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11 **UNITED STATES DISTRICT COURT**
 12 **FOR THE NORTHERN DISTRICT OF CALIFORNIA**
 13 **SAN FRANCISCO DIVISION**

15	HOOPA VALLEY TRIBE,)	Case No. 3:16-cv-04294-WHO
)	
16	Plaintiff,)	
)	
17	v.)	FEDERAL DEFENDANTS' NOTICE
)	OF ERRATA
18	U.S. BUREAU OF RECLAMATION, et al.,))	
19)	
20	Defendants,)	
)	
21	and)	
)	
22	KLAMATH WATER USERS)	
23	ASSOCIATION, et al.,)	
)	
24	Defendant-Intervenors.)	

1 Federal Defendants the United States Bureau of Reclamation and the National Marine
2 Fisheries Service, hereby submit this notice of errata regarding their Response to Defendant-
3 Intervenors' Motion for Relief From Judgment and/or Stay of Enforcement, filed on March 23,
4 2018. *See* Federal Defendants' Response, ECF No. 143. With their Response, Federal
5 Defendants included the declaration of Jared Bottcher, the Chief of the Water Operations
6 Division at the Klamath Basin Area Office of the Bureau of Reclamation, and a Hydrologic
7 Assessment. *See* ECF Nos. 143-3, 143-4. Both the Bottcher Declaration and Hydrologic
8 Assessment included the following language:

9 Based on the 50 percent exceedance scenario, Reclamation would be able to
10 implement a full 50,000 AF emergency dilution flow under MG4 starting on May
11 24 and still meet subsequent end-of-month UKL threshold elevations, **although**
12 **in only three years (2006, 2011, and 2017) of the eleven years for which we**
13 **have disease trigger data were triggers exceeded on May 24 or later.** All three
14 of these years were exceptionally wet years with above average precipitation
15 (both rain and snow) and above average river flows. In other words, it is unlikely
16 that triggers would be eclipsed on or after May 24 this year.

17 Bottcher Declaration, ECF No. 143-3 ¶ 19; Hydrologic Assessment, ECF No. 143-4 at 8. Upon
18 further review and intra-agency dialogue, the Bureau of Reclamation amends that language to:

19 Based on the 50 percent exceedance scenario, Reclamation would be able to
20 implement a full 50,000 AF emergency dilution flow under MG4 starting on May
21 24 and still meet subsequent end-of-month UKL threshold elevations; in five
22 years (2006, 2010, 2011, 2012, and 2017) of the thirteen years for which we have
23 disease trigger data, triggers were exceeded in late May or later. Three of these
24 five years (2006, 2011, and 2017) were exceptionally wet years with above
25 average precipitation (both rain and snow) and above average river flows.
26 Currently, we do not have the ability to predict if or when disease triggers will be
27 exceeded in any given year and are therefore not certain if or when disease
28 triggers will be exceeded this year.

1 Additionally, the Bureau of Reclamation has added a footnote to both documents clarifying the
2 term “as modelled.” *Id.* Complete and corrected copies of the Bottcher Declaration and
3 Hydrologic Assessment are attached to this notice of errata.

4 Federal Defendants’ Response cited, discussed, and relied on the previous language.
5 Federal Defendants’ Response, ECF No. 143 at 2-5, 7-8, 11-15. Therefore, Federal Defendants
6 will be filing a second notice of errata for their Response and an amended response brief.

7
8 Dated: March 27, 2018

9 Respectfully submitted,

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13 Environment & Natural Resources Division

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CERTIFICATE OF SERVICE

I hereby certify that on March 27, 2018, a true and correct copy of the above Notice of Errata was electronically filed with the Clerk of Court using CM/ECF. Copies of this document will be served upon interested counsel via the Notices of Electronic Filing that are generated by CM/ECF.

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11 **UNITED STATES DISTRICT COURT**
 12 **FOR THE NORTHERN DISTRICT OF CALIFORNIA**
 13 **SAN FRANCISCO DIVISION**

14			
15	HOOPA VALLEY TRIBE,)	Case No. 3:16-cv-04294-WHO
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16	Plaintiff,)	
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17	v.)	DECLARATION OF JARED
)	BOTTCHER
18	U.S. BUREAU OF RECLAMATION, et al.,))	
19)	
20	Defendants,)	
)	
21	and)	
)	
22	KLAMATH WATER USERS)	
23	ASSOCIATION, et al.,)	
)	
24	Defendant-Intervenors.)	

1 **Introduction**

2 I, Jared Bottcher, declare as follows:

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

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

25 **2018 Hydrologic Background and Status of the Injunction Implementation**

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

1 complete. The flows specified in the Injunction are modeled on Management Guidelines
2 described in *Measures to Reduce Ceratanova Shasta Infection of Klamath River Salmonids: A*
3 *Guidance Document* (Jan. 17, 2017) (“Guidance Document”) and include: (1) surface flushing
4 flows of 6,030 cubic feet per second (cfs) for 72 hours, required every year (Management
5 Guidance 1 [“MG1”]); (2) deep flushing flows of 11,250 cfs, required every other
6 year¹(Management Guidance 2 [“MG2”]); and (3) emergency dilution flows of up to 50,000
7 acre-feet (AF) (Management Guidance 4 [“MG4”]). The stated purpose of these flows is to
8 attempt to mitigate *C. shasta* disease concerns in the Klamath River. The Injunction also states
9 that Reclamation has discretion as to the timing of the flows within the timeframes specified in
10 the Injunction. The applicable time period for implementing MG1 and MG2 is November 1 to
11 April 30 and the time period for MG4 is April 1 to June 15, or until 80 percent of juvenile
12 salmon have out-migrated from the middle Klamath River, whichever occurs first.

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

24 5. Cumulative inflows to UKL since October 1, 2017, have been some of the lowest
25 observed within the Period of Record (“POR”) (as stated in the 2013 BiOp, the POR is 1981-
26 2017) and are currently below the 80 percent exceedance values. In other words, 80 percent of

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

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

9 6. The limited release capacity at Link River Dam combined with low accretions
10 between Link River Dam and Iron Gate Dam has prevented Reclamation from physically
11 producing a surface flushing flow under MG1 between November 1, 2017 and early March.
12 Only recently (approximately March 10) did UKL elevations and accretions between Link River
13 and Iron Gate Dam provide for the physical conditions necessary for implementation of the
14 6,030 cfs surface flushing flow for 72 hours (Table 1). However, Reclamation still cannot
15 produce the surface flushing flow due to the end-of-month UKL threshold elevations in the 2013
16 BiOp. Without significant accretions downstream, UKL is still not at a sufficient elevation to
17 allow those flows to be moved out of UKL without reducing the elevation of UKL below
18 required end-of-month threshold elevations specified for suckers in the 2013 BiOp. *See U.S.*
19 *Bureau of Reclamation Hydrologic Assessment Relative to Court Injunction* (“Hydrologic
20 Assessment”). Until such time as the elevation of UKL is either high enough to avoid missing
21 thresholds, or the combination of UKL elevations and significant accretions in the Link River
22 Dam to Iron Gate Dam reach occur, Reclamation cannot produce the surface flushing flows. *Id.*
23 Current forecasts do not indicate either of these conditions occurring prior to the end of April, the
24 deadline for completing MG1 in the Injunction. *Id. See Hydrologic Assessment.* Given these
25 constraints, as of the date of this Declaration, Reclamation could not and thus has not
26 implemented a surface flushing flow under MG1.

27

28

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

1 “LKNWR” and “UKNWR”; collectively [“Refuges”]), and water stored in PacifiCorp reservoirs.
2 See Hydrologic Assessment.

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

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

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

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

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

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

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

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

16 14. Reclamation has not made any deliveries to the Project since March 1, 2018, from
17 either UKL or the Lost River Basin. In fact, all deliveries to the Project ceased on December 30,
18 2017, when Reclamation made the determination that additional fall/winter water was not
19 available.

20 15. Reclamation will not allocate or deliver any water for irrigation purposes until: (1)
21 the Court issues an order on the Intervenor's Motion for Relief from Judgment and/or Stay of
22 Enforcement that resolves the issue of what operation Reclamation should perform in water year
23 2018; (2) there is enough water available from the Project to both fully comply with the flows
24 specified in the Injunction and allocate/deliver water to irrigators; or (3) the time for completing
25 the flows specified in the Injunction has passed (i.e., April 30 for MG1; June 15th or when an
26 estimated 80 percent of wild juvenile Chinook salmon have outmigrated past the Kinsman
27 Rotary Screw Trap, whichever occurs first, for MG4).

28 ***General approach to hydrologic modeling***

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

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

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

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

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

1 **deliveries**, Reclamation cannot implement both MG1 and MG4, as modelled², without missing
2 the end of April and May UKL threshold elevations for suckers specified in the 2013 BiOp.
3 Indeed, as modelled with the 50 percent exceedance scenario, Reclamation would only be able to
4 deliver a flushing flow of 6,030 cfs for 27 hours followed by modified ramp down rates (a total
5 of 23,829 AF) and an emergency dilution flow of 3,000 cfs for 168 hours (7 days) followed by
6 ramp down rates defined in the 2013 BiOp (a total of 27,714 AF), and still meet the end of April
7 and May UKL threshold elevations for suckers specified in the 2013 BiOp. For this “partial”
8 emergency dilution flow, there would not be sufficient volume to increase the flow to 4,000 cfs,
9 if necessary, as required by MG4. Based on the 50 percent exceedance scenario, Reclamation
10 would be able to implement a full 50,000 AF emergency dilution flow under MG4 starting on
11 May 24 and still meet subsequent end-of-month UKL threshold elevations; in five years (2006,
12 2010, 2011, 2012, and 2017) of the thirteen years for which we have disease trigger data, triggers
13 were exceeded in late May or later. Three of these five years (2006, 2011, and 2017) were
14 exceptionally wet years with above average precipitation (both rain and snow) and above
15 average river flows. Currently, we do not have the ability to predict if or when disease triggers
16 will be exceeded in any given year and are therefore not certain if or when disease triggers will
17 be exceeded this year. Finally, a “partial” surface flushing flow is inconsistent with the flow
18 requirements and justification for MG1 stated in the Guidance Document. *See id.*

19 20. Similarly, **with a complete shutoff of irrigation deliveries**, Reclamation cannot
20 implement MG1, as modelled, alone without missing the end of April UKL threshold elevation
21 for suckers specified in the 2013 BiOp (Figure 2, Table 6), regardless of which exceedance
22 forecast is modelled. As described above, to meet end of April UKL threshold elevation for
23 suckers specified in the 2013 BiOp, Reclamation would only be able to deliver 6,030 cfs for 27
24 hours followed by modified ramp down rates (based on the 50 percent exceedance forecast).
25 This “partial” surface flushing flow is inconsistent with the flow requirements and justification

26 ² As discussed above, Reclamation modelled the emergency dilution flow being triggered on May 9, 2018, which is
27 three weeks after the last day of 6,030 cfs at Iron Gate Dam. Therefore, any reference to “as modelled” assumes that
28 the emergency dilution flow occurs on May 9, 2018.

1 for MG1. Specifically, MG1 clearly states that a full flushing flow of 6,030 cfs for 72 hours is
2 anticipated to disrupt the lifecycle of the *C. shasta* host; a flow of lesser magnitude and duration
3 is not expected to achieve the desired result. *See id.*

4 21. Reclamation acknowledges that an accretion event of sufficient volume occurring
5 in mid-to-late April may enable implementation of the surface flushing flow under MG1 without
6 missing the end of April UKL threshold elevation for suckers under the 2013 BiOp. As such,
7 Reclamation continues to monitor hydrologic conditions with the intent of implementing MG1 if
8 an accretion event of sufficient volume occurs. Coupling implementation of the surface flushing
9 flow under MG1 with an accretion event of sufficient volume that occurs in mid-to-late April
10 may not necessarily prevent UKL elevation from dropping below end of May UKL threshold
11 elevations if a full emergency dilution flow (i.e., all 50,000 AF, increase to 4,000 cfs after one
12 week as in the Hydrologic Assessment) under MG4 is also implemented. Finally, Reclamation
13 previously analyzed the accretion volumes necessary to implement MG1 in March without
14 missing the end of March UKL threshold elevation and determined, based on data from 1981-
15 2017, that such an event was extremely unlikely in water year 2018 given the relatively low
16 snow pack. As such, Reclamation only assessed April accretion events and modeled April
17 implementation of MG1 in the Hydrologic Assessment, though that does not preclude
18 Reclamation from implementing MG1 in March if a sufficient accretion event is anticipated. *See*
19 *id.*

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

21 22. New information provided by disease experts with the USFWS Arcata Office that
22 was not previously considered by the Court indicates there is very limited scientific support for
23 an emergency dilution flow under MG4 in general. Additionally, this new information indicates
24 that a reduced volume of water available for an emergency dilution flow makes the possible
25 benefits of this measure in reducing spore concentration even more doubtful and that a partial
26 emergency dilution flow would likely not provide the intended population-level disease benefits.
27 *See* USFWS Technical Memorandum. For this water year in particular, Iron Gate Dam flows
28 just prior to implementation of the 3,000 cfs flow, as currently modelled, are projected to be

1 1,472 cfs. This represents a doubling of flow, similar in nature to the dilution flow implemented
2 in 2014, which the *C. shasta* experts at the USFWS's Arcata Office have characterized as
3 minimally successful in diluting spore concentration and reducing prevalence of infection (POI)
4 in Klamath River juvenile salmon. The partial dilution that is projected to be realized in 2018 if
5 MG4 is required is far less than the uncontrolled spill event that occurred in 2005, when flows at
6 Iron Gate increased by nearly six-fold to 6,000 cfs, remained elevated for four weeks, and when
7 reductions in weekly POI estimates were actually observed. *See* USFWS Technical
8 Memorandum.

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

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

24 25. With regard to the emergency dilution flow triggers, the authors of the USFWS
25 Technical Memorandum note that 5 spores/liter and 20 percent prevalence of infection (POI)
26 indicate normal or background levels of *C. shasta* conditions in the wild and are not necessarily
27 indicative of pending risk of disease as stated in the Guidance Document. Monitoring
28 observations made in 2017 underscore this point: both spore concentrations and POI were

1 approached or met in 2017, a year with “low *C. shasta* infection levels and no clinical signs of
2 disease...in any of the fish sampled in the Klamath basin.”

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

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

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1 28. The USFWS Technical Memorandum concludes that a reduced volume of water
2 available for an emergency dilution flow, or a partial emergency dilution flow, would amplify
3 the uncertainties as to the potential effectiveness of MG4 as compared to an event using the full
4 50,000 AF. As stated above, the current inflow forecasts and modelling indicate that
5 Reclamation cannot implement a 50,000 AF emergency dilution flow until May 24, 2018, which
6 is likely to be after disease triggers are eclipsed based on disease trigger data from 2005-2017.
7 *See Hydrologic Assessment.*

8 29. The National Marine Fisheries Services reached the same conclusion as USFWS
9 relative to the efficacy of MG4 and indicates that implementation of MG1 would provide a
10 greater reduction in *C. shasta* disease risk to juvenile salmon in the Klamath River than the
11 emergency dilution flow release prescribed by MG4. *See Simondet Declaration paragraph 4).*
12 ***Reclamation's proposal for operating under the 2013 Biological Opinion and the Injunction***
13 ***in water year 2018***

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

1 flushing flow, meeting UKL threshold elevations, and ensuring a viable Klamath Project in 2018.
2 *See* Hydrologic Assessment.

3 31. Under any exceedance forecast scenario, implementation of a full surface flushing
4 flow under MG1, while meeting end-of-month UKL threshold elevations, is only possible if
5 21,500 AF of non-Project water is provided for augmentation. *See* Hydrologic Assessment.
6 USFWS has agreed to provide 11,000 AF of water from its Refuges to augment Project water
7 and help Reclamation implement a full surface flushing flow under MG1, but this water is not
8 available for implementation of MG4. Additionally, PacifiCorp has agreed to provide 10,500 AF
9 of water from Copco Reservoir to augment Project water and help Reclamation implement a full
10 surface flushing flow under MG1.³ USFWS chose to provide this water for implementation of
11 MG1 because there is new information suggesting limited scientific support for MG4 and new
12 information suggesting that a surface flushing flow under MG1 is more effective in reducing
13 disease in Klamath River juvenile salmonids than implementation of MG4. *See* USFWS
14 Technical Memorandum; Letter from Paul Souza, USFWS. Finally, the April 16 MG1
15 implementation date was chosen for the reasons described in the general assumptions above and
16 does not preclude Reclamation from implementing this flow prior to this date if accretions of
17 sufficient volume are anticipated.

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

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

1 population-level disease benefits. *See* USFWS Technical Memorandum. Based on this
2 information and an inability to deliver both a full surface flushing under MG1 and a full
3 emergency dilution flow under MG4, as modelled, Reclamation's proposal includes full
4 implementation of the scientifically-supported MG1 and recommends not implementing MG4 in
5 2018. *See* Hydrologic Assessment.

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

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

4 Executed this 27th day of March, 2018 at Klamath Falls, Oregon

5
6 A handwritten signature in black ink, appearing to read 'Jared Bottcher', is written over a horizontal line. The signature is fluid and cursive.

7
8 Jared Bottcher
9 Chief of Water Operations Division
Klamath Basin Area Office, Reclamation

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**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.

¹Because 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. **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.

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 modelled¹, 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; in five years (2006, 2010, 2011, 2012, and 2017) of the thirteen years for which we have disease trigger data, triggers were exceeded in late May or later. Three of these five years (2006, 2011, and 2017) were exceptionally wet years with above average precipitation (both rain and snow) and above average river flows. Currently, we do not have the ability to predict if or when disease triggers will be exceeded in any given year and are therefore not certain if or when disease triggers will be exceeded 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.

¹ As discussed above, Reclamation modelled the emergency dilution flow being triggered on May 9, 2018, which is three weeks after the last day of 6,030 cfs at Iron Gate Dam. Therefore, any reference to “as modelled” assumes that the emergency dilution flow occurs on May 9, 2018.

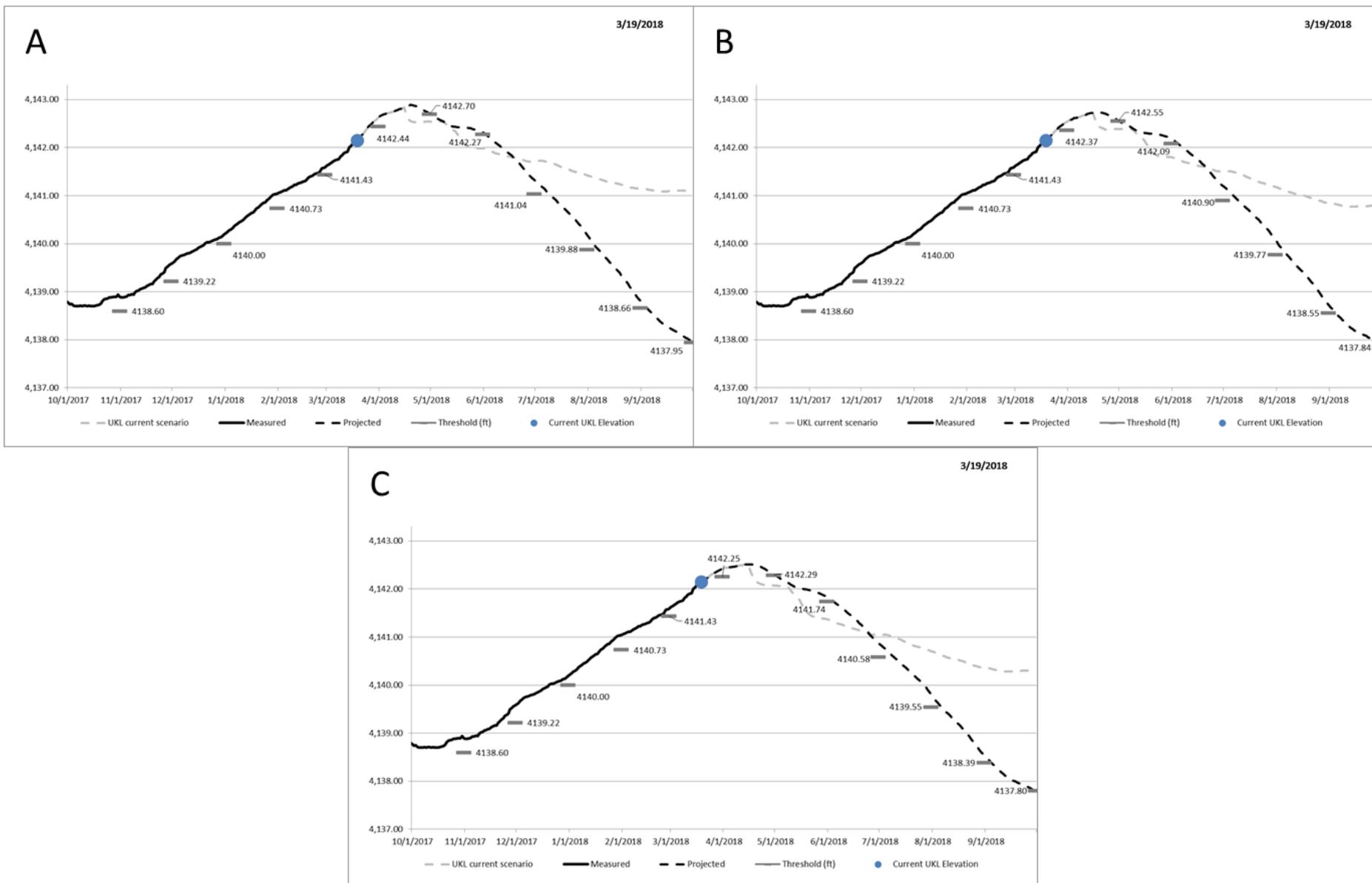


Figure 1. Upper Klamath Lake 2013 BiOp operations baseline scenarios (black dashed lines) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of both Injunction flows **with a complete shut off of irrigation deliveries** (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.

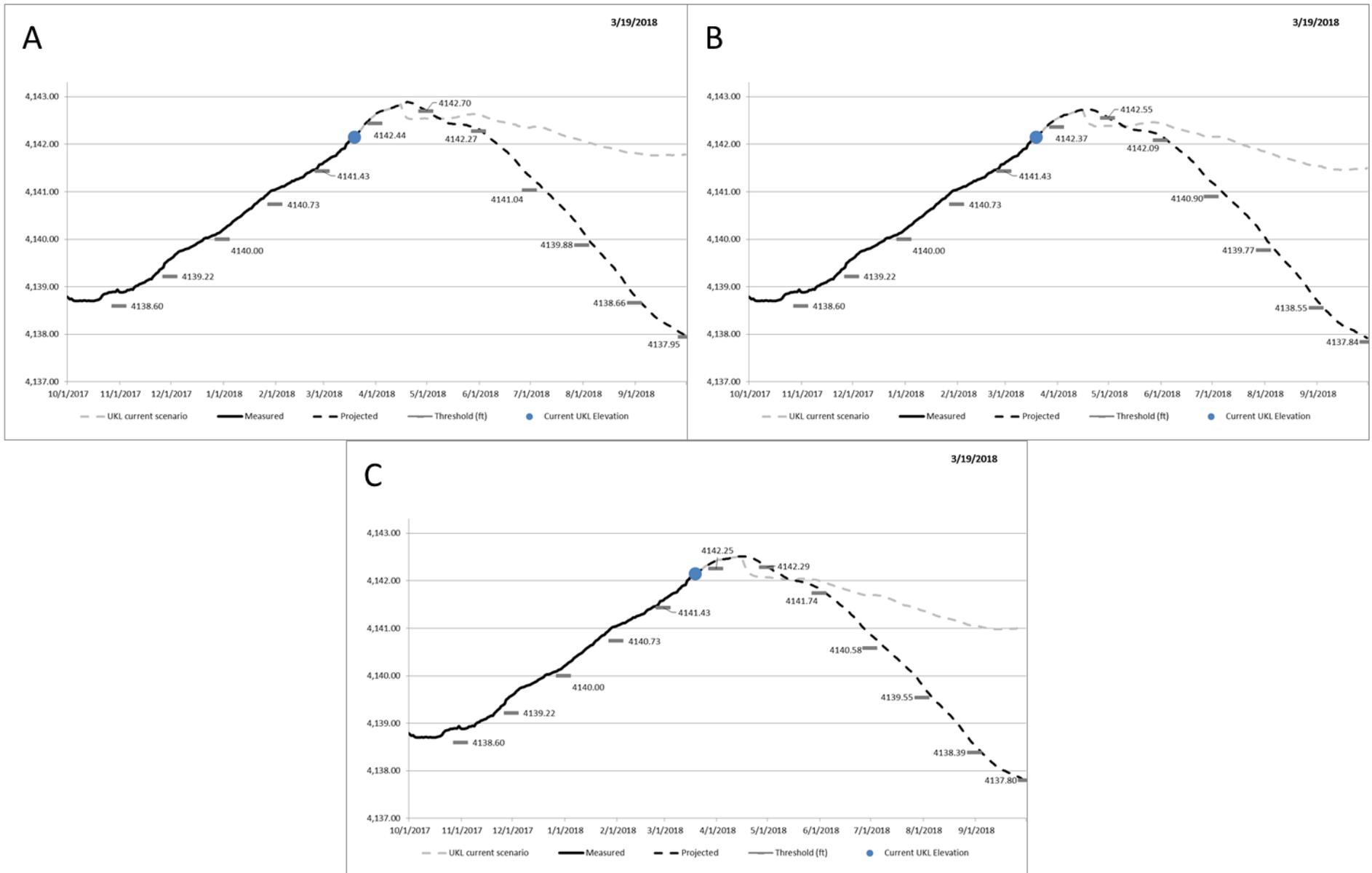


Figure 2. Upper Klamath Lake 2013 BiOp operations baseline scenarios (black dashed lines) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of a flushing flow with a complete shut off of irrigation deliveries (gray 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.

²PacifiCorp 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.

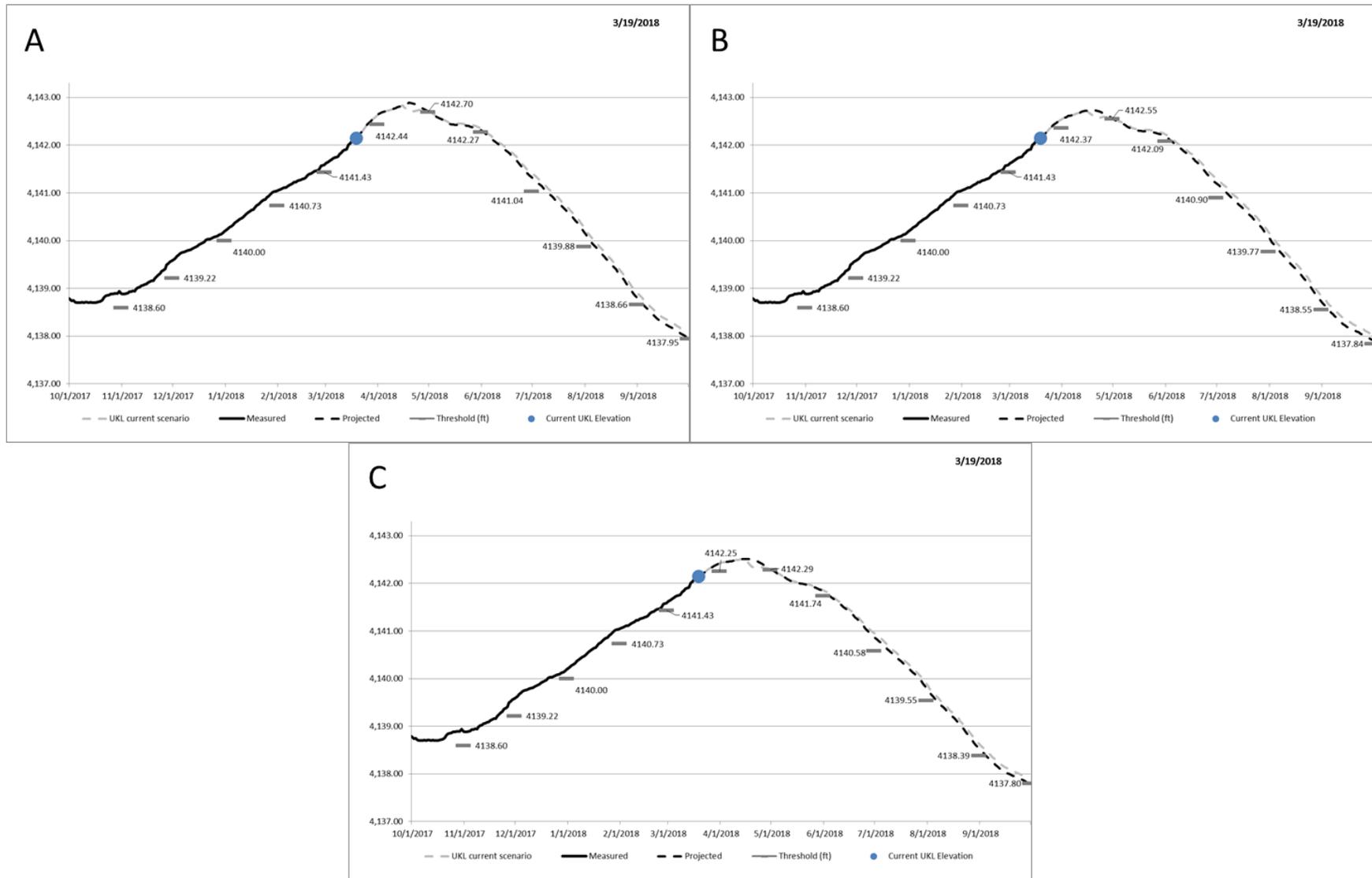


Figure 3. Upper Klamath Lake 2013 Biological Opinion operations baseline scenarios (black dashed line) at the 30 percent (A), 50 percent (B), and 70 percent (C) exceedance NRCS inflow forecasts compared to scenarios including implementation of an augmented flushing flow (augmented with 21,500 AF of non-Project 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