

RECLAMATION

Managing Water in the West

KLAMATH PROJECT 2012 OPERATIONS PLAN

April 6, 2012

INTRODUCTION

This is the 2012 Operations Plan (Plan) for the Bureau of Reclamation's (Reclamation) Klamath Project (Project), which is located within the upper Klamath River Basin in southern Oregon and northern California. This Plan describes estimated Project operations from April 1, 2012 through March 31, 2013 based upon current and expected hydrologic conditions.

Reclamation developed this Plan to serve as a planning aid for agricultural water users, Klamath Basin Tribes, national wildlife refuges, and other interested parties. This plan provides an estimated Project water supply to the following areas:

- West Side delivery area: This area includes lands in southern Oregon and northern California that receive Project water primarily from Upper Klamath Lake (UKL) and/or the Klamath River. This area also includes the Tule Lake and Lower Klamath National Wildlife Refuges.
- East Side delivery area: This area includes lands within Langell Valley Irrigation District and Horsefly Irrigation District on the east side of the Project area. This area receives water from Clear Lake Reservoir, Gerber Reservoir, and the Lost River.

In response to both the 2010 National Marine Fisheries Service (NMFS) biological opinion (BO) and the 2008 U.S. Fish and Wildlife Service (USFWS) BO, Reclamation developed a "Variable Base Flow" (VBF) procedure which will be used for 2012 operations. The VBF procedure was developed based on the following objectives: (1) provide certainty in compliance with the UKL minimum elevations, as outlined in Table 2-1 of the 2008 USFWS BO as well as (2) provide a procedure that tracks the flows outlined in Table 18 of the 2010 NMFS BO and Reasonable and Prudent Alternatives (RPA). These objectives were designed to help meet the needs of coho salmon during critical periods of the year. The elements of the VBF procedure are described in more detail below.

VARIABLE BASE FLOW PROCEDURE

For the April through September time period, a base flow for the Klamath River below Iron Gate Dam will be determined for each period using the most current 50% exceedance (chance of exceeding) Natural Resources Conservation Service (NRCS) UKL inflow forecast through September. The 50% exceedance inflow forecast value is identified in Table 1 for the given time period and the corresponding flow is the base flow requirement for downstream of Iron Gate Dam. Table 1 relates inflow forecasts from percent of average inflow to a “base flow” past Iron Gate. Linear interpolation is used for percent of average inflow values that fall in between the values listed in Table 1.

For the 2012 operations year, the April 1st NRCS 50% exceedance UKL inflow forecast for April through September is 400,000 Acre-Feet (AF), or 78% of the NRCS average inflow for this time period (515,000 AF). Using Table 1, the Iron Gate base flow for April 1st through April 15th is 1,500 Cubic Feet per Second (cfs).

Table 1. Forecast and Flows Used to Determine Iron Gate Dam Base Flows in Each Time Period

Current Apr - Sept 50% Exceedance Forecast in March	March 1-15	March 16-31	Current 50% Exceedance Forecast	April 1-15	April 16-30	May 1-15	May 16-31	June 1-15	June 16-30	July 1-15	July 16-31	August 1-31	September 1-30
(% Average)	(cfs)	(cfs)	(% Average)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
0%	1275	1275	0%	1325	1325	1175	1175	1025	1025	805	805	942	1000
43%	1275	1275	37%	1325	1325	1175	1175	1025	1025	805	805	942	1000
50%	1333	1333	47%	1383	1383	1255	1255	1099	1099	838	838	947	1000
53%	1392	1392	51%	1442	1442	1335	1335	1173	1173	872	872	952	1000
63%	1450	1450	56%	1500	1500	1415	1415	1246	1246	905	905	957	1000
71%	1567	1567	70%	1500	1500	1509	1509	1320	1320	925	925	964	1003
76%	1683	1683	73%	1500	1500	1603	1603	1379	1379	945	945	971	1006
80%	1905	1905	76%	1500	1500	1670	1670	1439	1439	973	973	984	1012
82%	2128	2128	78%	1500	1500	1736	1736	1498	1498	1001	1001	997	1018
90%	2350	2350	85%	1500	1500	1803	1803	1522	1522	1029	1029	1010	1024
97.0%	2510	2510	89%	1745	1745	1865	1865	1546	1546	1034	1034	1013	1029
97.5%	2670	2670	93%	1989	1989	1928	1928	1570	1570	1040	1040	1017	1034
103%	2830	2830	99%	2234	2234	1990	1990	1594	1594	1045	1045	1021	1038
107%	2990	2990	103%	2478	2478	2053	2053	1616	1616	1051	1051	1024	1043
113%	3150	3150	114%	2723	2723	2115	2115	1638	1638	1056	1056	1028	1048
119%	3164	3164	117%	2877	2877	2379	2379	1660	1660	1063	1063	1032	1054
124%	3177	3177	134%	3030	3030	2642	2642	1682	1682	1070	1070	1035	1060
128%	3346	3346	140%	3182	3182	2748	2748	1702	1702	1074	1074	1037	1064
139%	3516	3516	150%	3333	3333	2854	2854	1723	1723	1078	1078	1039	1067
151%	3685	3685	160%	3485	3485	2960	2960	1743	1743	1082	1082	1041	1071

As the elevation of UKL fluctuates, additional releases will be made to the Klamath River above VBF “threshold elevations”. A VBF threshold elevation is one, if exceeded, the water above that threshold is to be released in support of the 2010 NMFS BO. The threshold elevations for UKL were developed through a trial and error process in order to better track the 2010 NMFS RPA Table 18 flows while maintaining the 2008 USFWS BO minimums for UKL. The threshold elevations are shown below in Table 2. Flows will be released to mimic the natural inflow pattern into UKL as best as possible above these elevations.

Table 2. Threshold Elevations

Time Period	Threshold Elevations for UKL (feet)
October	4141.7
November	4141.7
December	4142.0
January	4142.3
February	4142.6
March 1-15	4142.6
March 16-31	4142.9
April 1-15	4143.0
April 16-30	4142.9
May 1-15	4142.6
May 16-31	4142.4
June 1-15	4142.5
June 16-30	4142.5
July 1-15	4141.8
July 16-31	4141.8
August	4141.0
September	4141.0

In periods when threshold releases are being made during the months of March, April and May, a maximum controlled flow release will be determined. Threshold releases will not be increased above the maximum unless required for flood control purposes. Therefore, the elevation of UKL will increase above the threshold elevations shown above if the flows at Iron Gate Dam are at the maximum flow shown in Table 3. Maximum flows will be determined based on the current percent of average forecast shown in Table 3. Once the flood control limit is reached, flows will be released in order to maintain a full lake until the flows decrease back to the maximum flow.

Table 3. Forecast and Maximum Flows for March through May

	March	April	May
Current 50% Exceedance Forecast	Max Flow (cfs)	Max Flow (cfs)	Max Flow (cfs)
≤114%	3940	3930	3225
117%	3990	4065	3390
134%	4160	4230	3480
140%	4285	4425	3615
150%	4355	4585	3710
160+%	4460	4790	3845

WEST SIDE DELIVERY AREA

ESTIMATED INFLOW TO UKL DURING 2012

Based on the April 1, 2012 NRCS inflow forecast, the projected inflow (in AF) to UKL from April 1 through September 30, 2012, at the 50% exceedance and 70% exceedance are 400,000 AF (78% of average) and 365,000 AF (71% of average), respectively. As of April 1, 2012, UKL elevation was 4,143.07 ft and the total storage above elevation 4,137.5 ft (USFWS 2008 BO minimum) was approximately 413,961 AF.

ESTIMATED PROJECT WATER SUPPLY FROM UKL FOR KLAMATH PROJECT IRRIGATION AND REFUGES DURING 2012

Water Supply for Irrigation

- **Project Demand:** The demand for Project irrigation from UKL is estimated to be between 350,000 AF and 400,000 AF for April 1st through September 30th of 2012 based on historical usage from 1981-2000 in similar year types.
- **Project Water Supply from UKL:** Based on existing April 1st hydrologic conditions and the 50% exceedance UKL inflow forecast for April through September, the water supply for the 2012 irrigation season is expected to provide full deliveries for all water users early in the year, but the forecasted below average inflows may put irrigation deliveries at risk later in the season. The Project water supply for irrigation from UKL is estimated to be 310,000 AF for April 1st through September 30th, 2012. This quantity will be recalculated with each NRCS inflow forecast on the 1st and 16th of each month between April and July, and may increase or decrease as actual conditions may differ from those predicted by the NRCS inflow forecast. Project water deliveries after October 1, 2012 are contingent upon availability of water from UKL at that time.
- **Timing of Project Deliveries from UKL:** The following is a timeline describing the process that will be implemented to determine water availability from UKL for delivery to Project contractors.
 - **April 2012:** Current and projected hydrologic conditions were evaluated and a determination was made that adequate water supplies are available such that deliveries consistent with existing contracts will be permitted to all contractors during the month of April.
 - **May and June 2012:** Reclamation will reevaluate the current and projected hydrologic conditions as of May 1st and June 1st to make a determination on the available water supply for delivery and decide if an adequate water supply exists to continue deliveries to all contractors or if a water shortage may exist. If inadequate water supplies are available, a letter will be sent out to affected parties stating that less than full deliveries are anticipated. Also, Reclamation will implement the steps outlined in the Klamath Project 2012 Drought Plan if a determination is made that less than full deliveries are available.
 - **July 2012:** Reclamation will conduct an evaluation of the available water supply to make a determination on water availability for 2012 on July 1st, and decide if an adequate water supply exists to continue deliveries to all contractors or if a water shortage may exist. If inadequate water supplies are available, a letter will

be sent out to affected parties stating that less than full deliveries are anticipated. Also, Reclamation will implement the steps outlined in the Klamath Project 2012 Drought Plan if a determination is made that less than full deliveries are available.

- Water Supply for Refuges: Based on the 50% exceedance UKL inflow forecast for April through September, it is expected that approximately 15,000 AF of water will be available from UKL for Lower Klamath National Wildlife Refuge during the April through May time period. This quantity, along with deliveries between June through September, may increase or decrease depending on future hydrologic conditions.

EAST SIDE DELIVERY AREA

ESTIMATED PROJECT WATER SUPPLY FOR THE EAST SIDE DELIVERY AREA DURING 2012

Water Supply for Irrigation

- Clear Lake Reservoir Demand: The Project water demands for irrigation from Clear Lake Reservoir are expected to be near the long-term average of approximately 34,000 AF to be used April 1st through September 30th of 2012.
- Project Deliveries from Clear Lake Reservoir: The Project water supply for irrigation from Clear Lake Reservoir is estimated to be 27,000 AF through September 30, 2012. This estimate is based upon the hydrologic conditions existing on April 1st, the 70% exceedance inflow forecast for April through September, minimum required elevations on September 30th, operational constraints, and estimated evaporation and seepage for Clear Lake Reservoir. The available water supply for Project deliveries may increase or decrease as actual conditions may differ from those predicted by the NRCS inflow forecast.
- Timing of Project Deliveries from Clear Lake Reservoir: The following is a timeline describing the process that will be implemented to determine water availability from Clear Lake Reservoir for delivery to Project contractors.
 - April 2012: Current and projected hydrologic conditions were evaluated and a determination was made that water supplies from Clear Lake Reservoir are inadequate to meet East Side Project demands in April of 2012. The priority of use identified in Table 3.2 of the Klamath Project 2012 Drought Plan will be employed to determine the allocation of available agricultural water supplies. Based on the current water supply estimate and the allocation process outlined in the Klamath Project 2012 Drought Plan, no Project water is available at this time for second priority of use contractors served by Clear Lake Reservoir.
 - May and June 2012: Reclamation will reevaluate the current and projected hydrologic conditions as of May 1st and June 1st to make a determination on the available water supply for delivery and decide if an adequate water supply exists to make deliveries to all contractors or if a water shortage may exist. If additional water supplies are identified, a letter will be sent to affected parties stating that the estimated water supply has increased and additional water is available for delivery. If additional water shortages are identified, a letter will be sent out to

affected parties stating that less than full deliveries are anticipated. Reclamation will implement the steps outlined in the Klamath Project 2012 Drought Plan to allocate available water supplies when water shortages exist.

- July 2012: Reclamation will conduct an evaluation of the available water supply to make a determination on water availability for 2012 on July 1st, and decide if an adequate water supply exists to make deliveries to all contractors or if a water shortage may exist. If additional water supplies are identified, a letter will be sent to affected parties stating that the estimated water supply has increased and additional water is available for delivery. If additional water shortages are identified, a letter will be sent out to affected parties stating that less than full deliveries are anticipated. Reclamation will implement the steps outlined in the Klamath Project 2012 Drought Plan to allocate available water supplies when water shortages exist.
- Gerber Reservoir Demand: The Project water demands for irrigation from Gerber Reservoir are expected to be near the long-term average of approximately 35,000 AF to be used April 1st through September 30th of 2012.
- Project Deliveries from Gerber Reservoir: A full Project water supply for irrigation from Gerber Reservoir is anticipated for the 2012 irrigation season. This estimate is based upon the hydrologic conditions existing on April 1st, the 70% exceedance inflow forecast for April through September, minimum required elevations on September 30th, and estimated evaporation and seepage for Gerber Reservoir.

Table 4 displays the elevations of Clear Lake and Gerber Reservoirs on April 1st, the forecasted April through September inflows (various exceedances), and the minimum elevations needed to meet the BO requirements for endangered suckers on September 30.

Table 4. Summary of Current Elevation, Storage, Inflow Forecasts, and BO Requirements for East Side Delivery Area Reservoirs

	April 1 Elevation (feet)	April 1 Storage (AF)	Forecast (90% Exc) (AF)	Forecast (70% Exc) (AF)	Forecast (50% Exc) (AF)	ESA Minimum Sept 30 Elevation (feet)	ESA Minimum Sept 30 Storage (AF)
Clear Lake Reservoir	4,526.06	126,970	9,000	24,000	35,000	4520.6	41,150
Gerber Reservoir	4,825.00	57,620	710	7,200	12,000	4798.1	1,308

OTHER INFORMATION RELEVANT TO 2012 OPERATIONS PLAN

LAKE AND RIVER PROCEDURES AND REQUIREMENTS AFFECTING AVAILABILITY OF WATER FOR IRRIGATION AND REFUGE USE

Klamath River Winter Flow Modification Procedure

A term and condition in the 2010 NMFS BO allows Reclamation to reduce Klamath River flows in the fall and winter under certain conditions to accelerate the refill of UKL and improve the

likelihood of increased spring flows in the Klamath River. The 2010 NMFS BO Term and Condition 2A (T&C 2A) directs Reclamation to “*convene a technical workgroup...to evaluate the benefits and risks of reducing flows [in the Klamath River] from November through February for the purpose of accelerating the refill of UKL, and ultimately enhancing Iron Gate Dam flow the following spring.*” T&C 2A then states that NMFS will review the workgroups products and determine if implementing flow reductions from November through February will result in greater effects to coho salmon and their designated critical habitat than otherwise described in the 2010 NMFS BO. In accordance with the T&C, Reclamation will seek input from the technical workgroup starting in October 2012 to evaluate if reduced flows during the November through February timeframe are warranted.

Klamath River Operational Flow Requirements

The river flow operational criteria include the following ramp down rates at Iron Gate Dam:

- When the flow at Iron Gate Dam is greater than 3,000 cfs: Ramp down rates will follow the rate of decline of inflows into UKL combined with accretions between Keno Dam and Iron Gate Dam.
- When Iron Gate Dam flows are above 1,750 cfs but less than 3,000 cfs: Decreases in flows of 300 cfs or less per 24-hour period, and no more than 125 cfs per four-hour period.
- When Iron Gate Dam flows are 1,750 cfs or less: Decreases in flows of 150 cfs or less per 24-hour period, and no more than 50 cfs per two-hour period.

Klamath River VBF Base Flow Operational Flexibility

Operational flexibility is required when implementing the VBF base flows at Iron Gate Dam to allow for the possibility of operational variability and uncertainties associated with releases from Iron Gate Dam. A letter sent from NMFS on November 16, 2011, provided clarification regarding operational flexibility in meeting the VBF base flows downstream of Iron Gate Dam. The letter states that the VBF base flow should not be interpreted as a rigid minimum flow; rather, it should be interpreted as a target flow. The following operational flexibility exists for meeting VBF base flows: Up to a 5% reduction in the instantaneous minimum VBF base flow for up to 72-hours is acceptable in order to allow for the possibility of operator error and uncertainties associated with flow releases at Iron Gate Dam, as long as the resulting average flow for each time period will meet or exceed the 95% exceedance flow represented in Table 18 of NMFS 2010 BO.

Lake Elevation Criteria for UKL

Reclamation will operate the Project so that elevations in UKL are maintained at levels that are consistent with Reclamation’s 2007 Biological Assessment and the 2008 USFWS BO as shown in Table 5.

If UKL elevations begin to drop below the minimum elevation trajectories, Reclamation will work with Project irrigation districts to ensure that water deliveries do not cause UKL elevations to fall below the end of month BO minimum elevations identified in Table 5 below.

Table 5. UKL BO Minimum Elevations

Date	Biological Opinion Minimum for UKL (feet)
April 30	4142.2
May 31	4141.6
June 30	4140.5
July 31	4139.3
August 31	4138.1
September 30	4137.5

COMPARISON OF ESTIMATED WATER SUPPLY TO HISTORIC DELIVERY

The following comparison is provided for informational purposes only. Table 6 compares the 2012 estimated Project water supply for irrigation from April 1st through September 30th to average historical deliveries from the indicated time periods.

Table 6. Comparison of Estimated 2012 Project Water Supply to Historic Deliveries

	2012 Estimated Supply April - September (AF)	Average Historic Delivery (AF)
West Side Delivery Area	310,000	367,663*
East Side Delivery Area	62,000	69,083**

*UKL Average Historic Delivery was calculated based on diversions from UKL and the Klamath River for the period of 1981 through 2000.

** East Side average deliveries were calculated based on releases from 1986 through 2009, but do not include years of partial deliveries.

WATER SHORTAGE PLANNING AND PREPARATION

Klamath Project 2012 Drought Plan

Reclamation will monitor Upper Klamath Lake, Clear Lake Reservoir, and Gerber Reservoir levels, precipitation, and other factors pertaining to water supply and hydrologic conditions. If conditions indicate the potential for a water shortage, drought conditions, or unusually low elevations in Upper Klamath Lake, Clear Lake Reservoir, and/or Gerber Reservoir, Reclamation will recommend measures to Project contractors and stakeholders that could be taken prior to a declaration of “Drought or Extreme Drought” as defined by the Oregon Water Resources Commission. Early detection of particularly dry conditions in the Klamath Basin may allow for adjustments to Upper Klamath Lake and Klamath River water management during the late fall, winter, and early spring periods. The purpose of such water management adjustments is to conserve water so that it is available to meet Reclamation’s Endangered Species Act and tribal trust responsibilities, contractual obligations, national wildlife refuge needs, and other Project related purposes.

To estimate future inflows into Upper Klamath Lake, Clear Lake Reservoir, and Gerber Reservoir, Reclamation will utilize the most current NRCS inflow forecast. Reclamation will

incorporate NRCS's best estimate and adjust its quantification of the amount of surface water available from Upper Klamath Lake, Clear Lake Reservoir, and Gerber Reservoir. Reclamation will implement the steps outlined in the Klamath Project 2012 Drought Plan if a determination is made that less than full deliveries are available. In the event of a water shortage, the priority of use identified in the Klamath Project 2012 Drought Plan will be employed to determine the allocation of available agricultural water supplies.

Water User Mitigation Program

The Water User Mitigation Program (WUMP) is a study funded by Reclamation under a cooperative agreement with Klamath Water and Power Agency (KWAPA). KWAPA administers the funding and manages the WUMP. Funds are used to help provide supplemental water supplies, including supplemental groundwater pumping and land idling programs, to offset the impact of a shortage of surface water supplies as a result of hydrologic conditions and competing water demands within the Klamath Basin.

The groundwater portion of the WUMP is based on the need to encourage the most sustainable, efficient pumping in the locations that will have the least impact on groundwater supplies. Implementation of a groundwater pumping program is closely coordinated with Oregon Water Resources Department, California Department of Water Resources, and KWAPA to minimize impacts and ensure that any groundwater pumped is within the local, state, and federal laws and regulations that regulate pumping from a well.

Districts within the Project will coordinate with KWAPA in the assessment of applications that may be submitted to KWAPA by users within their respective districts. Early coordination between the districts and KWAPA will allow the districts to identify and plan for any changes in normal agricultural practices or for groundwater to be transferred through Reclamation facilities.