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DRAFT Klamath Project January 2023 Temporary Operating Procedure (TOP)

Summary

Due to the extraordinary hydrologic conditions that currently exist in the Klamath Basin and are expected to persist until at least April 1, 2023, the Bureau of Reclamation is proposing to operate to a Temporary Operating Procedure (TOP) in response to said hydrologic conditions, which will be in effect from January 13 to April 1. Key elements of the TOP are as follows:

- Reduce Link River dam (LRD) mean daily releases to achieve a 14% reduction in river flows at Iron Gate Dam (IGD) to increase storage levels in Upper Klamath Lake (UKL) in an effort to meet ESA requirements. Adaptive modification of operations to increase or decrease river flow reductions will be discussed on a weekly basis between January 13th and March 31st.
- Collaborate with the US Fish and Wildlife Service, the National Marine Fisheries Service (collectively the Services), and Tribes within the Klamath Basin to develop (and augment, as necessary) habitat monitoring programs, focusing on key habitat locations within the Klamath River mainstem and UKL. Monitoring data and previous technical analyses will inform the adaptive management of IGD flow targets for the performance period. It is anticipated that monitoring results for habitat and fish health will be collected and analyzed on a weekly basis to inform proposed weekly operational adjustments.
- In addition, at weekly intervals following the initial release reduction and continuing through March 2023, Reclamation will analyze the California-Nevada River Forecast Center's (CNRFC) Upper Klamath Lake (UKL) forecast inflows and potentially, UKL forecast inflows from the Natural Resources Conservation Service (NRCS). Subject to any significant information to the contrary based on habitat monitoring results as above, Reclamation will modify operations up to a maximum of 40% reduction toward achieving UKL elevation traces depicting a March 31, 2023, elevation of not less than 4142.40'.



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Background & Current Conditions

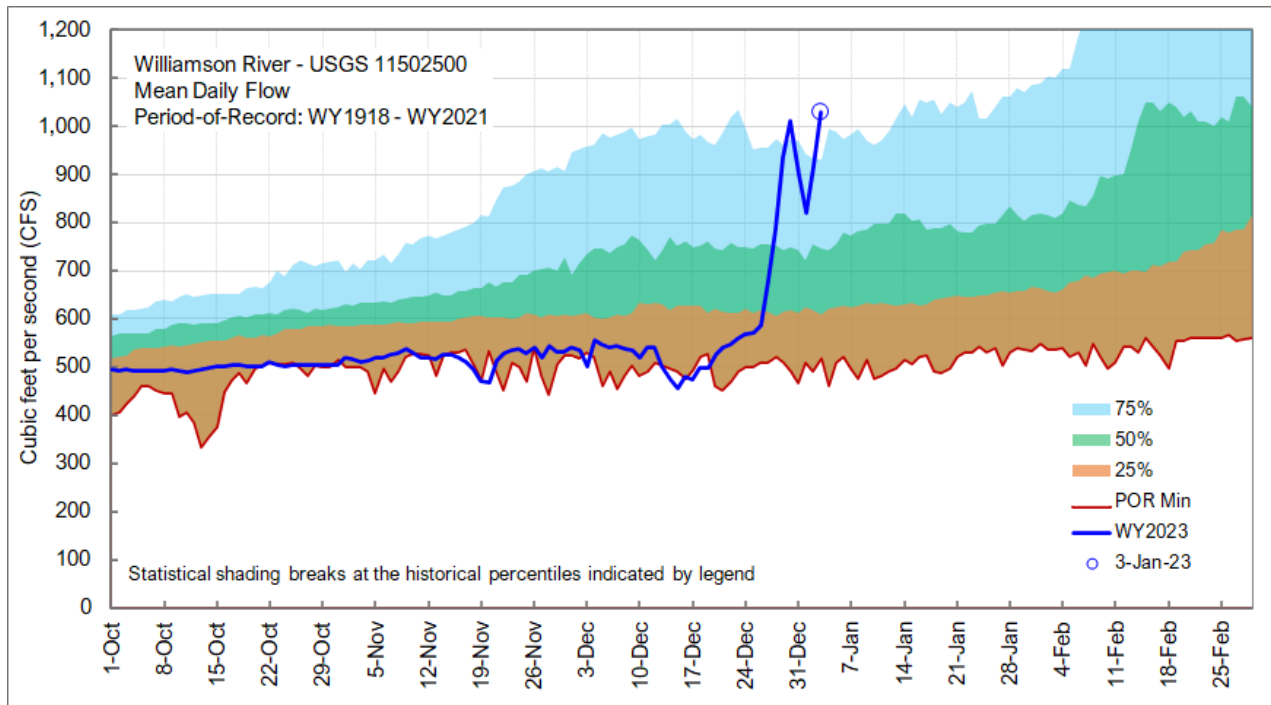
The 2023 Water Year has started significantly drier than normal, but recent weather has shown to temporarily offset the consistent dryness experienced so far this water year. Accumulated water year precipitation in the Klamath Basin had been below average through December 22—resulting in exceptionally low inflows to UKL—however, due to recent weather the accumulated water year precipitation is 112% of normal as of January 4. There was an average of 8.4 inches of snow water equivalent (SWE) at SNOTEL sites on January 4, similar to 2022. Soil moisture in the Sprague River sub-basin is at 151% of median and the Williamson River sub-basin is at 79% as of January 4. This is compared to 73% and 61% of median during 2021 for the Sprague and Williamson, respectively. In 2020, the comparable values were 26% and 88%. The low soil moisture values within the Williamson sub-basin help explain why tributary inflows appear decoupled with precipitation. Furthermore, groundwater pumping for agricultural and domestic wells during the last few years has lowered the groundwater table in the upper basin, based on information from Klamath County Emergency Management, also likely affecting baseflows. Flows in the Williamson River, which account for approximately 50% of total inflow to UKL in any given year, have now broken records for minimum flows in the river during the 104-year period of record for 21 days so far from October 1 through January 3.



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Figure 1. Williamson River Flows in WY 2023.



The low tributary flows have led to net inflows to UKL through December 21 that represent the lowest volume in the 41-year period of record. However, since December 22, tributary flows have steadily increased due to ongoing precipitation which have contributed to a healthy increase in UKL inflows (Figure 2). It is important to note that, even with wetter conditions, accumulated UKL net inflow ranks 7th driest relative to the period of record. UKL elevations have increased by just 0.13 feet between October 1 and December 21, compared to an average increase of 0.23 feet during this same period. The seasonal forecast shows the usual results of La Nina conditions persisting, though waning, through the winter with wetter than normal conditions for the Pacific Northwest and drier than normal conditions to the south. This is the third winter in a row with La Nina conditions, and the previous two La Nina cycles in 2021 and 2022 produced drought conditions in the Klamath Basin. The Klamath Basin remains in a severe to extreme drought status, which would extend to a fourth consecutive year of if current forecasts are realized.



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CNRFC - KLA03	
Monthly Probability	
Forecast Date	10/1/2022
Forecast Period	Oct
75% Exceedance Volume (AF)	51,673
Oct Observed Volume (AF)	50,026

CNRFC - KLA03	
Monthly Probability	
Forecast Date	11/1/2022
Forecast Period	Nov
75% Exceedance Volume (AF)	73,700
Oct Observed Volume (AF)	64,284

CNRFC - KLA03	
Monthly Probability	
Forecast Date	12/1/2022
Forecast Period	Dec
25% Exceedance Volume (AF)	92,800
Oct Observed Volume (AF)	92,735

In acknowledgement of these demonstrated extreme hydrologic conditions and multiple forecasts predicting their continuation, Reclamation has invoked the “meet and confer” provisions of the existing BiOp. Reclamation has met multiple times with the Services to discuss taking potential actions this winter to better manage the system under these extraordinary hydrologic conditions. In addition, Reclamation has updated models of several scenarios that are shown below.

Fall/Winter Operations Plan

Reclamation has evaluated the CNRFC exceedance UKL inflow projections, which represents their most current prediction of the most likely inflows to develop the current projection for a 1 April UKL elevation. It incorporates tributary flows, precipitation, snowpack, soil moisture content and other factors and is updated daily. Current projections of expected inflows to UKL and minimum flow releases to the Klamath River indicate, based on KBAO’s experience and



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professional opinion, a 21,686 Acre Foot (AF) deficit in UKL volume to meet the 4142.40' on April 1st. Reclamation will adaptively manage operations, including releases from LRD to meet IGD flow targets, informed by coordinated data analysis efforts, to meet ESA requirements within the Klamath Basin system. Key considerations include:

- All non-ESA releases of stored water or diversions of live flow from the Klamath River will be stopped immediately and remain shut off until at least 1 April.
- A monitoring plan, developed collaboratively between Reclamation, the Services, and Tribes within the Klamath Basin on a voluntary basis to develop habitat monitoring programs, initially focusing on mapping locations of Chinook Salmon redds within the Klamath River mainstem and informing adaptive management of IGD flow targets. There is a large amount of uncertainty on what percentage of total redds can be identified by these methods. There are water clarity and flow volumes that may not allow survey teams on to the river before January 17. Habitat and fish health data will be collected as thoroughly as conditions allow and analyzed based on operational adjustments.
- Chinook spawning has effectively been completed for the current water year and location of sites not previously identified will be difficult, Coho spawning is still occurring and will be monitored as well as conditions allow. The uncertainty in redd locations will need to be accounted for and considered when deciding to implement proposed flow reductions.
- Primary sites of observed Chinook salmon redds will be monitored and the stage/discharge relationship for Klamath River reaches will be considered to determine the potential for dewatering as a result of any proposed reduction in LRD releases until fry emergence is observed. At this stage, rearing habitat availability will be added to the factors under consideration during discussions on operational adjustments.
- In addition, at weekly intervals following the initial action and continuing through March 2023, Reclamation will continue to analyze the CNRFC UKL water surface elevation



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ensemble and, subject to any significant information to the contrary based on habitat monitoring results detailed above. Reclamation will modify operations up to a maximum of 40% reduction toward achieving UKL elevation traces depicting a March 31, 2023, elevation of not less than 4142.40’.

- Flows reductions at LRD will maintain an average daily flow of at least 300 cfs to prevent any fish stranding in the areas between LRD and Keno Dam per the USFWS BiOp
- The Lost Rive is a closed system that has, for most of its history, not provided flows to the Klamath River. The Lost River Diversion Channel (LRDC), Clear Lake Reservoir and the D Plant pumping stations were constructed to serve flood control purposes at different points in the system. Flows from the Lost River system to the Klamath River are intermittent and are not intended to meet ESA targets. While some flow may be directed through the LRDC as part of a flood control regime, they have not been factored into current hydrology projections for the Klamath River and Upper Klamath Lake.
- By late winter, prior to the completion of Salmon fry emergence, Sucker spawning will begin to be observed in the shoreline springs of UKL. UKL elevation and egg location will then be added to the factors under consideration for operational decisions.
- On April 1, 2023, there will be a transition from winter operations to spring operations. All spawning and hatching of Salmonids will be considered complete. A surface flushing flow will be discussed based on the current UKL elevation, the elevation needed to protect Sucker eggs, and predicted inflows. The volume, duration, and triggers of the surface flushing flow will need to consider all of these factors before a surface flushing flow can be set. All of these will be included as part of the Spring/Summer Operating Procedure.



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Overview of Possible Action(s) for Implementation

On January 13, 2023, based on the Reclamation evaluation of forecasting data, Reclamation will reduce Link River dam (LRD) mean daily releases to achieve Iron Gate Dam reductions of 14% to initialize action and to begin retaining storage in UKL to achieve 4142.40 feet by April 1st.

Approximately 24-48 hours following the change in flows, Reclamation will coordinate with the Services and the Tribes to begin observing mapped locations of redds for evidence of de-watering and Coho salmon spawning in the mainstem of the Klamath River for indications of altered migration patterns. Per previous technical information provided by USFWS requested by Reclamation, less than 10% of available spawning habitat would be expected to be impacted by this flow reduction. The highest spawning density in the Klamath River is the reach between IGD and the confluence of the Shasta River. Over 60% of Chinook spawning takes place in this reach historically. The impact to redds in this reach would be expected to be substantially less than 10% of totals but a maximum of 10% will be assumed for risk analysis purposes. If at any point, a larger impact is observed, Reclamation will take immediate action to return flows to minimums. At the end of the first week, Reclamation will evaluate the de-watering data, updated hydrology and other impacts to evaluate whether any future changes in flows are warranted. Reclamation will continue weekly evaluations of redd dewatering until hatching activity, and fry emergence are observed. Further flow adjustments will then consider habitat availability to emerging fry, in addition to hydrology and redds impact. Reclamation may reduce IGD flow targets up to a maximum reduction of 40% of base flows, as long as risks to the river ecosystem, as indicated by monitoring results and hydrologic modeling, are deemed to be justified to achieve an April 1, 2023, UKL elevation of 4142.40 feet. These risks will be evaluated weekly in conjunction with the FASTA team to ensure risks to Suckers, Salmonids, and other threatened species are fully understood before a decision to continue is made.



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Table 10. WY2023 Fall-Winter Adaptive Management Strategy – Implementation schedule, methods, & actions

Date	Analysis	Action
Jan 6	Reclamation evaluates forecast models and identifies most likely 4142.40' target trace and identifies LRD releases to achieve necessary IGD flow targets. Work begins on initiating monitoring plans	
Jan 13		
Jan 20		
Jan 27		
Feb 3		
Feb 10		
Feb 17		
Feb 24		
Mar 3		Once flow reductions take effect, evaluate data concerning condition of spawning, redds, and fry emergence along with updated hydrology to determine if operations changes are needed and within risk tolerance to achieve a 4142.40' ($\pm 0.10'$) UKL elevation on April 1.
Mar 10		
Mar 17		