Technical Memorandum and NMFS in the declaration of James Simondet.[8] Bottcher Decl., Exhibit C at ¶¶ 30-32.

Reclamation's proposal has the added benefit of avoiding a complete shutoff of irrigation deliveries that otherwise could result from the partial implementation of Management Guidance 4. *See id.* at ¶ 30. Reclamation could begin charging the irrigation canals in preparation for irrigation on April 19, 2018, based on the 50 percent exceedance scenario. *Id.* Limited irrigation deliveries could begin after the canals are fully charged. Reclamation could provide a total of 252,000 AF of water to irrigators (based on the 50 percent exceedance scenario), which is substantially less than the maximum allowed irrigation supply of 390,000 AF. *Id.* The 252,000 AF of water is used to meet irrigation needs from Upper Klamath Lake for the entire 2018 water year (from whenever the canals become fully charged through November 30, 2018). *See id.*

In short, Reclamation's proposal would meet all end-of-month and biologically significant Upper Klamath Lake thresholds, ensure implementation of the scientifically-supported surface flushing flow for coho salmon under Management Guidance 1, and guarantee some water for irrigation.

D. Federal Defendants Would Like to Clarify Their Views of the Available Science[9]

1. 2017 Water Conditions Provide Little Information on the Effectiveness of the Guidance Measures in 2018

Intervenors make a number of statements concerning Guidance Measures 1 and 4 and water years 2017 and 2018. Intervenors' Motion, ECF No. 101 at 10, 17. According to the

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[8] As discussed above, it would not be possible to fully implement Management Guidance 4 as it is described in the Injunction and Guidance Document without violating the end-of-month elevations for suckers—even after Reclamation acquires the 21,500 AF of supplemental water from USFWS and PacifiCorp. Hydrologic Assessment, Exhibit D at 8.

[9] Plaintiffs in this case and the related case claim the Court lacks jurisdiction to consider Defendant-Intervenors' motion. Plaintiffs' Opposition, ECF No. 105; Hoopa Valley Tribe v. U.S. Bureau of Reclamation, No. 16-cv-04294 (N.D. Cal.), ECF No. 141. At a minimum, the Court has jurisdiction to issue an indicative ruling pursuant to Rules 60(b) and 62.1. Plaintiffs' Opposition, ECF No. 105 at 9-10; Hoopa Valley Tribe, ECF No. 141 at 9; *see also* Injunction, ECF No. 70 at ¶ 17 (reserving jurisdiction to resolve disputes "relating to the Bureau's implementation of the surface flushing flows, deep flushing flows, and emergency dilution flows ordered herein").

expert view of USFWS, the scientific evidence regarding the potential "legacy effect" of high flow events is too uncertain to warrant ignoring the potential need for disease management flows in 2018. USFWS Technical Memorandum, Exhibit A at 7-8. The spatial extent and duration of reductions in the prevalence of infection that may result from 2017 have not been assessed yet and are therefore unknown at this time. *Id.*

For example, a 2016 study reported in the USFWS Technical Memorandum (Shea *et al*. 2016), discussed the historical frequency and duration of discharge events below Iron Gate Dam and the likelihood that high water events will mobilize various aspects of the riverbed. *Id.* Because in the last 10-15 years, flows have not neared the magnitude and duration below Iron Gate Dam observed in 2017, data is not available to inform the extent or duration of any potential legacy effect. *Id.* at 8. As such, scientific evidence of a "legacy effect" sufficiently potent to negate the benefit or need of managed flows for 2018 simply does not exist yet. *Id*. This is particularly true given the hydrologic conditions observed thus far in the 2018 water year. *Id.*

2. USFWS Does Not Share Intervenors' Opinions Regarding Management Guidance 1

Intervenors argue that Management Guidance 1's flushing flow event would increase the impacts of disease in juveniles. Intervenors' Motion, ECF No. 101 at 2, 3, 9. To the contrary, the experts at USFWS state that high flow events like Management Guidance 1's fine sediment flushing flow event are naturally-occurring springtime events in cold-water, salmon-producing streams. USFWS Technical Memorandum, Exhibit A at 8. The benefits of this event include flushing fine sediments and scouring polychaete worms, among others. *Id.* USFWS believes that Management Guidance 1's flushing flow event would, in this way, disrupt critical stages of the *C. shasta* lifecycle and decrease the risk of disease in outmigrating juvenile salmon. *Id.* at 1-2, 6. Such disturbances are particularly important given recent flow release levels from Iron Gate Dam, relatively low inflow accretions from tributaries, and the resulting accumulation of fine sediments since the last high flow event. *Id.* at 8.

Intervenors also make arguments regarding the timing of coho salmon outmigration. Intervenors' Motion, ECF No. 101 at 6-7, 9. Intervenors' certainty regarding the timing of the

2018 juvenile salmon outmigration is unwarranted because it is unknown at this time. USFWS Technical Memorandum, Exhibit A at 6, 9-10. USFWS constructed the scientific model Intervenors cite using 13 years of data concerning the outmigration timing of Chinook, not coho, salmon in the Klamath River. *Id.* at 9-10. The study Intervenors cite is not applicable to coho salmon. *Id.* FWS has not developed a model to predict the outmigration timing of coho salmon, and no such model exists. *Id.*at 9.

3. It is USFWS's Opinion that the POI Index is Currently a More Useful Tool than the S3 Model that Intervenors Reference

The version of the Stream Salmonid Simulator Model ("S3 Model") that Intervenors champion is a less reliable tool than the POI Index, which is utilized in the Guidance Document. *See* Intervenors' Motion, ECF No. 101 at 17 (citing Cramer Decl.). In fact, the S3 Model results cited by Intervenors cannot be used as the basis for any scientific relevant inference or comparison. USFWS Technical Memorandum, Exhibit A at 7 ("the S3 Model results are not appropriate for any comparison to summaries of field data collected in the Klamath River"). The Intervenors have extracted the cited material from a PowerPoint presentation–not a scientific paper or study. *Id.* at 10. That presentation is now several years old and displayed an early, draft version of the S3 Model. *Id.* FWS produced that early model to elicit comments on how to improve the S3 Model and its potential future uses. *Id.* FWS had not yet validated that draft of the S3 Model or subjected it to the Department of the Interior's peer review process. *Id.* Indeed, the S3 Model has undergone numerous revisions since then, been calibrated to the weekly abundance estimates of natural (non-hatchery) Chinook Salmon, and is currently undergoing the official Department of the Interior peer review process. *Id.* The outputs from outdated, un-peer reviewed, draft version of the S3 Model are not useful here.

Conversely, the POI Index is an important metric for assessing disease conditions, *id.* at 6-7, and criticisms of the POI Index do not resonate. *See* Intervenors' Motion, ECF No. 101 at 6-9 (citing Cramer at 17). Intervenors mischaracterize a table used in calculating the POI Index to suggest that it incorrectly estimates the applicable infection rate based on both hatchery and natural Chinook salmon, combined. *Id.* at 7. To the contrary, the 2016 study by Som et al. at

issue presents POI estimates weighted by abundance for outmigrating natural (non-hatchery) Chinook salmon. USFWS Technical Memorandum, Exhibit A at 6. Intervenors also overlook the importance of the Index for assessing disease conditions in real time and other aspects of disease impact assessment. *Id.* at 6-7. Intervenors additionally fail to recognize the POI Index's key role, along with other disease-related variables, for informing management decisions such as the timing of hatchery releases, calculating parasite exposure or dose, and its reliance to ongoing sentinel fish disease studies. *Id.* at 7.

E. Supplemental Water Cannot Be Obtained From the Rogue River Basin Project, or any Other Location, for Use in the Klamath Project

Intervenors suggest that, if the Court orders Reclamation to implement the Guidance Measures this year, the Court order Reclamation to acquire water from outside of the Klamath Project "before even considering action that would adversely affect the Klamath Project." Intervenors' Motion, ECF No. 101 at 19. Specifically, Intervenors propose that Reclamation use water from the Rogue River Basin Project—a federal water management project that is adjacent to, but separate from, the Klamath Project. *See id.* This suggestion is inappropriate, as the operation of the Rogue River Basin is a separate agency action subject to its own biological opinion and not before the Court in this action.

Although the Injunction does not (and cannot) require it, Reclamation voluntarily made a diligent search for sources of water outside the Project that could enable it to complete the Management Guidances. *See* Bottcher Decl., Exhibit C at ¶ 8; Hydrologic Assessment, Exhibit D at 3-4. As discussed above, Reclamation is able to obtain a total of 21,500 AF of non-Project water that has been volunteered by the USFWS and PacifiCorp for implementation of Management Guidance 1. Hydrologic Assessment, Exhibit D at 12. For a variety of reasons, Reclamation could not obtain non-Project water to implement Management Guidance 4. *See id.* at 3-4 (enumerating and describing the non-Project water sources that Reclamation considered and why those sources cannot be used). Reclamation specifically considered whether it could utilize water from the Howard Prairie and Hyatt Reservoirs in the Rogue River Basin Project for the purposes of implementing the Injunction. *Id.* However, water stored in those reservoirs is

utilized by the Rogue River Basin Project to comply with the 2012 Rogue River Basin Project Biological Opinion—which is distinct from the 2013 Klamath Project Biological Opinion and contains its own requirements for coho salmon. *Id.* Any water supplied to assist in augmenting the Guidance Measures would be outside the scope of the action that was analyzed in the 2012 Rogue River Biological Opinion and would trigger reinitiation of Endangered Species Act consultation on that action. *Id.* Therefore, it would be neither appropriate nor feasible for the Court to order Reclamation to utilize water from the Rogue River Basin Project for the Klamath Project this year.

IV. CONCLUSION

For all of the foregoing reasons, Federal Defendants respectfully request that the Court approve the attached proposed order acknowledging Reclamation's proposed operations plan for the 2018 water year.

Dated: March 23, 2018

Respectfully submitted,

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In Reply Refer To:
AFWO

Technical Memorandum

TO: Jeff Nettleton (Area Manager) and Jared Bottcher (Chief, Water Operations Division), Bureau of Reclamation Klamath Basin Area Office

FROM: Dr. Nicholas A. Som (Statistician) and Nicholas J. Hetrick (FAC Program Lead), Arcata Fish and Wildlife Office

SUBJECT: Response to Request for Technical Assistance – 2018 Klamath Project Operations

DATE: March 19, 2018

Under the authority of the Fish and Wildlife Coordination Act (16 USC §§ 661), the Bureau of Reclamation Klamath Basin Area requested the technical assistance of the U.S. Fish and Wildlife Service's Arcata Office on March 10, 2018 regarding their 2018 proposal for Klamath Project Operations. Primarily, Reclamation was seeking technical assistance on the following:

"…we are requesting your technical opinion as to your agreement in our prioritizing the managed flushing flow event over a potential emergency dilution flow event based on perceived reductions in disease impacts to Klamath River salmon."

As summarized below, it is our technical opinion that management guidance measure one (MG1) would provide a greater reduction in disease risk to juvenile salmon in the Klamath River than a emergency dilution flow release prescribed by management guidance four (MG4). Both MG1 and MG4 are described in a Management Guidance Document authored by a Tribal "Disease Technical Advisory Team" (DTAT 2017). We base our professional opinion on the best scientific information available. This includes a series of technical memoranda released by the Service's Arcata Office (Shea et al. 2016; Som and Hetrick 2016; Som et al. 2016a; Som et al. 2016b), supporting scientific manuscripts and reports, sections of the Tribes' 2017 Guidance Document, and new information presented in True et al. (2017), among others. In addition, our responses to Reclamation's request for assistance were reviewed for technical content and accuracy by Dr. Sascha Hallett, a *Ceratonova shasta* expert from Oregon State University, and she concurs with the responses we provide below. (Note: she did not review responses on the S3 Model given it is outside of her area of expertise).

We believe that clear linkages exist between the available science and MG1 (DTAT 2017). Our technical opinion is that surface sediment flushing flows like those prescribed by MG1 can adversely affect segments of the *C. shasta* lifecycle, which may prevent or limit the parasite's impacts on juvenile salmon populations. Our opinion is well supported in the documents cited in the previous paragraph, including the True et al. (2017) summary of POI data collected in spring

and early summer of 2017. Our prioritization of MG1 over MG4 is further supported by aspects of MG4 that make it difficult to predict population-level reductions in *C. shasta* disease risk to juvenile salmon, which we summarize below:

- The inability to predict the effects of emergency dilution flows resulting from a relative lack of high flow events since disease intensive sampling began in 2005.
- A fixed-discharge release from Iron Gate Dam (IGD) that is not tied to discharge and spore concentration at the specific sample location where the trigger is exceeded.
- The inability to evaluate the measure's effectiveness.
- The triggers for MG4 are not necessarily indicative of a pending disease risk.
- Water temperature is not incorporated into the triggers, yet is critical to assess disease risk.
- A reduced volume of water available for emergency dilution flows would amplify the uncertainties as to the potential effectiveness of MG4 as compared to an event using the full 50 thousand acre feet (TAF).

Further, the request from Reclamation includes a number of sub-questions related to MG4 outlined below in italics, which are followed by our responses. Given the short timeline associated with this request, responses are purposely brief and though complete, might exclude details deemed unnecessary for immediate comprehension of the evidence contained in the responses. While our responses here are restricted to the specific questions stated in Reclamation's request for technical assistance, several key inaccuracies in the associated Intervenors' Motion and declarations on 2018 Klamath Project Operations warrant correction. Those corrections will be addressed at another time.

Briefly, what is the current understanding of the science that supports Management Measure 4 (Emergency dilution flows) and its effectiveness at reducing disease risks to Klamath River salmon?

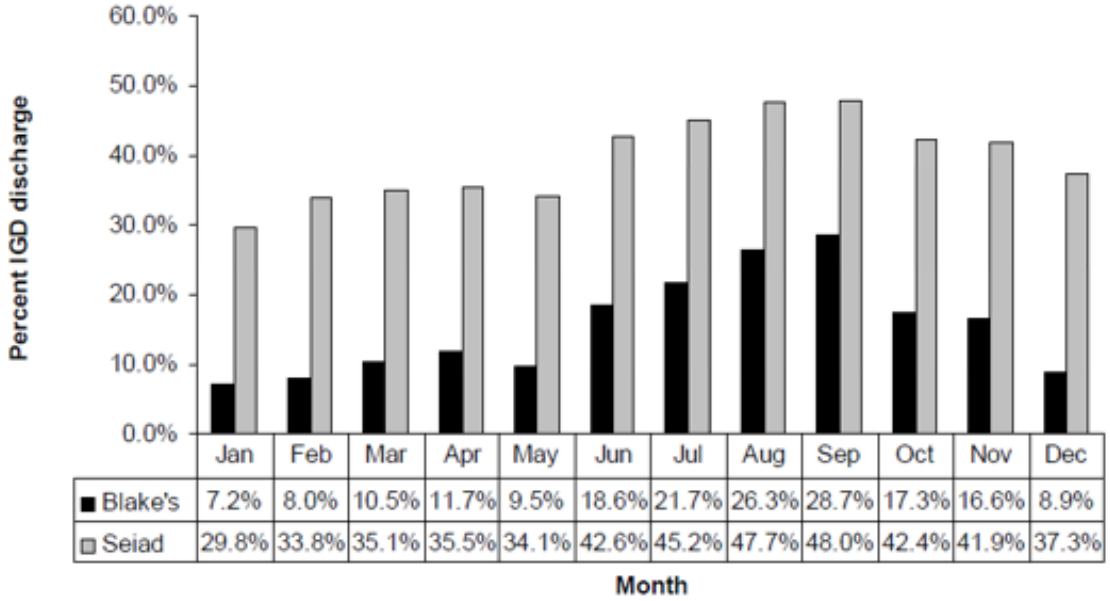
The current scientific understanding of emergency dilution flows proposed under MG4 make it difficult to predict their effectiveness at reducing disease risk to outmigrating juvenile salmon. We are unable to predict the effects of an emergency dilution flow as described by MG4 because IGD flow releases in the range of 3,000 4,000 cfs have not been concurrent with elevated spore counts since intensive juvenile fish disease sampling began in 2005. We have seen significant advances in our understanding of *C. shasta* dynamics in recent years. During this period of intensive disease study, however, there has been little opportunity for managed flow increases from IGD when disease risk was already elevated, which is needed to document a potential decrease. As such, we are not yet able to predict changes in disease-related variables like prevalence of infection (POI), disease severity, or percent mortality in response to discharge increases. We are also unable to predict how long any disease reductions, whether significant or minor (if realized at all), would persist following an elevated flow release or during an event's descending limb.

A primary concern we have with MG4 is that the spore concentration threshold or "trigger" of 5 spores per liter (s/L) can occur at any of the Klamath River sample locations, yet the dilution

flow discharge from IGD is fixed, regardless of the discharge or spore density at the sample location where the trigger was exceeded. Spore concentration monitoring occurs at several locations positioned throughout the mainstem Klamath River, with discharge of the river increasing at sites further downstream from IGD because of significant inflows from several tributary streams. To date, the limited scientific evidence for the efficacy of spore dilution has centered on analyses of data obtained at or near the traditionally recognized "infectious zone." This "infectious zone" is a section of the mainstem river proximal to the confluence of Beaver Creek, which is located nearly 30 miles downstream from IGD. Additionally, this section of mainstem is downriver of confluences with several other tributaries that provide significant inflows such as the Shasta River and Dutch Creek, among others. Therefore, augmented flow releases from IGD prescribed by MG4 would not generate the same proportional increase in discharge (dilution) at lower river sample sites as compared to sample sites located near Beaver Creek or closer to IGD (Figure 1; Beeman et al. 2008). As such, dilution potential of increased IGD flows at sample sites in the lower river reaches would be reduced relative to upstream sample locations that are more sensitive to changes in IGD flows.

Should either the spore concentration or POI trigger be exceeded, MG4 specifies a fixed-discharge prescription that would result in IGD discharge increasing to 3,000 cfs, then to 4,000 cfs after one week if the trigger thresholds are not remedied, with a maximum volume of 50 TAF applied for the duration of the dilution event. In specifying the dilution discharge levels for MG4, the authors of the Tribes' Guidance Document (DTAT 2017) appear to strike a balance between two flow events described in the Som and Hetrick (2016) technical memorandum on waterborne spores. In a 2005 spill event, peak discharge increased nearly six-fold, discharge was elevated for about four weeks, and a decrease in weekly POI estimates was observed. During a managed pulse flow event in 2014, peak discharge was elevated less than 2-fold, was held at this peak for a single day, and the entire event lasted around five days total. The 2014 event resulted in a measureable but minor decrease in spore concentrations, but this small decrease would not be expected to affect *C. shasta* mortality risk in outmigrating juvenile salmon.

MG4 specifies fixed-discharge levels potentially unlikely to reduce thresholds below trigger values, even under the uncertain assumption that dilution is proportionally effective. For example, if IGD flow is at 2,800 cfs and either the spore concentration or POI trigger is met, it would be highly unlikely that the resulting increase in discharge of 200 cfs to get to the 3,000 cfs required by MG4 would contribute to any measurable difference in spore density, POI, or risk of disease to outmigrating juvenile salmon. The same could be true for many lower initiating IGD flows. Additionally, given the maximum volume specified (50 TAF), ramp rate requirements, and potential to initiate the increase from a minimum IGD discharge, the duration of elevated flows may not be sufficient to reduce disease risk. In summary, it's difficult to predict that the fixed-volume dilution discharge from IGD specified under MG4 would lead to measurable reductions in disease risk, particularly without adjustments to account for specific spore concentrations and discharge at the sample location where the spore density trigger was exceeded.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Blake's	7.2%	8.0%	10.5%	11.7%	9.5%	18.6%	21.7%	26.3%	28.7%	17.3%	16.6%	8.9%
Seiad	29.8%	33.8%	35.1%	35.5%	34.1%	42.6%	45.2%	47.7%	48.0%	42.4%	41.9%	37.3%

Figure 1. Proportion of Klamath River discharge from Iron Gate Dam (IGD) relative to total river discharge at Seiad Valley (located about 60 river miles downstream of IGD), and at Blake's Riffle (located about 185 river miles downstream of IGD and 8 river miles upstream of the its confluence with the Pacific Ocean) during 2007 (from Beeman et al. 2008).

Another concern we have with MG4 is that it is not responsive to the potential efficacy of an emergency dilution flow event in benefiting the target population (Coho Salmon). MG4 uses Chinook Salmon as a surrogate for Coho Salmon, consistent with the 2013 Klamath Project Biological Opinion (NOAA and USFWS 2013). The spore concentration trigger in MG4 is based on a total spore concentration, which is primarily comprised of Type I spores that are associated with mortality in Chinook Salmon, and Type II spores that are associated with mortality in Coho Salmon. A dilution flow event can also be triggered by MG4 when the POI of all captured juvenile Chinook Salmon, not Coho Salmon, exceeds 20% in aggregate for the preceding week at the Kinsman Rotary Screw Trap. Non-genotype specific total spore concentration or Chinook Salmon POI triggers, as specified in MG4, could potentially initiate or prolong a dilution flow event, yet lead to an increase in the estimated incidental take of Coho Salmon as defined in the 2013 Klamath Biological Opinion (NOAA and USFWS 2013).

Are the triggers for implementing an emergency dilution flow (5 spores/L or 20% POI at Kinsman) indicative of a pending increase in disease risks in Klamath River salmon?

An additional concern we have with MG4 is that the measure's triggers are not necessarily indicative of a pending disease risk. MG4 contains trigger values of 5 s/L and 20% POI in Chinook Salmon at the Kinsman monitoring station, either of which can initiate an emergency dilution flow. As stated in a previous review of a draft version of MG4, we believe these values can indicate normal or background levels of *C. shasta* condition in the wild. For instance, these values were approached or met in 2017, a year with "low *C. shasta* infection levels and no

clinical signs of disease observed in any of the fish sampled in the Klamath basin" (True et al. 2017). Although these trigger values can occur in years with or without elevated disease risk, it is important to note that as described in the response below, temperature plays an essential role in disease incidence and severity (Ray et al. 2014), and that at warmer water temperatures these triggers could indicate escalating disease risk.

Given that temperature was a component of an earlier draft of the Guidance Document, briefly comment on the importance of temperature in C. shasta infection rates and disease progression.

The inclusion of a POI threshold as a trigger for MG4 without considering concurrent water temperatures is a serious concern. It is well established that the *C. shasta* mortality risk for salmon includes water temperature (e.g., Ray et al. 2014). Although POI remains an important monitoring characteristic for evaluating intra- and inter-annual infectious patterns in the Klamath River, measures of POI levels alone are not sufficient to infer the population will be negatively impacted by disease, as demonstrated by new information from 2017 (True et al. 2017). More specifically, recent work has suggested that mortality is more accurately predicted by the severity of infection and disease progression within individuals than by POI alone, both of which are highly influenced by water temperature. True et al. (2016) note that at water temperatures commonly encountered by outmigrating Chinook Salmon in the Klamath River, fish measuring less than 2 logs of *C. shasta* DNA (recorded as DNA copy numbers in the standard QPCR assessment) are less likely to experience mortality as a result of their infection. For example, despite recorded infections via *C. shasta* in sampled fish during the 2017 Klamath River Fish Health Survey, not a single fish assessed via QPCR exceeded the 2 logs threshold (True et al. 2017) considered indicative of likely mortality due to disease.

Given Reclamation's current projections that the hydrology will not support emergency dilution flows at the volume and timing as directed in the Court Injunction, are there benefits, in terms of reduced disease risks, to providing a partial emergency dilution flow (i.e., a reduced magnitude and duration) and if so what are these?

It is our professional opinion that from a disease risk perspective, a reduced volume of water available for emergency dilution flows generally amplifies the uncertainties we have previously discussed about the potential effectiveness of MG4. Given a smaller volume of water available to implement a managed emergency dilution flow event, it would be more difficult to predict measureable disease reductions than if the full 50 TAF were available. This is supported by the observation that as the amount of water available to implement a dilution flow decreases, the managed event likely takes the form of the 2014 pulse flow event previously described (2014 event where peak discharge was elevated less than 2-fold, was held at this peak for a single day, and the entire event lasted around five days total). This would not provide the intended population-level disease benefits intended by MG4.

Prioritization of a Flushing Flow and Significant Scientific Concerns with the Dilution Flow

In summary, we believe the science supporting the efficacy of the proposed flushing flow in MG1 is strong and agree that this action should be prioritized. Contrarily, we believe there are significant questions and uncertainties about the science behind the dilution flow as proposed under MG4, as it relates to disease impacts to salmon. First, the effects of the dilution flow cannot be accurately predicted because of a relative lack of high flow events since disease sampling began. Second, MG4's fixed-discharge release from IGD is insensitive to discharge and spore concentrations at the specific sample location where the trigger is exceeded. Third, the inability to measure the dilution flow's effectiveness is a cause for concern. Fourth, the management triggers may not be indicative of pending disease risk. Fifth, water temperature is not incorporated into the triggers, yet is critical to assess disease risk. Finally, a reduced dilution flow would only amplify all of these questions about the science behind the dilution flow.

In addition to Reclamation's flow proposal, we are requesting a review of certain technical information and statements contained within the Notice of Motion and individual Declarations provided by the Klamath Water Users Association.

In addition to the questions relating to MG1 and MG4 previously discussed, Reclamation also requested our technical input on specific topics and statements made in the Intervenors' Motion and/or associated supporting declarations. We provide a summary of those responses below, with more detail provided in subsequent discussions.

- POI is an important metric for informing disease studies and real-time management.
- The "legacy effect" of the 2017 high flow event on disease conditions is largely unknown with regard to its spatial extent and duration of benefits.
- The proposed fine flushing flow event specified under MG1 is expected to have positive benefits to disrupting the *C. shasta* lifecycle.
- The timing of the 2018 juvenile salmon outmigration is unknown at this time.
- High flow events of the magnitude and duration of the fine sediment flushing flow event (MG1) are expected to reduce risk of disease in outmigranting juvenile salmon.
- References to the S3 Model in the Intervenors' Motion and Cramer Declaration are invalid.

Please provide technical comment on the statement that "C. shasta infection is an entirely unreliable indicator of effects to the species", for Klamath River salmon (see line 10 page 6 in Notice of Motion).

The statement that "*C. shasta infection is an entirely unreliable indicator of effects to the species*" is a misrepresentation of the value of POI. POI is an important metric for assessing disease conditions, even given that temperature and progression of disease are required to more precisely assess mortality risk. We agree that POI weighted by abundance as presented by Som et al. (2016b) is the appropriate and more informative metric for assessing population-level effects of the parasite annually. However, the above statement discounts the importance of weekly POI estimates in assessing disease conditions in real time. The statement also discounts

POI's role, along with other disease-related variables, to inform management decisions such as timing of hatchery releases, calculating parasite exposure or dose, and its reliance to ongoing sentinel fish disease studies, among others.

Additionally, there are several statements in the Cramer Declaration referencing POI that are incorrect. For example, the Cramer Declaration suggests that:

> *"However, the infection rate estimates in that Table 1* [of Som et al. 2016b] *are calculated for all Chinook, which includes hatchery and natural fish combined."* [lines 8-9, page 17, Cramer Decl.].

However, this statement does not accurately represent the statistical summaries presented in Table 1 of Som et al. 2016b, which presents POI estimates weighted by abundance for natural (non-hatchery) Chinook Salmon outmigrating by the Kinsman rotary screw trap site. As stated in Som et al. 2016b:

> "*Our analysis goal was to estimate the proportion of the* ***natural*** [bold added] *juvenile Chinook Salmon population infected with C. shasta each year …*" and further adds that "*trapping occurs during a period of the year aimed to capture as much of the passing natural population as possible*" [page 16, Som et al. (2016b)].

Finally, the Cramer Declaration cites results of the S3 model with regard to POI, namely:

> *"The Stream Salmonid Simulator (S3) model developed by USFWS and the United States Geological Survey (USGS) has shown that the actual infection of all migrants is much lower than the POI index reported by quantitative polymerase chain reaction (QPCR)*" [lines 16-19, page 4, Cramer Decl.].

The S3 model results cited by the Cramer Declaration are not valid for any inference or comparison and in particular, are not appropriate for comparison to summaries of field data that have been collected in the Klamath River. Please see comments below regarding more general problems with the specific citation of the S3 model in the Intervenors' Motion and associated declarations.

Are we likely to observe legacy impacts from the geomorphic flows observed in 2017 (page 10, line 8-15 of the Notice of Motion)?

The scientific evidence regarding the potential legacy effects of high flow events is too uncertain to warrant ignoring the potential need for disease management flows in 2018. The Intervenors' Notice and Cramer Declaration claim that disease conditions in spring 2018 do not pose a threat to juvenile salmon, in part, because of a "legacy effect" from the high flows experienced in 2017. However, the spatial extent and duration of reductions in POI that may result from the 2017 high flow event have yet to be assessed and therefore, are not yet known.

Shea et al. (2016) discuss the historical frequency and duration of discharge events below IGD in the context of return intervals (the number of years between discharge events of a given magnitude), and how the events are predicted to mobilize various aspects of the riverbed. High flow events such as those observed in 2017 are not expected to occur every year. Hence, it is

reasonable to hypothesize that environmental benefits aligned with these flows, perhaps reductions to polychaete habitat, abundance, and distribution would persist in years following those having large flow events. *Ceratonova. shasta* monitoring programs have primarily occurred over the last 10 15 years. Data and analyses from these programs allow us to predict the potential, or measure the realized benefits, of these larger flow events. However, without flows having neared the magnitude and duration below IGD as observed in 2017 during the recent period of disease monitoring, data are not available to directly inform the spatial extent of a legacy effect or how long it may last. As such, there is no scientific evidence of legacy effects impactful enough to warrant completely ignoring the potential need or benefits of other managed flows for 2018. This is particularly true given the hydrologic conditions observed thus far in the 2018 water year.

Will implementing either or both of the injunction flow requirements (including surface flushing flows) exacerbate disease risks for Klamath River salmon in 2018 (lines 12-14 in Notice of Motion)?

It is our technical opinion that a high flushing flow event, particularly of the magnitude and duration of the event proposed by MG1, is expected to have positive benefits in disrupting various stages of the *C. shasta* lifecycle (Shea et al. 2016, Som and Hetrick 2016, Some et al. 2016a, DTAT 2017). However, the Intervenors' Motion contains a contradictory argument. Intervenors' state that a flushing flow event would increase the impacts of disease experienced by juvenile salmon during the 2018 outmigration season.

> … *"the implementation of Guidance Measures in this limited water-availability year is likely to increase, not decrease, the occurrence of infection. In 2017, there were extremely favorable conditions in the Klamath River, including abundant inflow from both the upper watershed and tributaries down the river's entire length. The basin-wide force resulted in a changed river, and conditions improved so fundamentally that application of the Order is unnecessary for at least the 2018 water year* [lines 12-17, page 6, Intervenors' Motion].

High flow events like the fine sediment flushing flow event called for in MG1, which would have a 3-day peak of 6,030 cfs and a protracted duration to account for ramp rate requirements, are naturally occurring springtime events in cold-water, salmon-producing streams. Our scientific opinion is that intended positive benefits of a flow event of this magnitude, including flushing fine sediments (Shea et al. 2017) and scouring polychaete worms (albeit to a lesser degree than for a channel maintenance or deep flushing flow event) (Som et al. 2016a), among others, would create disruptions in critical stages of the *C. shasta* lifecycle that would decrease risk of disease in outmigrant juvenile salmon. These disturbances are particularly important given the relatively flat-line flow releases from IGD that have occurred since mid-December 2017 (Figure 2), coupled with relatively low inflow accretions from tributaries given the 2018 water year and associated lack of snowpack, and the resulting accumulation of fine sediments that have occurred in the mainstem Klamath River since the last high flow event.

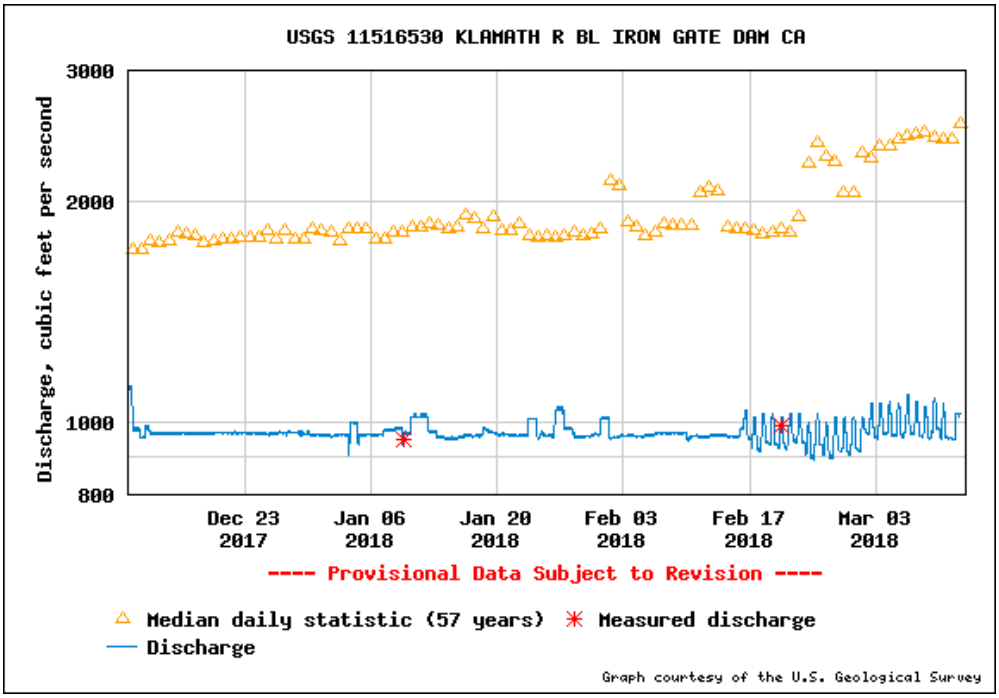


Figure 2. Discharge from Iron Gate Dam on the Klamath River between December 10, 2017 and March 11, 2018. Note that flushing flows called for in the Guidance Document are specified at 11,250 cfs for a deep-flushing event and 6,030 cfs for a fine sediment flushing flow event.

In addition, the timing of the 2018 juvenile salmon outmigration is unknown at this time and as such, we strongly disagree with the science used to support the statement in the Intervenors' Motion:

> "*even if conditions conducive to C. shasta infection arise in 2018, they will not exist until after the vast majority of salmon, especially Coho, have emigrated*" [lines 11-12, page 6 Intervenors' Motion].

The Yurok and Karuk tribes made a formal request for technical assistance of the Service's Arcata Fish and Wildlife Office in August 2016 to develop a tool for estimating when 80% of the natural juvenile Chinook Salmon had migrated downstream of the Kinsman trap site on the Klamath River. The resulting peer-reviewed model was constructed using 13 years of data having the requisite response variable information necessary for model fitting. The selected metrics include measures of spawn timing, egg incubation development time, and fish length, which were demonstrated to correlate with and predict the outmigration timing of Chinook Salmon in the Klamath River (Som and Hetrick 2017). No such model has been developed to predict the outmigration timing of Coho Salmon. Additionally, the Chinook Salmon model described above cannot be run to make intended predictions until after April 1st due to its data requirements. Therefore, we question the Intervenors' predictions of outmigrant timing in spring 2018, especially because they are presented without supporting justification or citation.

Furthermore, the Intervenors' statement was made before actual river conditions, generally understood to correlate with outmigration timing, have occurred.

Is the cited application of the S3 model in assessing population level impacts to Klamath River salmonids valid and appropriate (see line 10-13, page 21 of the Notice of Motion)?

References to the S3 Model in the Intervenors' Motion and Cramer Declaration are inappropriate. The Intervenors' Motion references outputs from a draft version of the S3 Model developed jointly by the Service's Arcata Office and USGS, stating "*the actual infection of all migrants is much lower than the POI index reported by QPCR, and has demonstrated quantitatively that the late release of hatchery fish artificially increases the POI index*." [Intervenors' Motion at 11; *see* Cramer Decl. at ¶¶ 4, 23-27].

First, the outputs referenced in Intervenors' Motion and Cramer Declaration are not sanctioned by any of the S3 Model authors. Second, all referenced/cited material was extracted from a Microsoft PowerPoint presentation that is now several years old. This presentation displays an early draft version of the model that was produced and presented to both exhibit and generate suggested comments to improve the S3 Model's architecture, and its potential future uses. In essence, the Intervenors' Motion and Cramer Declaration based the statement cited above on a long outdated, draft version of the S3 Model that had yet to be validated and had not yet gone through DOI's peer review process. The current version of the S3 model has since undergone numerous revisions, has been constructed and calibrated to the weekly abundance estimates of natural (non-hatchery) Chinook Salmon, and is currently undergoing a peer review process.

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UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

YUROK TRIBE, et al. Plaintiffs, v. U.S. BUREAU OF RECLAMATION, et al., Defendants, and KLAMATH WATER USERS ASSOCIATION, et al., Defendant-Intervenors.	Case No. 3:16-cv-06863-WHO **DECLARATION OF JAMES A. SIMONDET**

I, James A. Simondet, declare as follows:

1. I am the Klamath Branch Chief for the California Coastal Office of the West Coast Region of the National Oceanic and Atmospheric Administration National Marine Fisheries Service ("NMFS"), an agency of the United States Department of Commerce. I have been in this position for eight years. Prior to this position, I served for eleven years as a fisheries biologist in the Klamath Branch. I have worked extensively on fisheries issues in the Klamath Basin for over twenty years.

2. As Klamath Branch Chief, I oversee Klamath River program activities of the Arcata, California Office of the West Coast Region, including the development of the Biological Opinions on the Effects of Proposed Klamath Project Operations from May 31, 2013, through March 31, 2023, on Five Federally Listed Threatened and Endangered Species ("2013 BiOp") for the United States Bureau of Reclamation's ("Reclamation") Klamath Project ("Project") Operations. I also oversee the implementation activities and reinitiated consultation associated with the 2013 BiOp.

3. I have reviewed "Measures to Reduce *Ceratanova shasta* Infection of Klamath River Salmonids: A Guidance Document" authored by the Tribal "Disease Technical Advisory Team" (2017). *See* ECF 54-3. I am familiar with the proposals contained in the Guidance Document, including management guidance measure one (MG1), which requires Reclamation to provide a yearly flow (anytime from November 1 – April 30) of at least 6,030 cubic feet per second from Iron Gate Dam for a 72 hour period followed by the ramp down rates provided in the 2013 BiOp. *See id.* at 8. I am also familiar with management guidance four (MG4), which requires Reclamation to hold 50,000 acre feet ("AF") of water in reserve beginning on April 1 for the purpose of implementing emergency spore dilution flows if a certain threshold of spore concentrations or prevalence of infection in fish is met. *Id.* at 12-13.

Effective Use of This Year's Limited Water Supply to Reduce Disease Risks to Coho Salmon in the Klamath River

4. Reclamation has informed me that it will not be able to fully comply with MG1 or MG4 using solely Project water because of the limited water supply in the Klamath Basin this year. Based on that information, I provide the following opinion. Implementation of MG1 would

provide a greater reduction in *Ceratonova shasta* disease risk to juvenile salmon in the Klamath River than the emergency spore dilution flow release prescribed by MG4.

5. My opinion is based on: (1) MG1 would be expected to reduce disease risks to outmigrating juvenile salmon due to creating disruptions in the *C. shasta* lifecycle; and (2) the substantial uncertainties about the efficacy of the MG4 emergency spore dilution flows to reduce disease risks.

6. MG1 will result in a surface flushing flow below Iron Gate Dam. Benefits expected from a surface flushing flow have been described in U.S. Fish and Wildlife Service's four technical memorandums that summarize recent findings of studies contributing to our understanding of *C. shasta* infections in the Klamath River. A stated benefit of surface flushing flows is that the flows are expected to mobilize and modify habitat of the intermediate host of *C. shasta* (*Manayunkia speciose*). This habitat disturbance is expected to result in a reduction in release of *C. shasta* actinospores, the life stage that infects juvenile coho salmon.

7. As for MG4, the efficacy of the prescribed MG4 dilution flows is uncertain in part due to the prescribed fixed volume of water released at Iron Gate Dam. For example, if the sampled location known to trigger the dilution flow is far downstream of Iron Gate Dam, the fixed volume of water released at Iron Gate Dam might not be at a sufficient volume once it reaches the sampled location to result in an appreciable increase in flows to dilute spore concentrations. Also, estimates of infection rates alone (which are a trigger for emergency dilution flows under MG4) are not necessarily a good measure of disease risks to juvenile salmon populations given the strong relationship between water temperature and disease risks to juvenile salmon.

8. I base the above opinion on the best scientific information available, which includes a series of technical memoranda released by the U.S. Fish and Wildlife Service's Arcata Office (Shea et al. 2016; Som and Hetrick 2016; Som et al. 2016a; Som et al. 2016b), supporting scientific manuscripts and reports, and sections of the Tribes' Guidance Document (2017), among other analyses.

This declaration is made under the provision of 28 U.S.C. § 1746. I declare under penalty of perjury that the foregoing is true and correct to the best of my current knowledge, information, and belief.

Executed this 20th day of March, 2018 at Arcata, California.

James A. Simondet
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West Coast Region, NMFS

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SAN FRANCISCO DIVISION

YUROK TRIBE, et al., Plaintiffs, v. U.S. BUREAU OF RECLAMATION, et al., Defendants, and KLAMATH WATER USERS ASSOCIATION, et al., Defendant-Intervenors.	Case No. 3:16-cv-06863-WHO **DECLARATION OF JARED BOTTCHER**

Introduction

I, Jared Bottcher, declare as follows:

1. I am the Chief of the Water Operations Division at the Klamath Basin Area Office ("KBAO") of the United States Bureau of Reclamation ("Reclamation"), a position I have held since June 2017. Prior to my current position, I served as Chief of the Fisheries Resources Branch at KBAO starting in June 2015. Between July 2011 and June 2015, I served as Executive Director for a conservation based non-profit in Klamath Falls working to restore aquatic habitats for suckers and salmonids in the Upper Klamath Basin. My experience in the Klamath Basin began in March 2009, when I served as a field crew lead for the United States Geological Survey in the Klamath Falls Field Office with research primarily focused on juvenile sucker survival and ecology in Upper Klamath and Clear lakes.

2. In my current capacity, I am responsible for implementing Klamath Project ("Project") operations consistent with Reclamation's legal and contractual obligations. I am responsible for providing direction, oversight and guidance to the KBAO Water Operations Division, with a focus on compliance with hydrologic requirements outlined within the *Biological Opinions on the Effects of Proposed Klamath Project Operations from May 31, 2013, through March 31, 2023, on Five Federally Listed Threatened and Endangered Species* ("2013 BiOp"). As Chief of the Fisheries Resources Branch, I was responsible for implementation of a number of Conservation Measures and Terms and Conditions within the 2013 BiOp. Activities included annual monitoring of Lost River and shortnose sucker (collectively, "suckers") populations in the Upper Klamath Basin and providing adequate funding to monitor the prevalence and intensity of *Ceratonova shasta* ("*C. shasta*") disease in Chinook and Southern Oregon/Northern California Coast Evolutionarily Significant Unit ("SONCC") coho salmon in the Klamath River.

2018 Hydrologic Background and Status of the Injunction Implementation

3. The United States District Court for the Northern District of California issued an Injunction on March 24, 2017, requiring Reclamation to provide specified additional flows in the Klamath River until the ongoing reinitiation of formal consultation on the 2013 BiOp is

complete. The flows specified in the Injunction are modeled on Management Guidelines described in *Measures to Reduce Ceratanova Shasta Infection of Klamath River Salmonids: A Guidance Document* (Jan. 17, 2017) ("Guidance Document") and include: (1) surface flushing flows of 6,030 cubic feet per second (cfs) for 72 hours, required every year (Management Guidance 1 ["MG1"]); (2) deep flushing flows of 11,250 cfs, required every other year[1](Management Guidance 2 ["MG2"]); and (3) emergency dilution flows of up to 50,000 acre-feet (AF) (Management Guidance 4 ["MG4"]). The stated purpose of these flows is to attempt to mitigate *C. shasta* disease concerns in the Klamath River. The Injunction also states that Reclamation has discretion as to the timing of the flows within the timeframes specified in the Injunction. The applicable time period for implementing MG1 and MG2 is November 1 to April 30 and the time period for MG4 is April 1 to June 15, or until 80 percent of juvenile salmon have out-migrated from the middle Klamath River, whichever occurs first.

4. The Injunction states that the 2013 BiOp and incidental take statement remain in effect pending completion of the reinitiated formal consultation unless they are specifically altered by the Injunction itself. ECF 111 at ¶ 2. The Injunction also states that "[i]n no event shall the mitigation measures interfere with conditions necessary to protect the endangered sucker fish," referring to the endangered suckers that reside in the Upper Klamath Basin (principally, in Upper Klamath Lake ["UKL"], but also in Clear Lake and Gerber Reservoirs and the Tule Lake National Wildlife Refuge). *Id.* ¶ 3. As such, Reclamation has determined that any management action, including implementation of the Injunction, that could result in missing the end of month UKL threshold elevations for suckers specified in the 2013 BiOp "interferes with conditions necessary to protect" suckers. *Id.* Therefore, those management actions would be inconsistent with both the requirements in the 2013 BiOp relating to suckers and the Injunction.

5. Cumulative inflows to UKL since October 1, 2017, have been some of the lowest observed within the Period of Record ("POR") (as stated in the 2013 BiOp, the POR is 1981-2017) and are currently below the 80 percent exceedance values. In other words, 80 percent of

[1] Because parties to the litigation are in agreement that Reclamation made a good-faith effort, and substantially achieved the criteria for implementing the 11,250 cfs flushing flow in 2017, implementation of this flow is not required in 2018.

the inflow observations within the POR have been greater than what has been observed during the 2018 water year (beginning on October 1, 2017). The low inflows have resulted in UKL elevations that are currently projected to peak around 4,142.73 feet ("ft"), which is well below the full pool elevation of 4143.30 ft. These lower UKL elevations restrict the head and release capacity at Link River Dam. In addition to low inflows to UKL, accretions between Link River Dam and Iron Gate Dam have also been consistently low through the 2018 water year with recent accretions near the 70 percent exceedance level. In other words, nearly 70 percent of the accretions within the POR have been greater than those observed during this water year.

6. The limited release capacity at Link River Dam combined with low accretions between Link River Dam and Iron Gate Dam has prevented Reclamation from physically producing a surface flushing flow under MG1 between November 1, 2017 and early March. Only recently (approximately March 10) did UKL elevations and accretions between Link River and Iron Gate Dam provide for the physical conditions necessary for implementation of the 6,030 cfs surface flushing flow for 72 hours (Table 1). However, Reclamation still cannot produce the surface flushing flow due to the end-of-month UKL threshold elevations in the 2013 BiOp. Without significant accretions downstream, UKL is still not at a sufficient elevation to allow those flows to be moved out of UKL without reducing the elevation of UKL below required end-of-month threshold elevations specified for suckers in the 2013 BiOp. *See U.S. Bureau of Reclamation Hydrologic Assessment Relative to Court Injunction (*"Hydrologic Assessment"*)*. Until such time as the elevation of UKL is either high enough to avoid missing thresholds, or the combination of UKL elevations ad significant accretions in the Link River Dam to Iron Gate Dam reach occur, Reclamation cannot produce the surface flushing flows. *Id.* Current forecasts do not indicate either of these conditions occurring prior to the end of April, the deadline for completing MG1 in the Injunction. *Id. See* Hydrologic Assessment. Given these constraints, as of the date of this Declaration, Reclamation could not and thus has not implemented a surface flushing flow under MG1.

Table 1. Date on which Upper Klamath Lake (UKL) elevation was sufficient to meet daily requirements for the surface flushing flow under MG1 with ramp down; this includes maximum Link River Dam releases and forecasted total accretions. UKL elevation on March 10 is the projected elevation from the Iron Gate Dam calculator. Elevations thereafter reflect decreases due to actual Link River Dam releases necessary to implement a surface flushing flow. Maximum Link release reflects the maximum discharge rate (cfs) at Link River Dam at the provided UKL elevations. Total accretions are those projected to manifest between Link River Dam and Iron Gate Dam.

Date	UKL Elevation (ft)	Max Link Release (cfs)	Total Accretions (cfs)	Max Link Release + Total Accretions (cfs)	Required Flushing Flow (cfs)
10-Mar	4,141.90	5,820	639	6,459	6,030
11-Mar	4,141.80	5,640	652	6,292	6,030
12-Mar	4,141.69	5,442	779	6,221	6,030
13-Mar	4,141.58	5,244	795	6,039	4,030
14-Mar	4,141.52	5,136	934	6,070	3,030
15-Mar	4,141.58	5,244	1047	6,291	2,430
16-Mar	4,141.58	5,244	970	6,214	2,130
17-Mar	4,141.60	5,280	820	6,100	1,830
18-Mar	4,141.63	5,334	767	6,101	1,530
19-Mar	4,141.65	5,370	723	6,093	1,380

7. Regarding MG4, current forecasts and modeling indicates that Reclamation cannot establish a Reserve Water Supply ("Reserve Supply") of 50,000 AF by April 1. This quantity of water is not available from UKL without violating the end-of-month elevations specified for suckers in the 2013 BiOp, even if no Project deliveries are made prior to April 1.

8. Although the Injunction does not require it, Reclamation made a diligent search for sources of water outside the Project to help establish the Reserve Water supply. But, non-Project water was not available to use for the Reserve Water supply because these sources were difficult to accurately quantify, not available at a time that is consistent with the Injunction's definition of Reserve Water supply, logistically or operationally difficult to deliver to the Klamath River or UKL in a timely manner, volunteered to support a surface flushing flow under MG1, and/or outside the scope of biological opinions for other Reclamation Projects (e.g., Reclamation's Pacific Northwest Rogue River Project). These non-Project water sources excluded from further consideration for establishment of the Reserve Water supply include water rights regulation above UKL, Clear Lake and Gerber reservoirs, Hyatt and Howard Prairie reservoirs in the Rogue River Project, water stored on United States Fish and Wildlife Service's ("USFWS") Lower Klamath and Upper Klamath National Wildlife refuges (respectively

"LKNWR" and "UKNWR"; collectively ["Refuges"]), and water stored in PacifiCorp reservoirs. *See* Hydrologic Assessment.

Reclamation Project Operations - Fall/Winter Period (October 1 2017 - February 28, 2018)

9. The elevation of UKL was 4,138.78 ft. on October 1, 2017, the start of the 2018 water year and 2013 BiOp's fall/winter operational period. This elevation was 0.67 ft higher than the beginning of the 2017 water year on October 1, 2016.

10. Reclamation delivered 19,190 AF to the Klamath Drainage District ("KDD"), in accordance with the 2013 BiOp, from October 1 to December 30, 2017. These deliveries were made during a time in which precipitation and snow water equivalent (a measure of snowpack) were well above the historical average and there was no indication of the well below average hydrology that was to ensue. Under the 2013 BiOp, additional water may be delivered to KDD above the 19,234 AF if additional fall/winter water is determined to be available. Reclamation did not provide additional deliveries given the uncertainty surrounding whether winter hydrology could support those deliveries.

11. Reclamation also delivered 32,234 AF to the LKNWR during the fall/winter operational period (starting October 1, 2017). These deliveries were made with remaining and unused Project irrigation water supply (Project Supply) from the 2017 spring/summer operational period, consistent with calculations in the 2013 BiOp. Under the 2013 BiOp, LKNWR was allowed 60,762 AF in 2017 from UKL, but only 48,296 AF were ultimately delivered due to capacity limitations in the Ady Canal. Thus, the elevation of UKL is currently higher than would have been expected to occur had Reclamation delivered the full volume allowed under the rules of the 2013 BiOp to LKNWR.

12. UKL end-of-month threshold elevations are calculated as a combination of the previous month's lake volume and inflows during the current month. As such, any increase in UKL volume in the previous month will also increase the current month's threshold elevation, which is relevant to the situation described here. Therefore, although not providing the fall/winter deliveries to KDD and LKNWR during this time period would have resulted in some additional volume in UKL, the thresholds would have also been adjusted upwards to account for

this water and would not have necessarily allowed any additional water to be delivered for implementation of the Injunction.

13. Similarly, if the 19,190 AF had not been delivered to KDD this fall, a portion of that water would have likely gone towards Iron Gate Dam flows given that the UKL volume also affects Klamath River flow calculations. Specifically, increased UKL volume allows for increased Iron Gate Dam flows if the UKL refill rate is at or above the rate specified in the 2013 BiOp. In other words, if Reclamation had not delivered to KDD or LKNWR that volume of water would have contributed both to higher end-of-month thresholds in UKL and potentially higher releases from Iron Gate Dam such that the full difference in UKL volume would not be available to implement MG1 or MG4 this spring. For a full explanation of end-of-month threshold and Iron Gate Dam flow calculations, please refer to the 2013 BiOp at sections 8.1.3 (pg 116-132) and 4.2.3.2.3 (pg 26-32) respectively, and the May 2015 (for the spring/summer period) and December 2015 (for the fall/winter period) refinements for calculating end-of month-threshold elevations (*See* Exhibits 2 and 3).

Reclamation Project Operations - Spring/Summer Period (March 1, 2018 - Present)

14. Reclamation has not made any deliveries to the Project since March 1, 2018, from either UKL or the Lost River Basin. In fact, all deliveries to the Project ceased on December 30, 2017, when Reclamation made the determination that additional fall/winter water was not available.

15. Reclamation will not allocate or deliver any water for irrigation purposes until: (1) the Court issues an order on the Intervenors' Motion for Relief from Judgment and/or Stay of Enforcement that resolves the issue of what operation Reclamation should perform in water year 2018; (2) there is enough water available from the Project to both fully comply with the flows specified in the Injunction and allocate/deliver water to irrigators; or (3) the time for completing the flows specified in the Injunction has passed (i.e., April 30 for MG1; June 15th or when an estimated 80 percent of wild juvenile Chinook salmon have outmigrated past the Kinsman Rotary Screw Trap, whichever occurs first, for MG4).

General approach to hydrologic modeling

16. Reclamation utilized the Iron Gate Dam calculator, a tool used for daily water management operations, to model the effect of implementing MG1, MG4, and Reclamation's proposal (paragraphs 30-33) on UKL trajectory. To better understand Reclamation's ability to implement MG1 and MG4 in water year 2018, Reclamation modelled management scenarios using the mid-March NRCS inflow forecast for April through September, and current projections for the remainder of March. *See* Hydrologic Assessment.

17. Actual hydrology can change between now and the end of the implementation period for MG4 (June 15 at the latest). Therefore, in order to thoroughly assess a realistic range of potential hydrologic conditions, Reclamation has evaluated each management scenario using the Natural Resources Conservation Service ("NRCS") 30 percent, 50 percent, and 70 percent exceedance forecasts for April through September UKL inflows. These exceedances are defined as a 30 percent chance inflows to UKL will exceed the forecast in 2018, a 50 percent chance inflows to UKL will exceed the forecast in 2018, and a 70 percent chance inflows to UKL will exceed the forecast in 2018, respectively. *See* Hydrologic Assessment for a detailed discussion of assumptions specific to each forecast exceedance.

18. Each management scenario graph includes a "baseline scenario" (black dashed line), which represents operations as they would occur in compliance with the 2013 BiOp (i.e., these do not include Injunction flows MG1 or MG4). The purpose of the baseline scenario is to calculate UKL end-of-month threshold elevations, Environmental Water Account ("EWA") volumes, and Project Supply volumes as specified in the 2013 BiOp. **These baseline scenarios do not represent what Reclamation plans to implement this water year, but are only included as a reference.** The gray dashed line in each scenario graph represents the UKL trajectory as a result of implementation of the Injunction or Reclamation's proposal (summarized in paragraphs 30-33; *see* Hydrologic Assessment for further details).

Implementation of Court Injunction Flows with 30, 50, and 70 Percent Exceedance Natural Resources Conservation Service (NRCS) Inflow Forecasts - Model Output

19. Regardless of which exceedance forecast (i.e., 30, 50, or 70 percent) is used to model implementation of the injunction, and even **with a complete shutoff of irrigation**

deliveries, Reclamation cannot implement both MG1 and MG4, as modelled, without missing the end of April and May UKL threshold elevations for suckers specified in the 2013 BiOp. Indeed, as modelled with the 50 percent exceedance scenario, Reclamation would only be able to deliver a flushing flow of 6,030 cfs for 27 hours followed by modified ramp down rates (a total of 23,829 AF) and an emergency dilution flow of 3,000 cfs for 168 hours (7 days) followed by ramp down rates defined in the 2013 BiOp (a total of 27,714 AF), and still meet the end of April and May UKL threshold elevations for suckers specified in the 2013 BiOp. For this "partial" emergency dilution flow, there would not be sufficient volume to increase the flow to 4,000 cfs, if necessary, as required by MG4. Based on the 50 percent exceedance scenario, Reclamation would be able to implement a full 50,000 AF emergency dilution flow under MG4 starting on May 24 and still meet subsequent end-of-month UKL threshold elevations, **although in only three (2006, 2011, and 2017) of the eleven years for which we have disease data were triggers exceeded on May 24 or later.** All three of these years were exceptionally wet years with above average precipitation (both rain and snow) and above average river flows. In other words, it is unlikely that triggers would be eclipsed on or after May 24 this year. Finally, a "partial" surface flushing flow is inconsistent with the flow requirements and justification for MG1 stated in the Guidance Document. *See id.*

20. Similarly, **with a complete shutoff of irrigation deliveries,** Reclamation cannot implement MG1, as modelled, alone without missing the end of April UKL threshold elevation for suckers specified in the 2013 BiOp (Figure 2, Table 6), regardless of which exceedance forecast is modelled. As described above, to meet end of April UKL threshold elevation for suckers specified in the 2013 BiOp, Reclamation would only be able to deliver 6,030 cfs for 27 hours followed by modified ramp down rates (based on the 50 percent exceedance forecast). This "partial" surface flushing flow is inconsistent with the flow requirements and justification for MG1. Specifically, MG1 clearly states that a full flushing flow of 6,030 cfs for 72 hours is anticipated to disrupt the lifecycle of the *C. shasta* host; a flow of lesser magnitude and duration is not expected to achieve the desired result. *See id.*

21. Reclamation acknowledges that an accretion event of sufficient volume occurring in mid-to-late April may enable implementation of the surface flushing flow under MG1 without missing the end of April UKL threshold elevation for suckers under the 2013 BiOp. As such, Reclamation continues to monitor hydrologic conditions with the intent of implementing MG1 if an accretion event of sufficient volume occurs. Coupling implementation of the surface flushing flow under MG1 with an accretion event of sufficient volume that occurs in mid-to-late April may not necessarily prevent UKL elevation from dropping below end of May UKL threshold elevations if a full emergency dilution flow (i.e., all 50,000 AF, increase to 4,000 cfs after one week as in the Hydrologic Assessment) under MG4 is also implemented. Finally, Reclamation previously analyzed the accretion volumes necessary to implement MG1 in March without missing the end of March UKL threshold elevation and determined, based on data from 1981-2017, that such an event was extremely unlikely in water year 2018 given the relatively low snow pack. As such, Reclamation only assessed April accretion events and modeled April implementation of MG1 in the Hydrologic Assessment, though that does not preclude Reclamation from implementing MG1 in March if a sufficient accretion event is anticipated. *See id.*

New Biological Information that has not been Previously Considered by the Court

22. New information provided by disease experts with the USFWS Arcata Office that was not previously considered by the Court indicates there is very limited scientific support for an emergency dilution flow under MG4 in general. Additionally, this new information indicates that a reduced volume of water available for an emergency dilution flow makes the possible benefits of this measure in reducing spore concentration even more doubtful and that a partial emergency dilution flow would likely not provide the intended population-level disease benefits. *See* USFWS Technical Memorandum. For this water year in particular, Iron Gate Dam flows just prior to implementation of the 3,000 cfs flow, as currently modelled, are projected to be 1,472 cfs. This represents a doubling of flow, similar in nature to the dilution flow implemented in 2014, which the *C. shasta* experts at the USFWS's Arcata Office have characterized as minimally successful in diluting spore concentration and reducing prevalence of infection (POI)

in Klamath River juvenile salmon. The partial dilution that is projected to be realized in 2018 if MG4 is required is far less than the uncontrolled spill event that occurred in 2005, when flows at Iron Gate increased by nearly six-fold to 6,000 cfs, remained elevated for four weeks, and when reductions in weekly POI estimates were actually observed. *See* USFWS Technical Memorandum.

23. ***Disease experts with the USFWS Arcata Office indicate that surface flushing flows modeled on MG1 "would provide a greater reduction in disease risk to juvenile salmon in the Klamath River than an emergency dilution flow release prescribed by MG1". Therefore, implementation of surface flushing flow should be prioritized over the emergency dilution flow***. *See* USFWS Technical Memorandum.

24. USFWS's Arcata Office cites several reasons in their Technical Memorandum for the difficulties in predicting the effectiveness of implementing the emergency dilution flows prescribed in MG4, including the scarcity of high flow events that have coincided with elevated disease risks, a fixed-discharge release from Iron Gate Dam that is not tied to discharge and spore concentration at the specific sample location where the trigger is exceeded (i.e, emergency dilution flows could be required below the confluence with the Trinity River where Iron Gate contributions range between 9-18% of the mean flow; *see* Figure 1, USFWS Technical Memorandum), the inability to evaluate MG4's effectiveness, and the fact that the triggers for the emergency dilution flows are not indicative of a pending disease risk, or inclusive of water temperature (which is critical to assessing disease risk).

25. With regard to the emergency dilution flow triggers, the authors of the USFWS Technical Memorandum note that 5 spores/liter and 20 percent prevalence of infection (POI) indicate normal or background levels of *C. shasta* conditions in the wild and are not necessarily indicative of pending risk of disease as stated in the Guidance Document. Monitoring observations made in 2017 underscore this point: both spore concentrations and POI were approached or met in 2017, a year with "low *C. shasta* infection levels and no clinical signs of disease….in any of the fish sampled in the Klamath basin."

26. The USFWS Arcata Office's Technical Memorandum also underscores the importance of temperature in disease progression; it notes that the inclusion of POI as MG4 trigger without concurrent water temperatures is a serious concern. Although water temperature was initially incorporated as a trigger in the draft Guidance Document, it was subsequently removed from the final version of MG4. In the USFWS Technical Memorandum, the authors note, that: "[a]lthough POI remains an important monitoring characteristic for evaluating intra and inter-annual infectious patterns in the Klamath River, measures of infection alone are not sufficient to infer the population will be negatively impacted by disease. In fact, recent work has suggested that mortality is more accurately predicted by the severity of infection and disease progression within individuals than by POI alone, both of which are highly influenced by water temperature."

27. The USFWS's Arcata Office states that their primary concern with MG4 is the fixed-discharge prescription at Iron Gate Dam that is irrespective of spore concentration and discharge at the specific sampling location where the trigger is exceeded. The ability to dilute spore concentrations is substantially diminished downstream of Iron Gate Dam as several large tributaries (Shasta, Scott, Salmon and Trinity rivers) contribute flow to the Klamath River. *See* Figure 1, USFWS Technical Memorandum. This point is also underscored by monitoring observations in 2017: if water samples collected on April 24, 2017 at the Orleans monitoring site contained a single additional spore, Reclamation would have produced an emergency dilution flow which would have resulted in a dilution effect at the Orleans of approximately 2-3 percent. At this time, water temperatures were approximately 10 degrees Celsius, and no infected salmon were yet collected at the Kinsman site (where POI is monitored consistent with MG4). In addition to the marginal dilution that would have been realized, the biological need to dilute spores was completely unfounded due to the cold water temperatures and the absence of infected salmon. *See id.*

28. The USFWS Technical Memorandum concludes that a reduced volume of water available for an emergency dilution flow, or a partial emergency dilution flow, would amplify the uncertainties as to the potential effectiveness of MG4 as compared to an event using the full

50,000 AF. As stated above, the current inflow forecasts and modelling indicate that Reclamation cannot implement a 50,000 AF emergency dilution flow until May 24, 2018, which is likely to be after disease triggers are eclipsed based on disease trigger data from 2005-2017. *See* Hydrologic Assessment.

29. The National Marine Fisheries Services reached the same conclusion as USFWS relative to the efficacy of MG4 and indicates that implementation of MG1 would provide a greater reduction in *C. shasta* disease risk to juvenile salmon in the Klamath River than the emergency dilution flow release prescribed by MG4. *See* Simondet Declaration paragraph 4).

Reclamation's proposal for operating under the 2013 Biological Opinion and the Injunction in water year 2018

30. ***Reclamation proposes to implement a full surface flushing flow under MG1, augmented with 21,500 AF of non-Project water, on April 16, 2018. Reclamation proposes to not implement either a full or partial emergency dilution flow under MG4 pursuant to the models and science prioritized by the USFWS Arcata Office. Therefore, since the surface flushing flow under MG1 will be provided, Reclamation proposes to begin charging irrigation canals on April 19, 2018, with Project deliveries commencing after canals are fully charged; Project Supply under this proposed scenario is 252,000 AF (substantially less than a full irrigation supply; Project Supply is based on the 50% exceedance scenario).*** This action would allow Reclamation to meet all end-of-month UKL threshold elevations, while ensuring implementation of a scientifically-supported full surface flushing flow, and some level of irrigation. Given the new information from USFWS that questions the effectiveness of an emergency dilution flow in diluting spore concentrations in the Klamath River, Reclamation believes this proposal will contribute to a reduction in *C. shasta* host populations. This proposal will benefit coho salmon, the endangered suckers in UKL, and the agricultural community and economy of the Klamath Basin by implementing of a scientifically-supported full surface flushing flow, meeting UKL threshold elevations, and ensuring a viable Klamath Project in 2018. *See* Hydrologic Assessment.

31. Under any exceedance forecast scenario, implementation of a full surface flushing flow under MG1, while meeting end-of-month UKL threshold elevations, is only possible if 21,500 AF of non-Project water is provided for augmentation. *See* Hydrologic Assessment. USFWS has agreed to provide 11,000 AF of water from its Refuges to augment Project water and help Reclamation implement a full surface flushing flow under MG1, but this water is not available for implementation of MG4. Additionally, PacifiCorp has agreed to provide 10,500 AF of water from Copco Reservoir to augment Project water and help Reclamation implement a full surface flushing flow under MG1.[2] USFWS chose to provide this water for implementation of MG1 because there is new information suggesting limited scientific support for MG4 and new information suggesting that a surface flushing flow under MG1 is more effective in reducing disease in Klamath River juvenile salmonids than implementation of MG4. *See* USFWS Technical Memorandum; Letter from Paul Souza, USFWS. Finally, the April 16 MG1 implementation date was chosen for the reasons described in the general assumptions above and does not preclude Reclamation from implementing this flow prior to this date if accretions of sufficient volume are anticipated.

32. Reclamation believes the proposal to provide a full surface flushing flow under MG1 using augmentation of non-Project water, while foregoing partial implementation of MG4, is the best option for mitigating *C. shasta* in coho salmon in this dry water year. It is the technical opinion of disease experts at the USFWS Arcata Office and the National Marine Fisheries Service that MG1 provides a more certain and much greater reduction in disease risk to juvenile salmon in the Klamath River when compared to the emergency dilution flow called for in MG4. *See* USFWS Technical Memorandum; Simondet Decl. Additionally, there is relatively little information to suggest that even a full emergency dilution flow would be effective in diluting *C. shasta* spores in the Klamath River or that this flow would provide the intended population-level disease benefits. *See* USFWS Technical Memorandum. Based on this information and an inability to deliver both a full surface flushing under MG1 and a full

[2] PacifiCorp offered an additional 3,500 AF of water from Iron Gate Reservoir to use for a surface flushing flow. However, this water is not necessary to meet end-of-month minimum elevation thresholds suckers and was therefore not utilized.

emergency dilution flow under MG4, as modelled, Reclamation's proposal includes full implementation of the scientifically-supported MG1 and recommends not implementing MG4 in 2018. *See* Hydrologic Assessment.

33. In order to utilize the 11,000 AF of the water volunteered by USFWS to support the flushing flow, Reclamation must begin pumping 250 AF per day out of LKNWR as soon as possible. Reclamation would continue pumping until approximately 7,000 AF have been moved to the Klamath River. This action would provide approximately 7,000 AF of water, which would have otherwise been required to be released from UKL, to the river to meet minimum flow requirements such that the same volume is retained in UKL and available for implementation of a full surface flushing flow. Reclamation proposes to provide this flow event in mid to late April. As described above, ***to accomplish the flushing flow under the Injunction with the use of non-Project water, Reclamation must begin the operation as soon as possible and thus, seeks affirmation from the Court that this proposed operation is consistent with the Injunction.***

This declaration is made under the provision of 28 U.S.C. § 1746. I declare under penalty of perjury that the foregoing is true and correct to the best of my current knowledge, information, and belief.

Executed this 23rd day of March, 2018 at Klamath Falls, Oregon

Jared Bottcher
Chief of Water Operations Division
Klamath Basin Area Office, Reclamation

U.S. Bureau of Reclamation Hydrologic Assessment Relative to Court Injunction
March 23, 2018

Court requirements and implementation status

The United States District Court for the Northern District of California issued an injunction on March 24, 2017, requiring the Bureau of Reclamation (Reclamation) to provide specified additional flows in the Klamath River until the ongoing reinitiation of formal consultation of the 2013 Klamath Project Biological Opinion (2013 BiOp) is complete. The additional flows specified in the court injunction are: (1) a surface flushing flow of 6,030 cubic feet per second (cfs) for 72 hours, required every year (Management Guidance 1 [MG1]); (2) a deep flushing flow of 11,250 cfs, required every other year (Management Guidance 2 [MG2])[1]; and (3) an emergency dilution flow of up to 50,000 acre-feet (AF) (Management Guidance 4 [MG4]). The stated purpose of these flows is to attempt to mitigate *Ceratonova shasta* (*C. shasta*) disease concerns in the Klamath River. The injunction also states that Reclamation has discretion as to the timing of the flows, as long as flows occur within the timeframes specified in the injunction. The applicable time period for implementing MG1 is November 1 to April 30. The time period for MG4 is April 1 to June 15, or until 80 percent of juvenile salmon have out-migrated from the middle Klamath River, whichever occurs first.

It is important to note that, unless specifically altered by the injunction, the 2013 BiOp remains in effect. ECF 111 ¶ 2. Additionally, the injunction prohibits the implementation of any court-ordered flows from interfering "with conditions necessary to protect the endangered sucker fish," referring to the Endangered Species Act (ESA) listed Lost River and shortnose suckers that reside in the Upper Klamath Basin (principally, in Upper Klamath Lake [UKL]).

Specifically, as part of the 2013 BiOp, U.S. Fish and Wildlife Service (USFWS) identified end-of-month elevation thresholds that "represent the extreme lower limits of elevations that should be observed in UKL during the term [2013-2023] of [Reclamation's] proposed action." *See* 2013 BiOp at 117. End-of-month elevation thresholds fluctuate with inflow and UKL storage volume and define expectations for UKL elevations under varying hydrologic conditions. *Id.* at 115-18. Furthermore, the end-of-month elevation thresholds are not a management target but rather define the boundary conditions of the USFWS effects analysis for endangered suckers in the 2013 BiOp. *Id.* at 117. Actual end-of-month UKL elevations should be at or above the threshold elevations for all hydrologic conditions except in rare cases (defined as no more than 5 percent of months during the term of the 2013 BiOp). *Id.* at 116.

Regarding the biological perspective, UKL surface elevation management through the 2013 BiOp is based on the understood physical habitat needs for each life-history stage for endangered suckers, which are reflected in the critical habitat designations for each species (*See* 2013 BiOp. at 133-146). Conditions influencing surface elevation of UKL, such as developing drought conditions or management decisions, have impacts to the amount of habitat available to ESA-listed suckers at each life history stage. Generally, reduced UKL elevations, especially UKL elevations below the 2013 BiOp end-of-month thresholds, will reduce the amount of physical habitat available to larval, juvenile, and adult endangered suckers in UKL.

[1]Because parties to the litigation are in agreement that Reclamation made a good-faith effort, and substantially achieved the criteria for implementing the 11,250 cfs flushing flow in 2017, implementation of this flow is not required in 2018.

Based on the above information, Reclamation has determined that any purposeful management action resulting in missing UKL end-of-month threshold elevations does not sufficiently protect suckers. Therefore those management actions would not comply with either the 2013 BiOp or the provision of the injunction stating that ordered flows should not interfere with conditions necessary to protect the endangered suckers.

2018 Hydrologic Background

Cumulative inflows to UKL since October 1, 2017 have been some of the lowest observed under the Period of Record (as specified in the 2013 BiOp, the Period of Record is 1981-2017) and are currently below the 80 percent exceedance values. In other words, 80 percent of the inflow observations within the Period of Record have been greater than what has been observed during the 2018 water year (beginning on October 1, 2017). The Natural Resources Conservation Service (NRCS) has provided multiple spring/summer inflow forecasts for UKL since January 1, 2018, with the most recent inflow forecast provided on March 19. The current 50 percent exceedance inflow forecast is calling for 56 percent of the historical average inflow to UKL between April and September 2018 (Table 1). In this context, 50 percent exceedance is defined as a 50 percent chance that inflows to UKL in 2018 will exceed the NRCS forecast volume.

Table 1. 50 percent exceedance NRCS spring/summer inflow forecasts for UKL received since January 1, 2018. 50 percent exceedance is defined in this context as a 50 percent chance that inflows to UKL in 2018 will exceed this forecasted volume.

Update	Forecast period	Forecasted inflow (TAF)	% of historical avg
Jan 2018	Apr-Sept	335	70
mid-Jan 2018	Apr-Sept	280	58
Feb 2018	Apr-Sept	270	56
mid-Feb 2018	Apr-Sept	230	48
Mar 2018	Apr-Sept	255	53
mid-Mar 2018	Apr-Sept	270	56

Low inflows have resulted in UKL elevations that are currently projected to peak around 4,142.73 feet (ft), well below the full pool elevation of 4143.30 ft, which limits the maximum release capacity at Link River Dam. In addition to low inflows to UKL, accretions between Link River Dam and Iron Gate Dam have also been consistently low through the 2018 water year with recent accretions near the 70 percent exceedance level. In other words, nearly 70 percent of the accretions within the Period of Record have been greater than those observed this water year.

Reclamation's ability to comply with the court injunction in water year 2018 to date

Due to the combined limited release capacity at Link River Dam (because of low UKL elevations and reduced head at Link River Dam) and the low accretions between Link River and Iron Gate Dam, Reclamation has been physically unable to produce the surface flushing flow specified in MG1. Only recently (approximately March

10) did UKL elevations and accretions between Link River and Iron Gate Dam provide for the physical conditions necessary for implementation of the 6,030 cfs surface flushing flow for 72 hours. UKL is still not at a sufficient elevation, without significant accretions downstream, to allow the volume of water necessary to implement the surface flushing flow to be moved out of UKL without reducing the elevation of UKL below required end-of-month threshold elevations for suckers in the 2013 BiOp. Until such time as the elevation of UKL is either high enough to avoid missing UKL end-of-month threshold elevations, or the combination of UKL elevation and significant accretions in the Link River Dam to Iron Gate Dam reach occur, Reclamation cannot produce the surface flushing flow. As discussed more fully below, current forecasts do not indicate that either of these conditions will occur prior to the end of April, which is the deadline for implementing the surface flushing flows under MG1.

Given the hydrologic conditions and current forecasts described above Reclamation has not implemented a surface flushing flow and anticipates significant challenges in establishing a Reserve Water supply of 50,000 AF by April 1 for implementation of emergency dilution flow since there is insufficient water in UKL to establish this reserve, even if no Project deliveries are made before April 1.

Although the court injunction does not require it, Reclamation made a diligent search for sources of water outside the Project to help establish the Reserve Water supply. But, for reasons described below, non-Project water is not available:

- Water resulting from water rights regulation above UKL
    - This volume contributes to UKL inflows over the entire irrigation season and only a very small fraction would be available on April 1 for establishment of a Reserve Water supply.
    - This water is exceedingly difficult to accurately quantify; Reclamation has a contract with the United States Geological Survey (USGS) to develop a method to quantify regulation water. A draft report is not expected to be completed for two months.
    - To some extent regulation water is already incorporated into NRCS and California Nevada River Forecast Center inflow forecasts. The period of record supporting the models for these forecasts includes inflow in years with regulation, and the models do not differentiate between inflows as a result of regulation and "regular" inflows.
- Water from Clear Lake and Gerber Reservoirs
    - Transmission losses (i.e., evaporation, canal leakage, and losses to groundwater) through the Lost River system are substantial and Reclamation expects that only a small fraction of the water released from either reservoir would be realized in the Klamath River.
    - Substantial releases from either reservoir may endanger the city of Bonanza drinking water supply, something that has occurred in the past, and resulted in regulatory action. This is considered a significant health and public safety issue.
    - Both reservoirs have 2013 BiOp requirements, including end of September minimum elevations necessary to protect endangered sucker populations in the reservoirs. It is critical for water in these reservoirs to carry over from one year to the next to ensure sufficient water to meet 2013 BiOp elevations for suckers given that these reservoirs rarely (if ever) fill to capacity.
- Water from Howard Prairie and Hyatt Reservoirs in the Rogue River Basin Project
    - Water stored in these reservoirs is utilized by the Rogue River Basin Project to comply with the 2012 Rogue River Basin Project Biological Opinion. The 2012 Rogue River Basin Project Biological Opinion is separate from the 2013 BiOp for the Klamath Project and contains its own requirements relating to coho salmon. Any water supplied to the Klamath River to assist in augmenting the emergency dilution flow would be outside the scope of the action that was analyzed in the Rogue River Basin Project Biological Opinion and would require reinitiation of ESA consultation, which cannot be completed this water year.
- Water stored on USFWS Refuges

  - Water on the Upper Klamath National Wildlife Refuge and the Lower Klamath National Wildlife Refuge (Refuges) is used by dozens of species that either reside at the Refuges or use the Refuges when migrating.
  - Water on the Refuges is under the control of USFWS, who is not a party to this litigation.
  - USFWS has volunteered 11,000 AF of water from its Refuges for use in a surface flushing flow under MG1. *See* Letter from Paul Souza, USFWS. USFWS volunteered this water because the disease experts at USFWS's Arcata Office believe that flushing flows like MG1 may limit *C. shasta*'s impacts on juvenile salmon populations. *See* USFWS Technical Memorandum.
  - USFWS has not volunteered water for MG4 because its experts do not believe that the emergency dilution flow prescribed in MG4 is scientifically supported and do not believe it will lead to population-level reductions in disease risk. *See* USFWS Technical Memorandum.
- Water stored in PacifiCorp Reservoirs
  - PacifiCorp, a non-federal privately owned electric utility has volunteered up to 14,000 AF for augmentation of a surface flushing flow under MG1 and this water is therefore not available for the Reserve Water supply. *See* Letter from Tim Hemstreet, PacifiCorp.

General approach to hydrologic modeling

Reclamation utilized the Iron Gate Dam calculator, a tool used for daily water management operations, to model the effect of implementing MG1, MG4, and Reclamation's proposal (described below) on UKL trajectory. To better understand Reclamation's ability to implement MG1 and MG4 in water year 2018, Reclamation modelled management scenarios using the mid-March (March 19) April through September NRCS inflow forecast and current projections for inflows for the remainder of March.

Actual hydrology can change between now and the end of the implementation period for MG4 (June 15 at the latest). Therefore, in order to thoroughly assess a realistic range of potential hydrologic conditions, Reclamation has evaluated each management scenario using the NRCS 30 percent, 50 percent, and 70 percent exceedances for April through September UKL inflows. These exceedances are defined as a 30 percent chance inflows to UKL will exceed the forecast in 2018, a 50 percent chance inflows to UKL will exceed the forecast in 2018, and a 70 percent chance inflows to UKL will exceed the forecast in 2018, respectively. Assumptions specific to each forecast exceedance are detailed below.

Each management scenario graph (Figures 1-3) includes a "baseline scenario" (black dashed line), which represents operations as they would occur in compliance with the 2013 BiOp (i.e., these do not include injunction flows MG1 or MG4). The purpose of the baseline scenario is to calculate UKL end-of-month threshold elevations, Environmental Water Account (EWA) volumes, and Project Supply volumes as specified in the 2013 BiOp. **<u>These baseline scenarios do not represent what Reclamation plans to implement this water year, but are only included as a reference.</u>** The gray dashed line in each scenario graph represents the UKL trajectory as a result of implementation of the Injunction or Reclamation's proposal.

As previously stated, based on the terms of the Injunction, Reclamation has determined that any purposeful management scenario resulting in missing the end-of-month UKL threshold elevations defined in the 2013 BiOp does not sufficiently protect suckers and is therefore not allowed under either the 2013 BiOp or the Injunction.

General assumptions used for hydrologic modeling

The way inflows to UKL are currently projected and incorporated into the Iron Gate Dam calculator does not account for individual short-term, high-intensity storm events that may occur during the spring months; inflows

are based on exceedances in the period of record during which the magnitude of large storm events in individual years is muted when averaged across years.

All scenarios, regardless of NRCS forecast exceedance (30, 50, or 70 percent), assumed the same accretions to the Klamath River (Table 2). These accretion projections are based on current observations.

Table 2. Projections for accretions to the Klamath River based on current observations, using exceedances from the period of record (1981-2017). In this context, exceedance is defined the percentage of accretions in the period of record (1981-2016) that exceeded accretions at a specific exceedance. In other words, 70 percent exceedance means that 70 percent of the accretions seen since 1981 were greater.

Accretions	Exceedance (%)
Lake Ewauna	70
Lost River Diversion Channel to Klamath River	60
F & FF pumps to Klamath River	95
Keno Dam to Iron Gate Dam	70

For implementation of the surface flushing flow under MG1, Reclamation utilized modified ramp down rates informally agreed to by the National Marine Fisheries Service, USFWS, and the Hoopa Valley, Yurok, and Karuk Tribes (Table 3), instead of the ramp down rates specified in the 2013 BiOP. These modified ramp down rates reduce the total volume of water required to meet the flushing flow and necessary ramp down rates, which are required per MG1. Note that this modification is intended for implementation of a surface flushing flow in 2018 only and is not intended to be applied universally.

Table 3. Modified ramp rates for implementation of the surface flushing flow. Note that "Time period" indicates time since start of ramping period such that flows are at or below 3,000 cfs on Day 3.

Time period	Max. decrease per 24 hours (cfs)	Max. decrease per 6 hours (cfs
Day 1	2,000	500
Day 2	1,000	250
Day 3 and on	Defined in 2013 BiOp	Defined in 2013 BiOp

Reclamation modeled implementation of the surface flushing flow under MG1 beginning on April 16, 2018. This implementation date is supported by previous modelling that indicated an earlier flushing flow would (such as late March): (1) result in missing additional end-of-month UKL elevation thresholds for suckers under the 2013 BiOP (namely, the end of March threshold), (2) would cause UKL elevations to drop below the March threshold in the first few days of April, and (3) would cause UKL elevations to drop below (or farther below) 4,142 ft in March. As indicated in the 2013 BiOp, maintaining an UKL elevation above 4,142 ft from March

10-May 20 is critical for adult sucker access to spawning areas on the east shore of UKL. As described below, Reclamation does not intend to forgo implementing a surface flushing flow prior to this date if sufficient accretions occur, but pending sufficient accretions, and for the purposes of modelling, this date was chosen given the reasons described above.

Scenarios that include implementation of an emergency dilution flow include ramp down rates defined in the 2013 BiOp (Table 4). Unlike the surface flushing flow under MG1, there is not an informal agreement to modify the ramp down rates for MG4.

Table 4. Ramp rates defined in the 2013 BiOp, with the exception of ramp rates for flows over 3,000 cfs, which reflect rates implemented previously as a reasonable alternative when artificially elevating flows through management actions.

Discharge at Iron Gate Dam (cfs)	Max. decrease per 24 hours (cfs)
> 3,000	600
≤ 3,000 > 1,750	300
≤ 1,750	150

Reclamation requested input from Klamath Basin disease experts at the USFWS Arcata Office on the assumptions used to model implementation of an emergency dilution flow under MG4 (specifically with regard to timing relative to surface flushing flow implementation under MG1), which was necessary to understand how implementation of the flows would affect UKL trajectory. Reclamation assumed an emergency dilution flow would be triggered on May 9, 2018 which is three weeks after the last day of 6,030 cfs at Iron Gate Dam (which occurs on April 18 in this modelling exercise). Justification for a three week delay after the peak of the surface flushing flow in this modelling exercise is based on previous data indicating that flows at or above 6,000 cfs increases in spore concentrations by about a month. For 2018, USFWS's disease experts felt that spore concentrations may start to increase three weeks after a 6,000 cfs surface flushing flow given the relatively warm and dry winter experienced so far. Additionally, based on the discussion at the Tribal and Key Stakeholder Technical Team Meeting in Redding, CA on January 9, 2018, Reclamation felt it was appropriate to model utilizing all 50,000 AF when an emergency dilution flow is triggered given that data from 2005-2017 indicated the period between exceeding the trigger and 80% out-migration date was typically long enough that all 50,000 AF would have been expended. Modelling use of all 50,000 AF in an emergency dilution flow also assumes the dilution flow did not decrease spore concentrations or prevalence of infection below the dilution flow triggers within the injunction (5 spores per liter and 20% prevalence of infection).

Finally, none of the scenarios modelled include regulation water that may flow into UKL during the 2018 irrigation season. As mentioned above, regulation water is difficult to quantify. However, Reclamation has a contract with USGS to develop a method to track regulation water. A draft report from USGS is not expected for another two months, but when received, it will help inform the potential approach used to quantify and incorporate regulation water into daily operations for subsequent years. Additionally, regulation water is also incorporated into NRCS and California Nevada River Forecast Center inflow forecasts to some extent given that the period of record supporting the models for these forecasts includes years when regulation occurred; these models do not differentiate between inflows as a result of regulation and "regular" inflows.

Scenarios utilizing the 30 percent exceedance NRCS inflow forecasts

Based on the March 19, 2018 30 percent exceedance NRCS inflow forecast and current March inflow projections, Reclamation assumed that there will be 425,000 AF of UKL inflow from March through September (110,000 AF in March and 315,000 AF from April to September). To match inflows in the calculator with the NRCS forecast, Reclamation is projecting inflows slightly above the 30th percentile from March 19 until September 30 and then at the 30th percentile through September 30. As mentioned above, projecting inflows in this way does not account for individual short-term, high-intensity storm events (additional information relative to the frequency of such storms is detailed below and provided in Table 5), although inflows are based on exceedances in the period of record during which include large storm events in individual years (but the magnitude of individual events is muted when averaged across years).

The baseline scenarios for the 30 percent exceedance NRCS inflow forecasts (black dashed line in Figures 1A, 2A, and 3A) include 306,000 AF for Project Supply, but the Project Supply start date is delayed until April 20 in order to meet the end of April UKL threshold elevation specified in the 2013 BiOp. **Note that this calculated Project Supply is for the purposes of the baseline scenarios only** (the scenarios that would take place solely under the 2013 BiOp, not including the injunction flows). **The calculated Project Supply does not apply to management scenarios depicted by the gray dashed line which represents implementation of the Injunction flows or Reclamation's proposal for 2018** (see Table 6 for information relative to Project Supply for each management scenario). EWA for these scenarios is 365,000 AF.

Scenarios utilizing the 50 percent exceedance NRCS inflow forecasts

Based on the March 19, 2018 50 percent exceedance NRCS inflow forecast and current March inflow projections, Reclamation assumed that there will be 380,000 AF of UKL inflow from March through September (110,000 AF in March and 270,000 AF from April to September). To match inflows in the calculator with the NRCS forecast, Reclamation is projecting daily inflows at the 30th percentile from March 19 to September 30. As mentioned above, projecting inflows in this way does not account for individual short-term, high-intensity storm events (additional information relative to the frequency of such storms is detailed below and provided in Table 5), although inflows are based on exceedances in the period of record during which include large storm events in individual years (but the magnitude of individual events is muted when averaged across years).

The baseline scenarios for the 50 percent exceedance NRCS inflow forecasts (black dashed line in Figures 1B, 2B, 3B) include 289,000 AF for Project Supply, but the Project Supply start date is delayed until April 15 in order to meet the end of April UKL threshold elevation specified in the 2013 BiOp. **Note that this calculated Project Supply is for the purposes of the baseline scenarios only** (the scenarios that would take place solely under the 2013 BiOp, not including the Injunction flows). **The calculated Project Supply does not apply to management scenarios depicted by the gray dashed line which represents implementation of the Injunction flows or Reclamation's proposal for 2018** (see Table 6 for information relative to Project Supply for each management scenario). EWA for these scenarios is 337,000 AF.

Scenarios utilizing the 70 percent exceedance NRCS inflow forecasts

Based on the March 19, 2018 70 percent exceedance NRCS inflow forecast and current March inflow projections, Reclamation assumed that there will be 335,000 AF of UKL inflow from March through September (110,000 AF in March and 225,000 AF from April to September). To match inflows in the calculator with the NRCS forecast, Reclamation is projecting inflows slightly below the 30th percentile from March 19 to June 20 and then at the 30th percentile from June 21 to September 30. As mentioned above, projecting inflows in this way does not account for individual short-term, high-intensity storm events (additional information relative to the frequency of such storms is detailed below and provided in Table 5), although inflows are based on

exceedances in the period of record during which include large storm events in individual years (but the magnitude of individual events is muted when averaged across years).

The baseline scenarios for the 70 percent exceedance NRCS inflow forecasts (black dashed line in Figures 1C, 2C, 3C) include 225,000 AF for Project Supply, but the Project Supply start date is delayed until April 15 in order to meet the end of April UKL threshold elevation specified in the 2013 BiOp. **Note that this calculated Project Supply is for the purposes of the baseline scenarios only** (the scenarios that would take place solely under the 2013 BiOp, not including the Injunction flows). **The calculated Project Supply does not apply to management scenarios depicted by the gray dashed line which represents implementation of the Injunction flows or Reclamation's proposal for 2018** (see Table 6 for information relative to Project Supply for each management scenario). EWA for these scenarios is 320,000 AF.

Implementation of court injunction flows with 30, 50, and 70 percent exceedance NRCS inflow forecasts - model output

Regardless of which exceedance forecast is used to model implementation of the injunction, and even **with a complete Project Supply shut off (i.e., no water being delivered for irrigation)**, Reclamation cannot implement both MG1 and MG4, as modelled, without missing the end of April and May UKL threshold elevations specified for suckers in the 2013 BiOp (Figure 1, Table 6). Indeed, with the 50 percent exceedance scenario, Reclamation would only be able to deliver a flushing flow of 6,030 cfs for 27 hours followed by modified ramp down rates (a total volume of 23,829 AF) and an emergency dilution flow of 3,000 cfs for 168 hours (7 days) followed by ramp down rates defined in the 2013 BiOp (a total volume of 27,714 AF), and still meet end of April and May UKL threshold elevations specified for suckers in the 2013 BiOp. For this "partial" emergency dilution flow, there would not be sufficient volume to increase the flow to 4,000 cfs, if necessary, as required by MG4. Based on the 50 percent exceedance scenario, Reclamation would be able to implement a full 50,000 AF emergency dilution flow under MG4 starting on May 24 and still meet subsequent end-of-month UKL threshold elevations, **although in only three years (2006, 2011, and 2017) of the eleven years for which we have disease trigger data were triggers exceeded on May 24 or later.** All three of these years were exceptionally wet years with above average precipitation (both rain and snow) and above average river flows. In other words, it is unlikely that triggers would be eclipsed on or after May 24 this year. Finally, a "partial" surface flushing flow is inconsistent with the flow requirements and justification for MG1 stated in *Measures to Reduce Ceratanova Shasta Infection of Klamath River Salmonids: A Guidance Document* (Jan. 17, 2017) ("Guidance Document").

Similarly, **with a complete shut off of irrigation deliveries** Reclamation cannot implement MG1, as modelled, alone without missing the end of April UKL threshold elevation for suckers in the 2013 BiOp (Figure 2, Table 6), regardless of which exceedance forecast is modelled. As described above, to meet end of April UKL threshold elevation specified for suckers in the 2013 BiOp, Reclamation would only be able to deliver 6,030 cfs for 27 hours followed by modified ramp down rates with the 50 percent exceedance scenario. This "partial" surface flushing flow is inconsistent with the flow requirements and justification for MG1. Specifically, MG1 clearly states that a full flushing flow of 6,030 cfs for 72 hours is anticipated to disrupt the lifecycle of the *C. shasta* host. Therefore, a flow of less magnitude and/or duration is not expected to achieve the desired result.

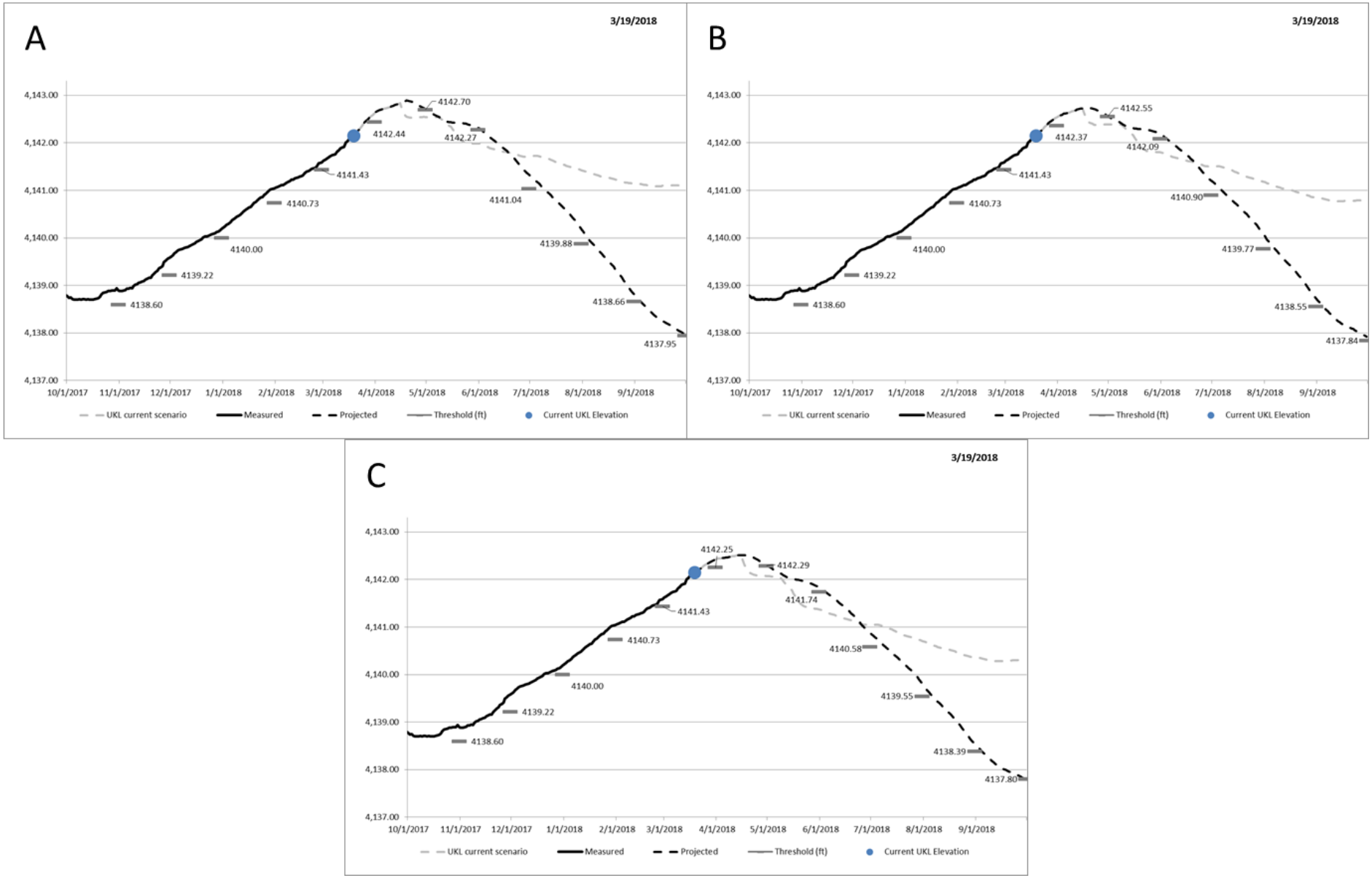

Figure 1. Upper Klamath Lake 2013 BiOp operations baseline scenarios (black dashed lines) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of both Injunction flows **with a complete shut off of irrigation deliveries** (gray dashed line). Gray bars represent Upper Klamath Lake thresholds, as defined in the 2013 BiOP, the blue dot represents the current date, and the solid black line represents measured lake elevation.

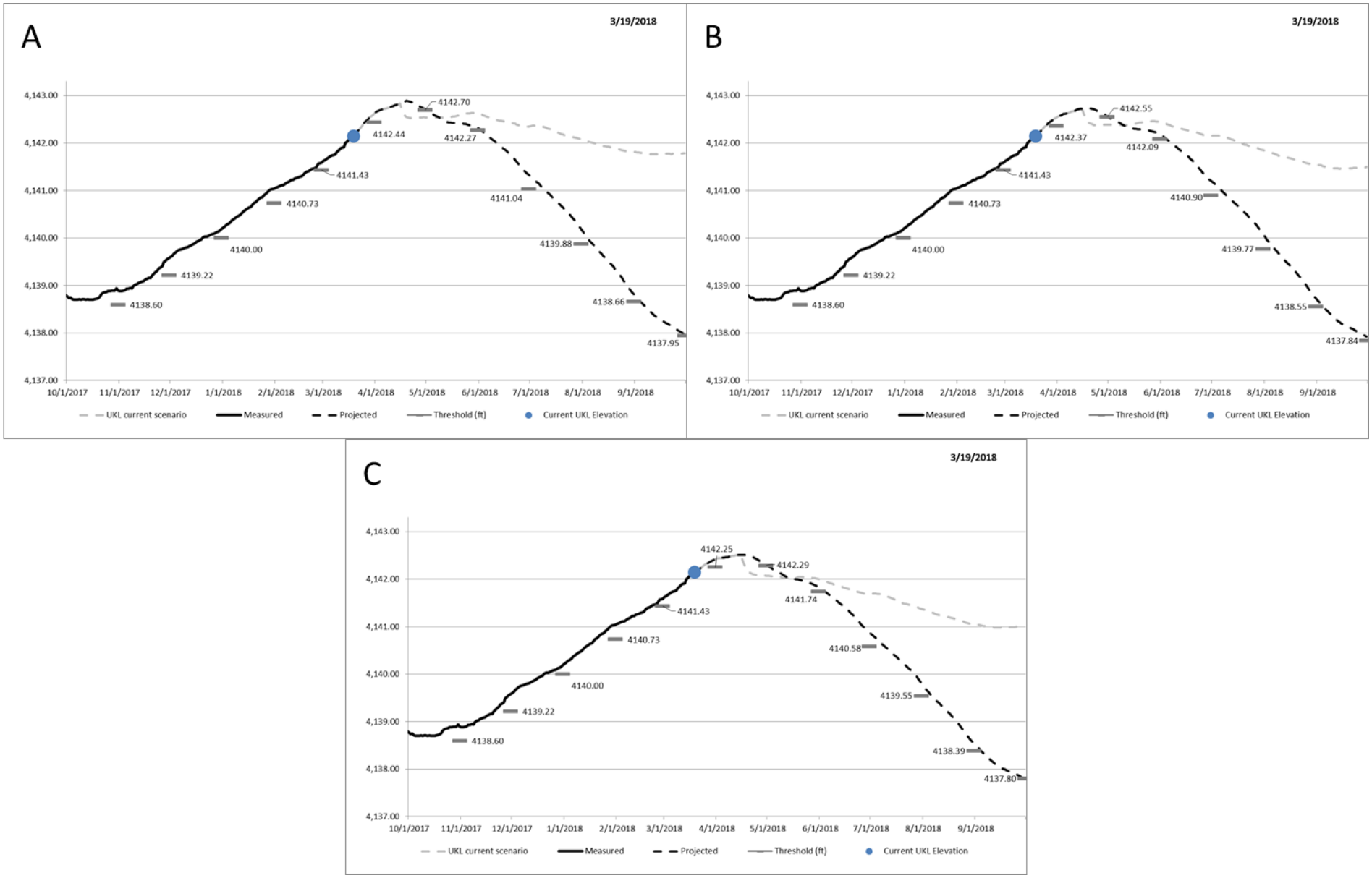

Figure 2. Upper Klamath Lake 2013 BiOp operations baseline scenarios (black dashed lines) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of a flushing flow **with a complete shut off of irrigation deliveries** (gray dashed line). Gray bars represent Upper Klamath Lake thresholds, as defined in the 2013 BiOp, the blue dot represents the current date, and the solid black line represents measured lake elevation.

In addition to missing end of April and/or May UKL threshold elevations, implementation of one or both court injunction flows, as modelled, also results in UKL elevations dropping below 4,142 ft between March and May for some modelled scenarios (see Figures 1B and 1C, Table 6). Regardless, Reclamation is precluded from providing either flow under the injunction if that results in missing end of month UKL thresholds under the 2013 BiOp.

Finally, Reclamation acknowledges that an accretion event of sufficient volume occurring in mid to late April (Table 5) may enable implementation of the surface flushing flow under MG1 without missing the end of April UKL threshold elevation for suckers under the 2013 BiOp. As such, Reclamation continues to monitor hydrologic conditions with the intent of implementing MG1 if an accretion event of sufficient volume looks likely. Coupling implementation of the surface flushing flow under MG1 with an accretion event of sufficient volume that occurs in mid to late April may not necessarily prevent UKL elevation from dropping below end of May UKL threshold elevations if a full emergency dilution flow (i.e., all 50,000 AF, increase to 4,000 cfs after one week as modelled here) under MG4 is also implemented. Finally, Reclamation previously analyzed the accretion volumes necessary to implement MG1 in March without missing the end of March UKL threshold elevation and determined, based on data from 1981-2017, that such an event was extremely unlikely in water year 2018 given the relatively low snow pack. As such, Reclamation only assessed April accretion events and modeled April implementation of MG1 here, though that does not preclude Reclamation from implementing MG1 in March if a sufficient accretion event is anticipated.

Table 5. Accretion volume necessary to implement MG1 and meet end of April UKL threshold elevations, and the likelihood of seeing the necessary accretion volume in any given April. Likelihood was determined by assessing how often accretion events with the necessary volumes occurred over a range of 12, 10, 7, or 5 days in the month of April in the period of record (from 1981-2017) between Link River Dam and Iron Gate Dam.

NRCS forecast exceedance (%)	Accretion volume necessary to meet April threshold (AF)	Likelihood of seeing accretion volume in any given April (%)			
		12 day	10 day	7 day	5 day
30	13,298	63	46	16	3
50	13,288	63	46	16	3
70	18,222	32	19	3	0

New biological information that has not been considered by the Court

New information provided by disease experts with the USFWS Arcata Office indicate there is very limited scientific support for an emergency dilution flow under MG4 in general. Additionally, new information indicates that a partial emergency dilution flow makes the possible benefits of this measure in reducing spore concentration even more doubtful and therefore unlikely to provide the intended population-level disease benefits. *See* USFWS Technical Memorandum. For this water year in particular, Iron Gate Dam flows just prior to implementation of a 3,000 cfs emergency dilution flow, as modelled, are projected to be 1,472 cfs. A 3,000 cfs emergency dilution flow represents a doubling of Iron Gate Dam flow prior to any dilution flow event, similar in nature to the dilution flow implemented in 2014, which the *C. shasta* experts at the USFWS's Arcata

Office characterize as having a measurable, but minimal impact at reducing spore concentrations. *See* USFWS Technical Memorandum.

Finally, disease experts with the USFWS Arcata Office indicate that **a surface flushing flow is more effective in reducing disease in Klamath River juvenile salmon than implementation of an emergency dilution flow and that the surface flushing flow should therefore be prioritized over the emergency dilution flow**. *See* USFWS Technical Memorandum.

Reclamation's proposal for operating under the 2013 Biological Opinion and the court injunction in water year 2018

Based on our modelling results (Figure 3, Table 6), ***Reclamation proposes to implement a full surface flushing flow under MG1, augmented with 21,500 AF of non-Project water, on April 16, 2018. Reclamation proposes to not implement either a full or partial emergency dilution flow under MG4 pursuant to the models and science prioritized by the USFWS Arcata Office. Therefore, since the surface flushing flow under MG1 will be provided, Reclamation proposes to begin charging irrigation canals on April 19, 2018, with Project deliveries commencing after canals are fully charged; Project Supply under this proposed scenario is 252,000 AF (substantially less than a full irrigation supply; allocation is based on 50% exceedance scenario).*** This action would allow Reclamation to meet all end-of-month UKL threshold elevations, while ensuring implementation of a scientifically-supported full surface flushing flow, and some level of irrigation. Given new information from USFWS that questions the effectiveness of an emergency dilution flow in diluting spore concentrations in the Klamath River, Reclamation believes this proposal will contribute to a reduction in *C. shasta* host populations. This proposal will benefit coho salmon through implementation of a full surface flushing flow, benefit suckers by meeting UKL threshold elevations, and benefit the agricultural community and economy of the basin by ensuring a viable Klamath Project in 2018.

Assumptions

Under any exceedance forecast scenario, implementation of a full surface flushing flow under MG1, while meeting end-of-month UKL threshold elevations, is only possible if 21,500 AF of non-Project water is provided for augmentation (Figure 3, Table 4). USFWS has agreed to provide 11,000 AF of water from its Refuges to augment Project water and help Reclamation implement a full surface flushing flow under MG1, but this water is not available for implementation of MG4. Additionally, PacifiCorp has agreed to provide 10,500 AF of water from Copco Reservoir to augment Project water and help Reclamation implement a full surface flushing flow under MG1.[2] USFWS and PacifiCorp chose to provide this water for implementation of MG1 because there is new information suggesting limited scientific support for MG4 and new information suggesting that a surface flushing flow under MG1 is more effective in reducing disease in Klamath River juvenile salmonids than implementation of MG4. *See* USFWS Technical Memorandum; Letter from Paul Souza, USFWS; Letter from Tim Hemstreet, PacifiCorp. The scenarios include payback of 13,600 AF of the non-Project water by the end of September 2018, as informally agreed to by USFWS, PacifiCorp, and Reclamation. The remaining volume of water used for augmentation will be paid back in October and November 2018. Additionally, to ensure the ability to payback augmentation water while staying above the absolute minimum UKL elevation identified in the 2013 BiOp (4,137.72 ft) in this drought year, Reclamation has incorporated a 0.1 ft lake elevation buffer above the end of September UKL threshold elevation. Finally, the April 16 MG1 implementation date was chosen for the reasons described in the general assumptions above and does not preclude Reclamation from implementing this flow prior to this date if accretions of sufficient volume are anticipated.

[2]PacifiCorp offered an additional 3,500 AF of water from Iron Gate Reservoir to use for a surface flushing flow. However, this water is not necessary to meet end-of-month elevation thresholds specified for suckers and was therefore not utilized.

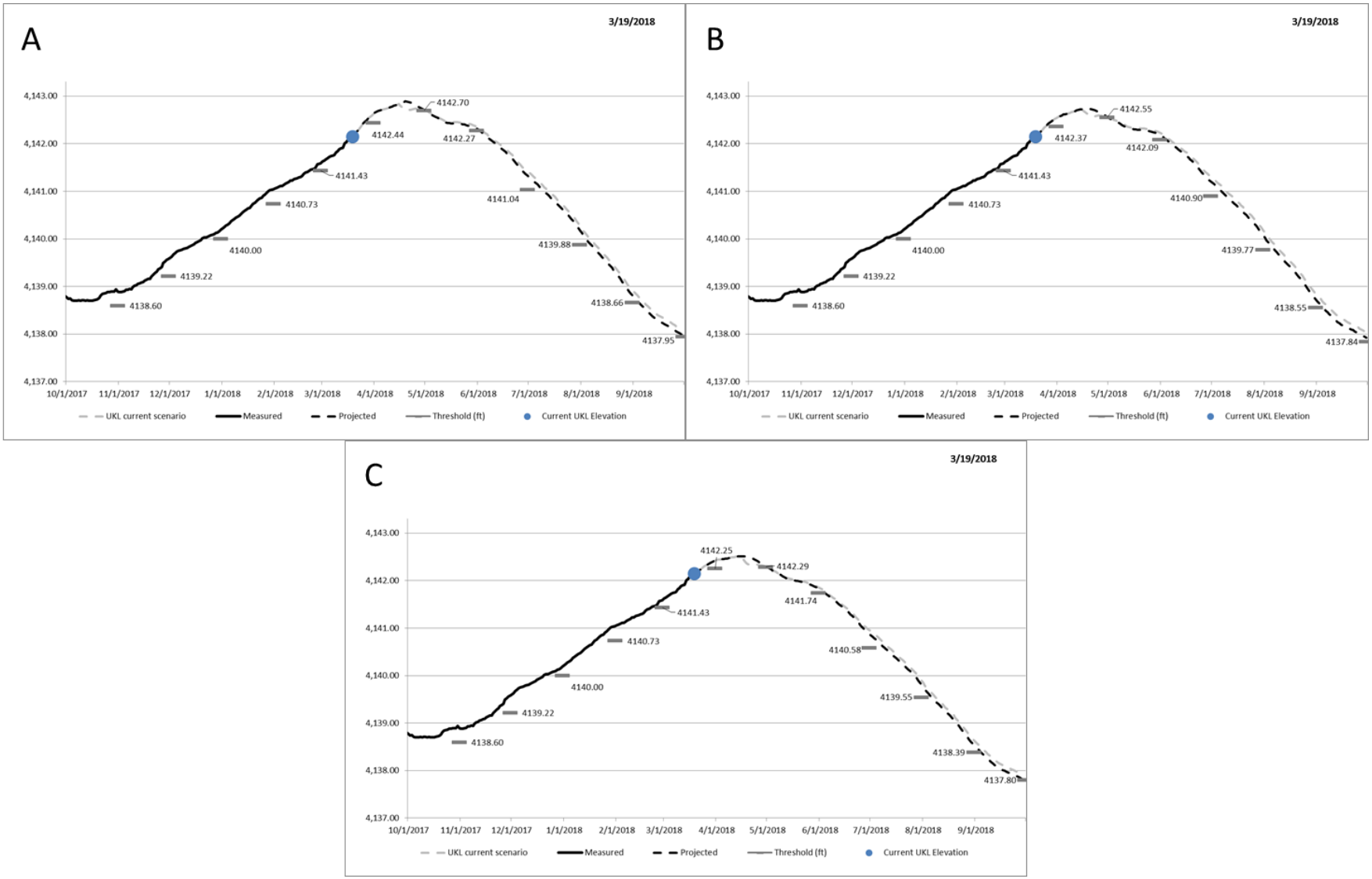

Figure 3. Upper Klamath Lake 2013 Biological Opinion operations baseline scenarios (black dashed line) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of an augmented flushing flow (augmented with 21,500 AF of non-Project water), and a Project start date around May 1 (exact date varies by exceedance forecast, see Table 6 for details). This scenario includes payback of 13,600 AF of the augmentation water by the end of September 2018, as informally agreed to by USFWS, PacifiCorp, and Reclamation; the remaining volume of water used for augmentation will be paid back in October and November 2018. Gray bars represent Upper Klamath Lake thresholds, as defined in the 2013 BiOp, the blue dot represents the current date, and the solid black line represents measured lake elevation.

Justification for Reclamation's proposal

Reclamation believes the proposal to provide a full surface flushing flow under MG1 using augmentation of non-Project water, while foregoing partial implementation of MG4, is the best option for mitigating *C. shasta* for coho salmon in this below average water year. It is the technical opinion of disease experts at the USFWS Arcata Office and the National Marine Fisheries Service that MG1 provides a more certain and much greater reduction in disease risk to juvenile salmon in the Klamath River when compared to the emergency dilution flow called for in MG4. *See* USFWS Technical Memorandum; Simondet Decl. Additionally, there is relatively little information to suggest that even a full emergency dilution flow would be effective in diluting *C. shasta* spores in the Klamath River or that this flow would provide the intended population-level disease benefits. *See* USFWS Technical Memorandum. Based on this information and an inability to deliver both a full surface flushing under MG1 and a full emergency dilution flow under MG4, as modelled and highlighted in Figures 1 and 2, Reclamation's proposal prefers implementation of the scientifically-supported MG1 and recommends not implementing MG4 in 2018.

Input from the Court

Finally, in order to utilize the 11,000 AF of the water volunteered by USFWS to support the flushing flow, Reclamation must begin pumping 250 AF per day out of Lower Klamath National Wildlife Refuge as soon as possible. Reclamation would continue pumping until until approximately 7,000 AF have been moved to the Klamath River. This action would provide approximately 7,000 AF of water, which would have otherwise been required to be released from UKL, to the river to meet minimum flow requirements such that the same volume is retained in UKL and available for implementation of a full surface flushing flow. Reclamation proposes to provide this flow event in mid to late April. As described above, **to accomplish the surface flushing flow under the Injunction with the use of non-Project water, Reclamation must begin the operation as soon as possible and thus, seeks affirmation from the court that this proposed operation is consistent with the injunction.**

Table 6. A summary of water year 2018 operations scenarios. Thresholds are based on the baseline scenario (2013 BiOp operations) for each exceedance forecast. The April distribution to the Klamath Project is intended for use in charging irrigation canals only, as discussed in Reclamation's proposal.

Figure #	NRCS forecast exceedance	Flushing flow volume (AF)	Dilution flow volume (AF)	Augmentation volume (AF)	What does augmentation include?	Which flow is augmented?	Drop below 4,142 ft between Mar and May?	Drop below 4,138 ft in August or September?	Thresholds missed	Volume needed to meet thresholds [AF (ft)]		Project Supply (AF)	Project start date	April distribution (AF)
										Apr	May			
1A	30%	33,404	53,297	0	NA	Neither	Yes	No	Apr, May	13,298 (0.16)	24,013 (0.29)	0	NA	NA
1B	50%	37,280	53,783	0	NA	Neither	Yes	No	Apr, May	13,288 (0.16)	23,984 (0.29)	0	NA	NA
1C	70%	40,283	51,541	0	NA	Neither	Yes	No	Apr, May	18,222 (0.22)	29,757 (0.37)	0	NA	NA
2A	30%	33,404	NA	0	NA	Neither	No	No	Apr	13,298 (0.16)	NA	0	NA	NA
2B	50%	37,280	NA	0	NA	Neither	No	No	Apr	13,288 (0.16)	NA	0	NA	NA
2C	70%	40,283	NA	0	NA	Neither	No	No	Apr	18,222 (0.22)	NA	0	NA	NA
3A	30%	33,404	NA	21,500	Copco Reservoir and USFWS Refuges	Flushing flow	No	Yes	None	NA	NA	273,000	Begin charging canals in late April, full deliveries when charged	7,000
3B	50%	37,220	NA	21,500	Copco Reservoir and USFWS Refuges	Flushing flow	No	Yes	None	NA	NA	253,000	Begin charging canals in late April, full deliveries when charged	6,000
3C	70%	40,227	NA	21,500	Copco Reservoir and USFWS Refuges	Flushing flow	Yes	Yes	None	NA	NA	224,000	Begin charging canals in late April, full deliveries when charged	3,000

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Southwest Region
2800 Cottage Way, Suite W-2606
Sacramento, California 95825-1846

MAR 2 0 2018

David Murillo
Regional Director
Bureau of Reclamation

Dear Mr. Murillo:

Our teams have worked closely together and with many partners over the last couple of months to determine how to best meet our various, and often competing, obligations to protect imperiled species in both the Klamath River and Upper Klamath Lake, species which are also of great importance to the Basin's Tribes, and to provide water for farmers and ranchers and National Wildlife Refuges in this very difficult water year. We have appreciated everyone's effort in this time of drought, with a clear recognition of the challenges it causes people throughout the Basin. We care deeply about the Basin and are committed to being a partner in helping resolve issues.

We understand the Bureau of Reclamation has determined that it is not possible to meet both the lake level thresholds established under the 2013 biological opinion for Klamath Project operations (2013 BiOp) in Upper Klamath Lake for endangered Lost River Suckers and short-nosed suckers, while at the same time fully meeting the Court's injunction to provide flows for the threatened coho salmon (i.e., flushing flows and dilution flows), even without providing any Project water to Klamath Project water users. We also understand the Bureau has determined that if it could find sufficient water outside of the Klamath Project, it may be able to provide the flushing flows in accordance with the Court injunction, but not the dilution flows. The Bureau has therefore worked diligently to identify potential sources of non-project water.

We also understand that the Lower Klamath National Wildlife Refuge is one of the primary potential sources of this non-project water. Already, the Upper Klamath National Wildlife Refuge has provided more than 4,000 acre-feet of non-project water to enhance lake levels to benefit fisheries and enhance water supply for other important needs. We estimate that a greater amount of water could be pumped from the Lower Klamath National Wildlife Refuge to help in this time of hardship.

Specifically, the Bureau's analyses have shown that non-project water provided from the Lower Klamath National Wildlife Refuge and PacificCorp's downstream reservoirs would allow the Bureau to provide the flushing flow required by the Court Order, while also meeting the 2013 BiOp lake level thresholds. We agree that water for the flushing flow would have benefits for salmon, and would be important for the conservation and long-term recovery of the species.

We also agree that the use of our non-project water for the flushing flow will provide a more certain benefit to the coho than would the dilution flow. Notwithstanding this very challenging water year, it is our belief, based on the best available science, that there are significant questions about the science behind the dilution flows even if more water was available in the Basin. As requested, we recently provided our technical review of the final Guidance Measure 4 on the efficacy of the dilution flows to the Bureau.

We take all of our fish, wildlife, and Tribal responsibilities seriously. We have carefully considered the request to use non-project water from the Lower Klamath National Wildlife Refuge this year and agree to provide this assistance. We have developed a plan to minimize impacts in the near term from this action, and believe taking this action this year will not have long term impacts to the Refuge resources provided that careful management follows. We are committed to this work. To reduce potential future impacts to Refuge resources, it is important to the Service that a commensurate amount of water is returned to the Refuge in the fall, which is critical for the migration of waterfowl and other birds to their wintering habitat. We believe that our willingness to voluntarily provide water from the Refuge to meet other important needs warrants this consideration, and would like to work in collaboration with the Bureau and water users to this end.

We believe the Bureau's proposal provides for the best use of the limited supply of water in this difficult year consistent with its obligations under the Court injunction. It is important to emphasize again that the Bureau cannot fully meet any of the Court-Ordered salmon flows and 2013 BiOp sucker lake threshold requirements simultaneously. With water from the Refuge, the Bureau could provide protection for suckers, the scientifically sound flushing flows for salmon, with the possibility of providing an allocation, although reduced, for Klamath Project water users. We believe all of these needs are critical and our agency has benefitted from a longstanding partnership with Tribes, farmers and ranchers, and other partners in the Basin that we truly value.

Please do not hesitate to call upon us for further information and assistance.

Sincerely,

Paul Souza
Regional Director

PACIFICORP

Pacific Power |
Rocky Mountain Power
825 NE Multnomah, Suite 1500
Portland, OR 97232

March 23, 2018

Mr. Jeff Nettleton, Area Manager
Klamath Basin Area Office
Bureau of Reclamation
6600 Washburn Way
Klamath Falls, OR 97603-9365

Subject: Use of PacifiCorp Reservoir Storage in 2018 to Increase Water Supply Availability

Dear Mr. Nettleton:

As you know, PacifiCorp and the Bureau of Reclamation (Reclamation) regularly coordinate over the implementation of the flow strategy contained in the National Marine Fisheries Service's (NMFS) 2013 Biological Opinion for Reclamation's project operations. PacifiCorp has engaged in this coordination with Reclamation pursuant to the terms of PacifiCorp's 2012 Habitat Conservation Plan and associated Incidental Take Permit issued by NMFS for the Klamath Hydroelectric Project (Project).

Through this coordination, PacifiCorp now understands that Reclamation has requested that PacifiCorp provide up to of 20,000 acre-feet of non-Klamath Project water stored in Iron Gate and Copco reservoirs during the 2018 irrigation season, with up to 14,000 acre-feet available commencing March 26, 2018 (subject to the facility-related flow restrictions discussed in our March 2, 2018 letter to Reclamation), and the remainder available after September 3, 2018.

PacifiCorp has reviewed this request, and has determined that it can voluntarily adjust how it operates the Project in 2018 to provide the requested flow volumes. PacifiCorp understands from its discussions with Reclamation that providing 14,000 acre-feet in the spring will help meet surface flushing flow requirements. If this water is used, PacifiCorp will operate the Iron Gate and Copco reservoirs at lower elevations consistent with applicable legal requirements until the reservoirs can be refilled consistent with a plan developed to do so that is agreeable to PacifiCorp. We understand that refill will occur by the late fall of 2018.

PacifiCorp appreciates the close collaboration between our organizations regarding the implementation of Klamath River flow releases in support of our respective objectives. If you have any questions concerning this matter, please contact me at (503) 813-6170.

Sincerely,

Tim Hemstreet

Tim Hemstreet
Director, Renewable Energy Development

UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

YUROK TRIBE, *et al*, Plaintiffs, v. U.S. BUREAU OF RECLAMATION and NATIONAL MARINE FISHERIES SERVICE, Defendants, and KLAMATH WATER USERS ASSOCIATION, SUNNYSIDE IRRIGATION DISTRICT, BEN DUVAL, KLAMATH DRAINAGE DISTRICT, KLAMATH IRRIGATION DISTRICT, and PINE GROVE IRRIGATION DISTRICT, Defendant-Intervenors.	CASE NO. 3:16-cv-06863-WHO

[PROPOSED] ORDER

Before the Court is a motion by Defendant-Intervenors Klamath Water Users Association, Sunnyside Irrigation District, Ben Duval, Klamath Drainage District, Klamath Irrigation District, and Pine Grove Irrigation District to stay enforcement of two flows required in this Court's March 24, 2017 Injunction (ECF No. 70) for the 2018 water year, namely the winter-spring flushing flows modeled on Guidance Measure 1 and the emergency dilution flows

modeled on Guidance Measure 4. ECF No. 101. Plaintiffs and Federal Defendants have filed separate responses to Intervenors' Motion. Having considered all submissions and arguments of the parties,

IT IS HEREBY ORDERED that Federal Defendants' proposed operations plan for the 2018 water year (ECF No. ___) is approved.

Dated: _____, 2018

_____
WILLIAM H. ORRICK
United States District Judge