

Interim Operations Plan Technical Attachment

The purpose of this document is to provide additional technical explanation of the proposed Interim Operations Plan and the modeling done to analyze its effects on Iron Gate Dam flows and Upper Klamath Lake elevations. To the extent it restates, paraphrases, or contradicts anything in the Interim Operation Plan letter accompanying this addendum, the letter controls.

Base EWA Augmentation

As part of the Interim Plan, Reclamation proposes to provide a base EWA augmentation of 40,000 acre-feet (AF) in water years with an Upper Klamath Lake (UKL) Supply at or above 550,000 AF and at or below 950,000 AF. The 40,000 AF of EWA augmentation would be comprised of 23,000 AF from Project Supply and 17,000 AF from volume within UKL. An initial determination on whether the 40,000 AF of EWA augmentation would occur will be based on the March 1 Natural Resources Conservation Service (NRCS) UKL inflow forecast and the resulting UKL Supply. A final determination of EWA augmentation would be made in early April, with the April 1 NRCS inflow forecast and the resulting UKL Supply. If a portion of the EWA augmentation volume is utilized in March, that volume would be subtracted from the EWA augmentation available beyond March. If a volume of EWA augmentation is used in March and the subsequent April 1 UKL Supply calculation does not provide EWA augmentation, then all water utilized in March above and beyond formulaic release of EWA (i.e., augmentation volume) would be counted against the EWA. The EWA augmentation scheme related to UKL Supply is shown in Figure 1.

National Marine Fisheries Service (NMFS) has requested flexibility in the distribution of the 40,000 AF of EWA augmentation to optimize the use of this water, while maintaining UKL elevations/conditions necessary for listed suckers. As modeled, the 40,000 AF of EWA augmentation was released according to a NMFS-specified schedule that was unique to each year's hydrologic circumstances. Simulated release of the flexible flows started as early as March 23 and as late as May 18. Actual releases of the EWA augmentation may vary significantly in real time operations and Reclamation, NMFS, the U.S. Fish and Wildlife Service (FWS), along with input from the Flow Account Scheduling Technical Advisory (FASTA) team, will determine the final release schedule. The EWA augmentation flows can continue through June and are assumed to overlap and add to the enhanced May/June flows described in the following section.

General rules used for the modeling of the implementation of the 40,000 AF of EWA augmentation are as follows:

1. An initial calculation of EWA augmentation occurs in early March using the March 1 NRCS UKL net inflow forecast. This volume is available for use in March, subject to the rules laid out in 2.b.
2. Using the April 1 NRCS UKL net inflow forecast, calculate whether the 40,000 AF of EWA augmentation is triggered according to the relationship shown in Figure 1;
 - a. May and June calculation of UKL Supply does not affect the EWA augmentation volume determined in April.
 - b. If a portion of the EWA augmentation is utilized in March, that volume would be subtracted from that available beyond March. If a volume of EWA augmentation is used in March and the subsequent April 1 UKL Supply calculation does not provide EWA

augmentation, then all water utilized in March above and beyond formulaic release of EWA (i.e., augmentation volume) would be counted against the EWA

3. Release of the 40,000 AF of EWA Augmentation will be according to a schedule set by Reclamation, NMFS, and FWS, with input from the FASTA team;
 - a. As discussed above, if the March UKL Supply is within the EWA Augmentation range, the augmentation can be partially used in March under FASTA consultation
4. Project supply calculations, based on the April 1, May 1, and June 1 UKL inflow forecasts are reduced by 23,000 AF when the EWA augmentation scheme is triggered (April UKL Supply at or above 550,000 AF and at or below 950,000 AF)

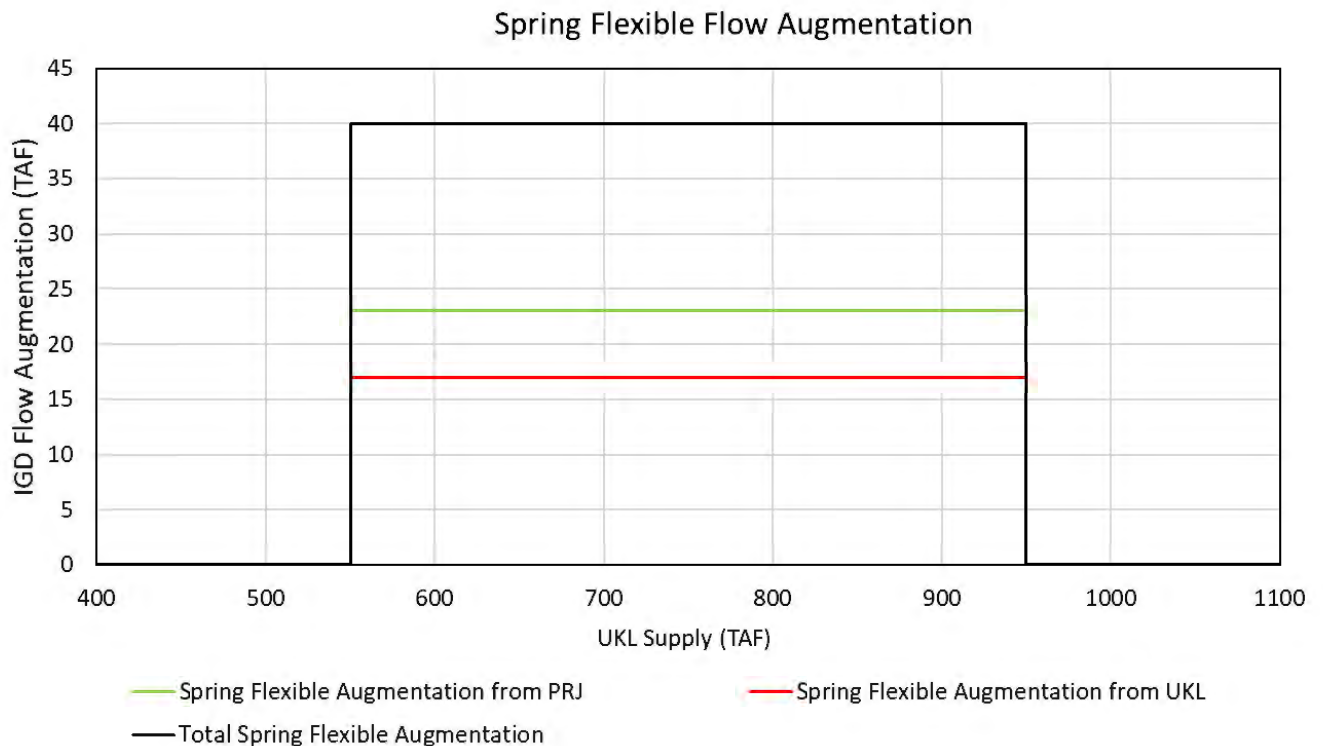


Figure 1. Base EWA Augmentation as related to UKL Supply. UKL Supply is as defined as it is in Reclamation’s 2018 Operations Plan (as analyzed in the Services 2019 BiOps). Spring Flexible Augmentation is the amount of water to be contributed from Project Supply, limited to 23,000 AF, under this operation as a function of UKL Supply. Spring Flexible Augmentation from UKL is the amount of water to be contributed from Upper Klamath Lake under this operation as a function of UKL Supply. Total Spring Flexible Augmentation is the total amount of EWA augmentation to be provided as a function of UKL Supply from all sources.

Because the EWA augmentation is counted against EWA when the flows are implemented (when the intention is for this volume to be in addition to EWA), the aggregate augmentation (as determined in April) is added to the July 1 EWA to ensure proper EWA accounting for the remainder of the spring/summer season. Additionally, the default rules assume that when enhanced May/June flows are implemented and IGD flow targets would otherwise be at minimums, Reclamation would implement flow variability (up to +/- 75 cfs around enhanced IGD flow targets).

With regard to Upper Klamath Lake elevations, implementation of EWA augmentation will be carried out as described in the Interim Operations Plan letter.

Enhanced May/June Flows

In years in which May UKL Supply is greater than 625,000 AF and less than 950,000 AF, an additional volume of up to 20,000 AF (shared equally at all volumes between Project Supply and UKL) is distributed in May and June. The Enhanced May/June flows scheme as it relates to UKL Supply is shown in Figure 2. For UKL Supply values from 625,000 AF to 717,000 AF, the May/June Augmentation scheme increases linearly in relation to increasing UKL Supply from 0 AF to 20,000 AF. With UKL Supply between 717,000 AF to 858,000 AF, the May/June Augmentation is a constant 20,000 AF. May/June Augmentation decreases linearly in relation to increasing UKL Supply from 20,000 AF to 0 AF over the UKL Supply range of 858,000 AF to 950,000 AF. The May/June Augmentation is 0 AF if UKL Supply is below 625,000 AF or above 950,000 AF based on the May 1 NRCS UKL net inflow forecast. This replaces the enhanced May/June flow provision in Reclamation's 2018 Operations Plan (as analyzed in the Services' 2019 BiOps) that was dependent on EWA allocations instead of UKL Supply.

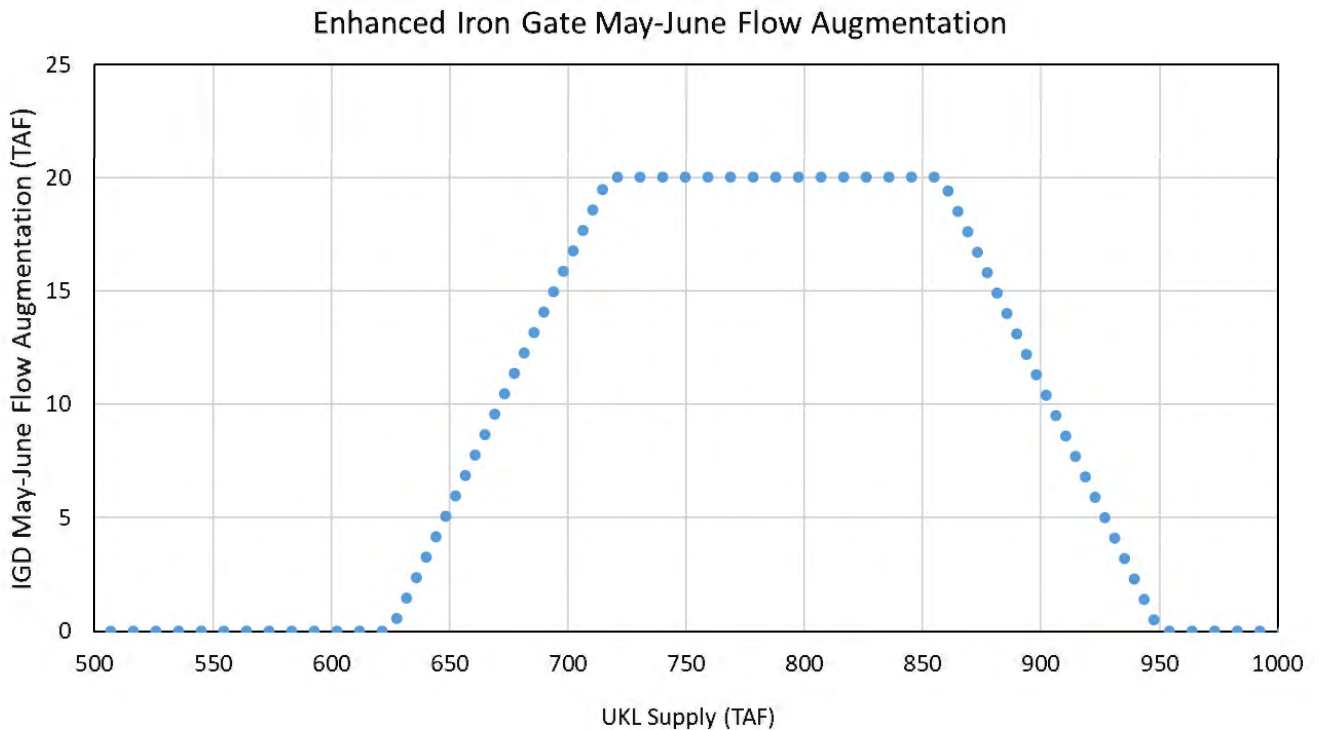


Figure 2. Enhanced May/June Flow Augmentation as related to UKL Supply. The above May/June augmentation scheme replaces the enhanced May/June provision in Reclamation's 2018 Operations Plan (as analyzed in the Services 2019 BiOps) that was dependent on EWA allocations instead of UKL Supply. The enhanced May/June augmentation volumes are shared equally (at all volumes) between Project Supply and UKL.

This action is meant to improve coho habitat in specific years of concern to NMFS. NMFS has requested flexibility in the distribution of the May/June Augmentation to maximize the benefit to listed coho, while maintaining UKL elevations/conditions necessary for listed suckers. However, for purposes of modeling effects of the enhanced May/June flows and Reclamation's planning needs

(unless NMFS requests alternative management scenarios in a given water year), the specific “default” rules for implementing enhanced May/June flows are as follows:

1. Using the May 1 NRCS UKL net inflow forecast, calculate the May/June Augmentation according to the relationship shown in Figure 2;
 - a. No volume of May/June Augmentation is available for release prior to May 1.
 - b. June calculation of UKL Supply does not affect the May-June Augmentation determined in May.
2. Sixty percent of the May-June Augmentation volume is applied uniformly as a daily increase in calculated IGD release over the month of May;
3. Forty percent of the May-June Augmentation volume is applied uniformly as a daily increase in calculated IGD release over the month of June; and
4. May and June Project Supply estimates are reduced by 50 percent of the enhanced May-June flow augmentation volume.

Because the enhanced May/June flows are counted against EWA when the flows are implemented (when the intention is for this volume to be in addition to EWA), the aggregate augmentation (as determined in May) is added to the July 1 EWA to ensure proper EWA accounting for the remainder of the spring/summer season. Additionally, the default rules assume that when enhanced May/June flows are implemented and IGD flow targets would otherwise be at minimums, Reclamation would implement flow variability (up to +/- 75 cfs around enhanced IGD flow targets).

With regard to Upper Klamath Lake elevations, implementation of EWA augmentation (including enhanced May/June flows) will be carried out as described in the Interim Operations Plan letter.

Reclamation anticipates NMFS will recommend alternative distributions to default rules 2 and 3 described above, based on information specific to environmental conditions and forecasts, as a means to optimize the use of this water. NMFS will lead annual efforts to evaluate and seek input from the FASTA team members on alternatives to deviate from default rules.