Oregon
Kate Brown, Governor

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BEFORE THE OREGON WATER RESOURCES DEPARTMENT

IN THE MATTER OF AN INVESTIGATION IN AID OF DISTRIBUTION PURSUANT TO ORS 540.210	)	**DETERMINATION ON STATUS OF RELEASES OF WATER STORED UNDER DETERMINED CLAIM KA 294**
Klamath Irrigation District *Petitioner*,	)	
Bureau of Reclamation *Reservoir Owner*.	)	

To: Staff of the Oregon Water Resources Department

I. BACKGROUND

Pursuant to the order of the Marion County Circuit Court dated October 13, 2020, [1] (*Klamath Irrigation District v. Water Resources Department* (20CV15606)) the Oregon Water Resources Department (Department) must determine whether water that is passing through the Link River Dam is water stored pursuant to Determined Claim KA 294. This Determination provides the status of water released from Upper Klamath Lake (UKL) between July 27, 2021, and August 23, 2021 (Determination #8).

II. REGULATION OF DETERMINED CLAIMS

[1] The October 13, 2020, Order directed the Watermaster to:

"* * * immediately stop the distribution, use and/or release of Stored Water from the UKL [Upper Klamath Lake] without determining that the distribution, use and/or release is for a permitted purpose by users with existing water rights of record or determined claims to use the Stored Water in UKL.

The term "existing water rights of record" has the meaning provided in ORS 540.045(4). The term "determined claim" has the meaning provided in Section 1, chapter 445, Oregon Laws 2015 (which is published in the Oregon Revised Statutes as a note following ORS 539.170).

ORS 540.145 authorizes the Water Resources Commission to adopt rules to "secure the equal and fair distribution of water in accordance with the rights of the various users" which rules "shall apply to all water rights that have been established * * * "[u]nder an order of the Commission or the Water Resources Director in proceedings for the determination of relative rights to the use of water * * *." The rules of the Commission authorizing the distribution of Determined Claims in the Amended and Corrected Findings of Fact and Final Order of Determination (ACFFOD[2]) to secure the equal and fair distribution of water in accordance with the rights of the various users are provided in Oregon Administrative Rules (OAR) Chapter 690 Division 250.

A "reservoir" includes a modified natural lake such as UKL, in which water is collected for beneficial use or purpose.[3] "Legally stored water" means any "water impounded in a reservoir under the provisions of an established right to store water."[4] Use of legally stored water is governed by the water rights that may call on that source of water and is limited to that amount of water that may be put to beneficial use without waste.[5] Any legally stored water that is in excess of the needs of the water rights calling on that stored water is considered "natural flow" which may be diverted according to the next water right in priority or is once again public water subject to appropriation.[6]

III. FINDINGS OF FACT

A. KA 294 and KA 1000

1. The Bureau's Klamath Project (Project) was established in accord with federal legislation and state legislation in 1902 and 1905, respectively. The Bureau built and owns the facilities, known as the works in the Project area. UKL is a modified natural lake and is one of the three reservoirs in the Project which also comprises eight dams, five major pumping plants, 19 canals, and other works.

2. The Bureau is the sole owner of Determined Claim KA 294. KA 294 provisionally authorizes the Bureau to store a maximum annual volume of 486,828 acre-feet (AF) of water in UKL between elevations 4,136 feet and 4,143.3 feet, relative to the Bureau's Klamath Basin Datum.

3. The volume of water stored in UKL above elevation 4,136 is estimated based on an elevation capacity curve, or rating, provided by the Bureau, and using the weighted mean lake level as

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[2] The term "ACFFOD" refers to the Amended and Corrected Findings of Fact and Order of Determination. The ACFFOD is the Director's order of determination regarding claims filed in the Klamath Adjudication and is currently under review in the Klamath County Circuit Court. Pursuant to ORS 539.170 while the ACFFOD is pending before the Circuit Court, the "division of water from the stream involved in the appeal shall be made in accordance with the order of the Director."

[3] OAR 690-250-0010(13); Modifications of the outlet of UKL along with the construction of the Link River Dam around 1916 allow the UKL to be operated and managed as a reservoir between the elevations of 4136 and 4143.3.

[4] OAR 690-250-0010(10).

[5] OAR 690-250-0010(3); *Bennett v. City of Salem*, 192 Or 531, 543 (1951)(An appropriator is never entitled to divert more water than is actually put to beneficial use, reasonable transmission losses excepted); *In re Water Rights of Deschutes River and Tributaries*, 134 Or 623, 644 (1930) ("The right of a prior appropriator is paramount, and the right is limited to such an amount of water as is reasonably necessary for such use and project as may be fairly within contemplation at the time the appropriation is made); *Tudor v. Jaca*, 178 Or 126, 143 (1945) *citing Bolter v. Garrett*, 44 Or 204 (1904) for the proposition that the use of water appropriated "must not only be beneficial to the lands of the appropriator, but it must also be reasonable in relation to the reasonable requirements of subsequent appropriators."

[6] OAR 690-250-0150(4); *Jones v. Warmsprings*, 162 Or 186, 195 (1939) (Water discharged to the natural stream with no intent to recapture it becomes part of the natural stream and is subject to reappropriation).

reported by the United States Geological Survey (USGS). The most recent rating provided by the Bureau indicates the maximum storage volume for KA 294 (486,828 AF) is met when the lake elevation is at 4,142.48 feet.[7]

4. The KID and 20 other Klamath Project Water Users (together the KPWU) and the Bureau are co-owners of Determined Claim KA 1000. KA 1000 provisionally authorizes the diversion of natural flow from UKL and water stored in UKL pursuant to KA 294 for beneficial use by the KPWU both upstream and downstream of the Link River Dam.[8] KA 1000 does not specify what amount of water must be taken from natural flow as opposed to stored water and does not prohibit the taking of water from both sources simultaneously.

5. Pursuant to KA 1000, KID may divert up to 1,150 cubic feet per second (cfs) through the A-Canal for irrigation during the irrigation season March 1 through October 31, with a priority date of May 19, 1905.

6. The Link River Dam is a federally owned dam located on the Link River. The storage and release of water pursuant to KA 294 from UKL is through the Link River Dam.

7. Downstream of the Link River Dam, and pursuant to KA 1000, there are 34 authorized points of diversion from the Klamath River. Many of these diversions have an authorized season of use from March 1 to October 31, and two irrigation districts also maintain an additional season of use from November 1 to February 28. These 34 points of diversion have a total authorized instantaneous maximum diversion rate of 1,572.51 cfs.

B. Determining Water Stored in UKL Pursuant to KA 294

1. Calculating Storage Release

8. The equation the Department is using to calculate stored water releases is:

{eqn 1} Storage Release = Link River Flow – (UKL Inflows - UKL Diversions)

with the storage release in excess of water rights then calculated as:

{eqn 2} Excessive Storage Release = Storage Release – Downstream Storage Diversion $_{KA1000}$

If either equation results in a zero or negative value, then no storage release unrelated to water rights is occurring.

Description of the Variables Used in the Equation:

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[7] The weighted mean lake level of UKL is monitored and reported by the USGS. Four separate lake stage gages are operated and maintained by the USGS, and the data from each gage are entered into an equation to calculate the weighted mean lake elevation. The provisional lake elevation data are available at the website: https://waterdata.usgs.gov/or/nwis/uv/?site_no=11507001&agency_cd=USGS

[8] KA 1000 erroneously refers to KA 293, but this is a typographical error.

Link River flow data are available from a USGS stream gage (USGS 11507500) operated on the river. The Keno power canal began diverting flow on 04/28/2021. The diversion starts at Link River Dam and the diverted water enters the Link River below the Link River stream gage. The Keno power canal diversion was added to the Link River flow to get the total outflow to the Klamath River from Upper Klamath Lake.

UKL inflows represent the total amount of *natural flow* coming into the lake from surface water, groundwater, and precipitation. Some of these inflows are measured directly (e.g., Wood and Williamson River stream gages) while others must be estimated (e.g., groundwater inflows) as explained below.

UKL Diversions: The largest UKL Diversion, the A-Canal, is monitored by a gage accessible at this link:
https://www.usbr.gov/pn-bin/wyreport.pl?site=acho&parameter=qj&head=yes
There are 12 authorized points of diversion from UKL above the Link River Dam included in KA 1000. Additionally, there are ten state certificated water rights and eight non-KA 1000 determined claims each exceeding one cfs for the use of natural flow from UKL. These 18 non-KA 1000 water rights and determined claims have a combined total of 23 authorized points of diversion from UKL. Because many of these points of diversion do not have measuring devices installed, their diversion rates are estimated using the authorized diversion rate on the determined claim or water right, estimations provided by the water user, or measured by Watermaster staff.[9]

Downstream Storage Diversions $_{KA1000}$: Gages monitor three of the KA 1000 diversions below UKL; the Lost River Diversion Channel (LRDC), the North Canal, and the Ady Canal. There are 34 authorized points of diversion identified under the KA 1000 below the Link River Dam and approximately 61 other diversions from the Klamath River downstream of the Link River Dam not associated with KA 1000. The ungaged diversions and individual pump diversions are currently estimated as described below (see footnote 9).

The estimated ungaged diversions between Link River Dam and Keno Dam, which are not part of equation 2, were updated on May 17, 2021, based on the water balance between those two sites from the gages monitoring inflows and outflows in the reach. The large number of diversions, inability to access these diversions, and lack of measuring devices made direct measurements of the diversion amounts impractical. This reach showed a neutral water balance (no unaccounted-for difference in flow between Link River Dam and Keno Dam) until the irrigation season started, at which time a negative water balance was calculated similar in magnitude to the theoretical diversion rate of the water rights in the reach. A 7-day moving average of the daily water balance is used to estimate the daily diversions to account for gaging uncertainty, travel time for water between the beginning and end of the reach, and ability of the channel to temporarily store and release water.

Both gaged and ungaged diversions below Link River Dam have been taking natural flow as no storage releases have occurred and the water rights allow for these users to divert natural flow.

[9] Efforts are underway to develop a more sophisticated mechanism of estimating these numerous smaller users that divert water directly from UKL, including inventorying each POD and working with the landowner to install measuring devices.

2. Calculating Inflows

9. To manage the water rights and determined claims and distinguish between natural flow and stored water, the Department must quantify gross inflows to UKL. Table 1 contains measured inflows (all reported in cfs) between July 27, 2021, and August 23, 2021.

10. Stream tributaries constitute one component of inflow that contributes to UKL. Tributary inflows include the Williamson River, Wood River, Sevenmile Creek, Crystal Creek, Thomason Creek, and Fourmile Creek. These streams and their tributaries are listed as sources on KA 294.[10]

11. Groundwater contributions and direct precipitation are also estimated inflow contributions that contribute to UKL. Table 1 includes estimates of groundwater inflow[11] and direct precipitation into the UKL.[12]

12. Ungaged tributary inflows are also estimated inflow contributions to UKL. A constant ungaged inflow estimate for the ungaged tributaries (approximately 60 cfs) was implemented for the daily water distribution determination based on the average inflows from these tributaries observed in a USGS water budget study of the lake (Hubbard, 1970). At the issuance of the present Determination, the ungaged inflow estimate was updated (166 cfs) based on the lake water balance reconciliation process as described in section 3.0 and equation 2 and applied retroactively backwards to the previous Determination. By using this approach, large swings in the daily gross inflow estimate are avoided, thereby reducing the need for large daily (or sub-daily) changes in water management unrelated to changes in actual hydrologic conditions.

3. Calculating Inflows in Relation to Outflows

13. The total UKL inflow estimate is reconciled against the change in UKL contents and the outflows based on a water balance of the lake performed periodically, expressed as the following equation:

{eqn 2} Reconciled UKL Inflows = Change in UKL Contents + UKL outflows

Adjustments to the estimated ungaged tributary inflow are made based on this reconciliation to ensure the UKL water balance is satisfied (Table 2) as previously described in section two.

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[10] Gaged inflow streams include the Williamson and Wood Rivers, and Sevenmile Creek. On November 5, 2020, the Department issued a FINAL ORDER MEASURING DEVICES to the Bureau requiring installation of measuring devices on Sevenmile Creek, Thomason Creek, Fourmile Creek, and Crystal Creek. On December 30, 2020, the Bureau requested reconsideration of this Order, and on February 23, 2021, the Department notified the Bureau that it is reconsidering its Order. At the time of the issuance of this Order, the Department is working with the Bureau to evaluate the viability of installing gages on Crystal Creek and Fourmile Creek.

[11] Groundwater contributions are based on USGS estimates and adjusted for current hydro-climate conditions.

[12] Precipitation is scaled from the average daily precipitation recorded at the two USBR AgriMet sites KFLO and AGKO located north and south of the lake. The scaling is based on the PRISM precipitation data set ratio of the lake areal average compared to the two AgriMet sites and results in an approximately 14% increase from the recorded average values at the AgriMet sites.

Upper Klamath Lake Inflows (CFS)							
DATE	USGS Gage 11504115 Wood River	USGS Gage 11504290 Sevenmile at Dike Rd	USGS Gage 11502500 Williamson	GW Inflow Estimate	Fourmile, Crystal Creek & Other Ungaged Tributaries	Precipitation	Total Inflow to UKL
7/27/2021	347	0	439	224	166	1815	2990
7/28/2021	350	1	451	224	166	67	1260
7/29/2021	346	0	460	224	166	550	1750
7/30/2021	366	0	479	224	166	0	1240
7/31/2021	356	1	482	224	166	583	1810
8/1/2021	351	0	466	224	166	0	1210
8/2/2021	345	0	449	224	166	0	1180
8/3/2021	337	0	439	224	166	0	1170
8/4/2021	330	0	438	224	166	0	1160
8/5/2021	323	0	444	224	166	0	1160
8/6/2021	320	0	446	224	166	0	1160
8/7/2021	307	0	443	224	166	0	1140
8/8/2021	304	0	439	224	166	0	1130
8/9/2021	299	0	441	224	166	0	1130
8/10/2021	291	0	446	224	166	0	1130
8/11/2021	283	0	449	224	166	0	1120
8/12/2021	282	0	438	224	166	0	1110
8/13/2021	273	0	436	224	166	0	1100
8/14/2021	274	0	441	224	166	0	1110
8/15/2021	272	2	440	224	166	0	1100
8/16/2021	268	0	436	224	166	0	1090
8/17/2021	258	4	433	224	166	0	1090
8/18/2021	267	5	441	224	166	0	1100
8/19/2021	263	6	450	224	166	0	1110
8/20/2021	266	4	458	224	166	0	1120
8/21/2021	272	10	452	224	166	0	1120
8/22/2021	272	9	446	224	166	0	1120
8/23/2021	274	7	449	224	166	0	1120

Table 1: Measured Inflows into UKL in Cubic Feet per Second. ***Note: OWRD gages were located and installed to monitor instream determined claims.***

<u>Description of the Variables Used in the Equation</u>:

The **change in UKL contents** is based on contents derived from the USBR elevation capacity table using the average UKL elevation from four USGS lake level gages.

UKL outflows consist of lake evaporation, outflows through the Link River and A-Canal, and 23 other authorized diversions greater than one cfs directly from the UKL. Lake evaporation is currently estimated using weather station data from two nearby AgriMet sites.[13] Flow through the Link River and A–Canal are measured with gages. The other diversions from the UKL are currently estimated.

Water Balance Summary Table

Start Date (12:01 am)		7/27/2021
End Date (11:59 pm)		8/23/2021
Number of Days in Reporting Period		28
	AC-FT	*Equivalent CFS*
Change in Contents (+ = increase)	-25,637	*-462*
Gaged Inflows	41,804	*753*
Ungaged Inflows [1]	9,227	*166*
Groundwater Inflow[2]	12,440	*224*
Precipitation Inflow	5,978	*108*
Total Inflow	69,449	*1,250*
Evaporation	-42,029	*-757*
Link River Outflow	-48,030	*-865*
A Canal Diversions	0	*0*
Adjacent UKL Land Diversions	-5,027	*-91*
Total Outflow	-95,086	*-1,712*
UKL Water Balance	0	0
[1] Adjusted to close water balance		
[2] Updated from Hubbard using Spring Cr&Fall R as hydro-climate index		

Table 2: Water Balance Table in Reconciliation Process.

An estimate of lake evaporation between issued Determinations is required to determine the lake water balance, as shown in Table 2. Estimates of daily lake evaporation are also shown in the distribution Table 3 as one component of the daily lake outflows. This daily UKL evaporative estimate from the lake (ac-ft) was modified to be based on the 14-day moving average of the daily rate. The daily rate is based on weather data recorded at two nearby USBR AgriMet sites (KFLO and AGKO).

[13] The Department estimates evaporation by a Penman-Monteith equation that uses weather data from two USBR AgriMet weather stations just north and south of UKL. Evaporation estimates are adjusted for local lake conditions based on comparisons of the Penman-Montieth derived estimates with concurrent evaporation data on UKL from a study completed by USBR in 2015.

14. Table 3 represents the Department's calculations of inflows into UKL versus lake outflows for the time period between July 27, 2021, and August 23, 2021.

DATE	Lake Elevations (FT) and Storage (AC-FT)				Lake Inflows (CFS)	Lake Outflows (CFS)					Flow Distribution Calculation (cfs)						
	UKL Lake Elevation (USBRKB Datum)	UKL Storage	Stored since Jan 1, 2021	KLA 294 Remaining to Store (Max 486,828 AF)	Total Inflows into UKL	Evap	Link River + Keno Canal Flow	A- Canal Diversion	KA 1000 Diversions from Adjacent UKL Lands	Non KA 1000 Diversions from Adjacent UKL Lands	Live Flow Available to Pass Link R Dam	Stored Water Released from Link R Dam	Gaged KA 1000 below LRD	Ungaged KA 1000 below LRD	Non KA 1000 Diversions below LRD	KA 1000 Storage Deliveries blw LRD	Stored Release in Excess of WRs
7/27/2021	4139.20	217,007	197,789	66,423	2990	842	779	0	11.9	88.9	2889	0	102	0	50	0	0
7/28/2021	4139.22	218,398	198,493	65,718	1260	824	804	0	11.9	88.9	1159	0	78	0	38	0	0
7/29/2021	4139.21	217,703	200,061	64,151	1750	817	863	0	11.9	84.6	1653	0	86	0	37	0	0
7/30/2021	4139.20	217,007	200,427	63,785	1240	787	959	0	11.9	84.6	1143	0	77	0	44	0	0
7/31/2021	4139.19	216,311	201,913	62,298	1810	759	964	0	11.9	84.6	1713	0	77	0	62	0	0
8/1/2021	4139.19	216,311	202,523	61,688	1210	748	806	0	11.9	84.6	1113	0	94	0	65	0	0
8/2/2021	4139.18	215,615	203,149	61,063	1180	746	768	0	11.9	84.6	1083	0	113	0	56	0	0
8/3/2021	4139.17	214,919	203,695	60,516	1170	730	798	0	11.9	84.6	1073	0	114	0	53	0	0
8/4/2021	4139.15	213,528	204,154	60,057	1160	711	832	0	11.9	84.6	1063	0	111	0	56	0	0
8/5/2021	4139.13	212,138	204,533	59,678	1160	689	876	0	11.9	81.0	1067	0	104	0	50	0	0
8/6/2021	4139.11	210,749	204,785	59,426	1160	672	940	0	11.9	81.0	1067	0	109	0	30	0	0
8/7/2021	4139.10	210,054	205,089	59,123	1140	672	894	0	11.9	81.0	1047	0	95	0	16	0	0
8/8/2021	4139.09	209,359	205,438	58,774	1130	676	861	0	11.9	81.0	1037	0	85	0	27	0	0
8/9/2021	4139.07	207,969	205,791	58,420	1130	683	859	0	11.9	81.0	1037	0	83	0	44	0	0
8/10/2021	4139.05	206,584	206,144	58,067	1130	734	859	0	11.9	81.0	1037	0	114	0	51	0	0
8/11/2021	4139.03	205,204	206,472	57,740	1120	749	862	0	11.9	81.0	1027	0	150	0	48	0	0
8/12/2021	4139.02	204,513	206,698	57,514	1110	749	903	0	11.9	81.0	1017	0	158	0	49	0	0
8/13/2021	4139.01	203,823	206,714	57,498	1100	769	1002	0	11.9	78.1	1010	0	137	0	71	0	0
8/14/2021	4138.99	202,442	206,743	57,468	1110	781	1005	0	11.9	78.1	1020	0	105	0	90	0	0
8/15/2021	4138.97	201,061	206,815	57,397	1100	783	974	0	11.9	78.1	1010	0	91	0	103	0	0
8/16/2021	4138.97	201,061	206,979	57,232	1090	788	917	0	11.9	78.1	1000	0	93	0	109	0	0
8/17/2021	4138.92	197,601	207,154	57,058	1090	794	912	0	11.9	78.1	1000	0	78	0	121	0	0
8/18/2021	4138.91	196,908	207,596	56,616	1100	796	799	0	0.0	78.1	1022	0	51	0	129	0	0
8/19/2021	4138.88	194,830	208,190	56,022	1110	798	733	0	0.0	77.5	1033	0	72	0	122	0	0
8/20/2021	4138.87	194,137	208,730	55,481	1120	796	770	0	0.0	77.5	1043	0	100	0	98	0	0
8/21/2021	4138.86	193,445	209,257	54,954	1120	777	777	0	0.0	77.5	1043	0	88	0	73	0	0
8/22/2021	4138.84	192,061	209,718	54,493	1120	765	810	0	0.0	77.5	1043	0	90	0	55	0	0
8/23/2021	4138.83	191,370	210,028	54,184	1120	753	889	0	0.0	75.1	1045	0	82	0	58	0	0

Table 3: Daily Calculations of Inflows Versus Outflows for UKL.

15. Based on the daily calculation of inflows and outflows, no storage releases occurred between July 27, 2021, and August 23, 2021.

IV. ULTIMATE FINDINGS OF FACT

1. As of the date of this Determination, water passing through the Link River Dam constitutes natural flow as opposed to water legally stored pursuant to KA 294.

V. CONCLUSION

1. During the period of July 27, 2021, through August 23, 2021, the Bureau has been in compliance with the Order.

VI. DETERMINATION

During the period of July 27, 2021, through August 23, 2021, the water passing through the Link River Dam was natural flow. The Department and the Watermaster, District 17, will continue to monitor conditions in the UKL throughout 2021 and will issue a status determination on a monthly basis or as conditions change.

DATED this 30th day of August, 2021

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DANETTE WATSON,
Watermaster, District 17
Oregon Water Resources Department