Mono Basin Runoff Year 2023-24
Annual Operations Plan

Licenses 10191 and 10192
Order WR 2021-0086 EXEC – October 1, 2021

May 2023

Los Angeles Department of Water and Power

Table of Contents **Page No.**

I. Abbreviations, Definitions, Memberships Table

amsl	above mean sea level
AF	acre-feet
AFA	acre-feet per annum
AOP	Annual Operations Plan
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
cfs	cubic feet per second
DSOD	California Department of Water Resources, Division of Safety of Dams
Deputy Director	Deputy Director for the Division of Water Rights
Division	Division of Water Rights
GLOMP	Grant Lake Operations and Management Plan
GLR	Grant Lake Reservoir
Grant Outlet	Grant Lake Outlet
LADWP	Los Angeles Department of Water and Power (Licensee)
MAT	Mono Basin Monitoring Administration Team
MBOP	Mono Basin Operations Plan
MGORD	Mono Gate One Return Ditch
Monitoring Directors	Stream Monitoring Team, Limnology Director, and Waterfowl Director
Parties	California Department of Fish and Wildlife, Mono Lake Committee, and California Trout
RCTE	riffle crest thalweg elevation
RY	runoff year
SCE	Southern California Edison
SEFs	Stream Ecosystem Flows
SMT	Stream Monitoring Team
SMR	Storage Management Release
State Water Board	California State Water Resources Control Board
TUCP	Temporary Urgency Change Petition
USFS	United States Forest Service
USGS	United States Geological Service
Teams and Directors as of Current Runoff Year:	
MAT	The Parties and the Licensee
SMT	Bill Trush, Ross Taylor
Waterfowl Director	Debbie House
Limnology Director	Dr. John Melack

II. Introduction

The purpose of the AOP is to describe how operations will work for the current year-type to accomplish exports and stream releases in accordance with the water license. The AOP will provide specific information about the flow schedule, export, and facility operations for the year ahead. The AOP will also review the prior year's plan and compare it to actual runoff and operations.

The timeline for AOP development and submittal is as follows:

- By March 31: convene a meeting to prepare for developing the AOP. Meeting attendees to include the SMT, the Waterfowl Director, the Limnology Director, and the Parties.
- By April 15: distribute a draft AOP to the Waterfowl Director, SMT, Limnology Director, and the Parties.
- By April 24: receive written comments from Parties, SMT, and Directors on the draft AOP.
- By May 5: convene a meeting to resolve any unresolved issues.
- By May 15: submit AOP to the SWRCB Deputy Director for a 30-day review, modification, and approval if necessary. No Division approval will be necessary if the terms of the AOP are entirely within the parameters of the MBOP then in effect.

The draft MBOP submitted in October 2022 is not in effect at the time of this writing.

III. Summary of Mono Basin RY 2022-23 Operations

For RY 2022-23, Mono Basin was operated under the amended licenses with planned operations described in the 2022 AOP and summarized below.

RY	2022-23
Year Type	Dry
April 1 Mono Lake Elev (USGS)	6379.92 ft
April 1 GLR Elev. & Storage	7,089.5 ft & 11,614 AF
Rush Creek SEF Table	1G
Lee Vining SEF Tables	2B (with hourly changes), 2C
Projected Five Siphons Operation	Yes
Projected West Portal (AF)	4,500
Projected GLR Spill (AF)	0
SMT Adaptive Management	No

Mono Basin operations followed the plan described in the 2022 AOP, with some deviations discussed below. No water diversions occurred on Walker or Parker Creeks. The appropriate SEF tables were utilized for Rush and Lee Vining Creeks, Five Siphons was in operation during summer months due to GLR storage, exports were below 4,500

AF, and GLR did not spill. DSOD valve cycling took place in Summer 2022, and SMT fish surveys took place in Fall 2022. The surveys did not require flow reductions due to the flowrates in creeks at that time.

The April 1, 2022 runoff forecast was 56,200 AF of runoff, with a reasonable range of 43,000 – 69,000 AF. The actual runoff was approximately 64,000 AF; please see the appropriate quarterly reports for final flow data for RY2022-23. The final data shown in the quarterly reports will show the deviations that occurred, as significant winter storms impacted road conditions, measurement equipment, and safe access to various Mono Basin locations.

Lee Vining Creek operations were based on upstream flows according to Table 2B and adjusted on an hourly basis. Diversions may have occurred throughout the day when flows exceeded appropriate Table 2B values and stopped when flows decreased below those values. This hourly-based method of operation maintained compliance with the SEF requirements, but may not be apparent when viewing average daily flow data. The SMT appreciates this method of operation on Lee Vining Creek and prefers it over daily-based operations.

As an example, consider a 24-hour day of operations under Table 2B where langemann gate flow changes are instantaneous on the hour. If for the first 6 hours of the day Lee Vining Above flows are 42 cfs, diversions will be 12 cfs and flows down Lee Vining Below will be 30 cfs. If for the next 18 hours of the day Lee Vining Above flows are 22 cfs, then diversions will be 0 cfs and flows down Lee Vining Below will 22 cfs. The daily averages for all three stations will be as follows:

Lee Vining Above:

$$Avg\ Flow = 42\ cfs * \frac{6\ hrs}{24\ hrs} + 22\ cfs * \frac{18\ hrs}{24\ hrs} = 27\ cfs$$

Lee Vining Conduit:

$$Avg\ Flow = 12\ cfs * \frac{6\ hrs}{24\ hrs} + 0\ cfs * \frac{18\ hrs}{24\ hrs} = 3\ cfs$$

Lee Vining Below:

$$Avg\ Flow = 30\ cfs * \frac{6\ hrs}{24\ hrs} + 22\ cfs * \frac{18\ hrs}{24\ hrs} = 24\ cfs$$

IV. Proposed Mono Basin Operations Plan for RY 2023-24

A. Forecast for RY 2023-24

The runoff forecast for RY 2023-24 is 227% of normal, which is classified as a “Extreme Wet” year. The Mono Basin’s April 1 forecast for RY 2023-24 for April to March period is 268,100 AF (see Attachments), with a reasonable range of 252,000 to 285,000.

B. Adaptive Management

LADWP has received adaptive management comments for RY 2023-24, which are shown further below. The SMT can provide adaptive management recommendations for flow requirements (such as ramping rates, durations, timing, and/or start and end dates) for SEF Tables 1 and 2, per amended license 11.a.1, 20.f.3 and 20.f.4. The SMT will produce an Annual Monitoring Report to document monitoring observations and discuss possible adaptive management recommendations; the SMT may also include adaptive management recommendations in comments on the draft AOP.

Real-time adaptive management in response to unforeseen circumstances may also be proposed by the SMT, per amended license 3.7 and 20.f. Unforeseen circumstances are extreme events (e.g. structural failures or natural disasters) that are not expected variations of regular operations. Such recommendations will be made by written notice to the Division, and they shall be developed in consultation with the Licensee and Parties.

Adaptive management recommendations are subject to review, modification, and approval by the Deputy Director.

SMT adaptive management comments received for RY2023-24:

1. In regard to the trout fisheries, avoiding large spills from GLR in the late fall and winter months is preferrable, to avoid bed mobilization during and after spawning season…the 170 cfs threshold (cited in the draft AOP) is most likely where fines start to mobilize, not the bed proper. Releases as high as 200 cfs are probably OK, even with accretions from Parker and Walker creeks adding to this release in Rush Creek below the Narrows.
2. If feasible, plan to have flow rates compatible with fishery sampling October 3 – 10.
3. Two peak streamflow thresholds can be considered in managing/releasing Extreme Wet hydrographs: (1) LADWP cites (in page 7) a streamflow threshold of 170 cfs for initial bedload movement; the Synthesis Report cites 200 cfs to 250 cfs for Lower Rush Creek and (2) bankfull discharge of 300 cfs to 350 cfs that can scour bars and begin to mobilize rifflebeds.

C. Planned Operations

Year Type	Extreme Wet
April 1 Mono Lake Elev (USGS)	6379.99
April 1 GLR Elev. & Storage	7,104.8 ft & 22,694 AF
Rush Creek SEF Table	1A (with SMRs)
Lee Vining SEF Tables	2A, 2C (see below re: curtailment)
Projected Five Siphons Operation	No
Projected West Portal (AF)	4,500
Projected GLR Spill (AF)	Appx. 25,000 AF (see discussion below)
SMT Adaptive Management	Yes

Planned operations for RY 2023-24 are summarized in the above table, and will be based on the Mono Basin runoff forecast, SEF tables, Mono Lake elevation, SMT adaptive management comments, and any events that may arise during the course of the year. Events such as stream monitoring may require flow reductions for safety purposes during the monitoring/work period. RY operations were modeled in eSTREAM using April 1, 2023 elevations for GLR and Mono Lake.

The current staff gage in use at Mono Lake is “1S” with a zero elevation of 6377.79 feet (USGS reference). Depending on changing lake elevations, staff gage “1R” may be used during this RY. “1R” has a zero elevation of 6380.00 feet (USGS reference). If other staff gages are required during the year, LADWP will survey those as necessary.

Due to the record high snowpack and coming runoff with minimized operational flexibility, LADWP will be filing a one-year extension request with the State Water Board regarding construction of the GLR spillway (Amended Licenses Section 13). If the extension is not approved, SMRs will be released in fall and winter in order to get GLR elevation to near 7,101 feet (about 19,700 AF) by early Spring 2024. See below for further discussion.

The operational plan presented in this 2023 AOP was modeled using the best-available representative historical inflow data (2017 runoff year at 194% of normal). As 2023 is the highest year on record, there is no directly comparable year available to model in eSTREAM. The runoff forecast for April to September gives a total of about 218,000 AF for Rush and Lee Vining Creeks. The 2017 numbers used in eSTREAM total to about 178,000 AF, or a 40,000 AF difference. The reader is advised to be aware of this when viewing 2023 AOP attachments. If the actual runoff matches closer to the reasonable maximum, an even larger difference between 2023 and 2017 would take place. Higher flows down Lee Vining Creek could lead to less GLR inflows, however, per Table 2A flow schedules, diversions will be cut off when Lee Vining Creek flows exceed 250 cfs.

For spring and summer operations, to better ensure peak SEF releases can be met, the 2023 AOP does not have SMRs before the Snowmelt Peak. SMRs will be released after the Snowmelt Peak; and if GLR is still spilling, flows down Return Ditch will be in the 220 cfs range with water also flowing down the GLR Spillway. When GLR stops spilling, Return Ditch flows will maintain 220 cfs and be ramped down to SEF values when GLR reaches 44,000 AF. SMRs will be implemented again if GLR reaches 46,000 AF. In addition, after the Snowmelt Peak, diversions to LV Conduit will be curtailed, with the exception of early October for fish survey work.

SMRs in fall and winter are not planned, pending actual GLR storages as of October 1 and the extension request. The fall and winter forecasted runoff for Rush Creek is approximately 11,000 AF, while Table 1A SEFs total approximately 9,800 AF and projected West Portal flows are 4,500 AF. This means GLR will likely lose storage and elevation over the winter months.

In comments on the Draft AOP, the SMT stated flows in the 170-200 cfs range are acceptable for fall and winter months. SMRs will be released if GLR storage is above 46,000 AF during fall and winter months, to avoid winter spills, and SMRs will stop when GLR reaches 44,000 AF, unless GLR elevation is being reduced for spillway construction purposes. Target SMRs will be near values discussed in the draft AOP and Chapter 8.3.2 of the draft MBOP (shown below) to avoid GLR spills. If lowering GLR for construction purposes, SMRs will be higher values, but will be less than the 170-200 cfs discussed by the SMT in their draft AOP comments. Due to fish survey work, any SMRs would be stopped in early October during the survey period.

Month	MBOP # cfs	SEF # cfs	cfs increase	Possible AF/period	Higher release	cfs increase	Possible AF/period
October	70	27	43	2,600	127	100	6,100
November	35	27	8	500	35	8	500
December	35	27	8	500	35	8	500
Jan - Mar	90	27	63	11,400	127	100	18,000
			Total =	15,000		Total =	25,100

Planned exports will be 4,500 AF or less. Modeled export flow in eSTREAM was approximately 20 cfs from November through February; actual export may vary from the model run but will be at a steady rate starting after summer, likely to be 25 cfs +/- 10 cfs.

Rush Creek and Lee Vining Creek and Conduit daily flows depend on both hydrology and SCE operations, and therefore may differ from eSTREAM model flows.

SEF peak timing for Rush Creek will follow the outline described in Chapter 4.2.4 of the draft MBOP, with changes due to Gem Lake snow pillow not functioning.

Starting June 8, which is 15 days before the snowmelt flood window in Table 1A, the following three criteria will be monitored:

- Daytime highs at or above 80 degrees F for three consecutive days at Cain Ranch Weather Yard (#5116);
- Nighttime lows consistently above 32 degrees F; and
- A 10-day forecast for June Lake showing likely temperatures at or higher than those specified above.

Once all criteria items are met, a peak should occur within 14 days of the first day (of the three consecutive days) with a daytime high of 80 degrees F at Cain Ranch Weather Yard (#5116). The ramp up period for the SEF peak flow will begin the next day after these conditions are met if the date is within the appropriate snowmelt peak starting ramp up dates found in Amended Licenses Tables 1A, 1B, or 1C (depending on RYT). If the date is prior to the first listed start date allowable for ramp up, then the ramp up will begin on the first possible allowable date of the snowmelt peak period.

If all three criteria have not been reached by the end of the snowmelt peak ramp start date window, then ramping will begin on the last date allowed in the window.

Each year the GLR outlet valve must be cycled per DSOD requirements. The planned cycling period will depend on the particular SEF tables for Rush Creek; in general, the cycling takes place during periods of higher SEF flows in the summer months. This year planned cycling will be after fish survey work in early October. The downstream effects will include a reduction and then an increase in flows, followed by a return to the SEF flow rate at the completion of the cycling exercise. The cycling procedure occurs over a two or three hour period and the reduction and increase in flows is attenuated downstream due to the relatively short duration of flow variation. SEF flow values will likely be met during the cycling exercise based on past experience.

No sediment bypass operations are planned for this year at Walker and Parker creeks.

Operations are subject to change due to actual hydrology and SCE operations during the upcoming RY. This AOP is based on projections from eSTREAM modeling and forecasts with the understanding that actual creek flows and runoff may vary substantially due to weather patterns, other agency operations, and/or other factors. LADWP will notify the Parties of adjustments in operations via electronic communication within 3 days if changes are in conflict with amended license requirements. Otherwise, monthly and quarterly reports will document adjustments in operations.

ATTACHMENTS

2023 EASTERN SIERRA RUNOFF FORECAST

April 1, 2023

APRIL THROUGH SEPTEMBER RUNOFF

	MOST PROBABLE VALUE (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1971 - 2020) (Acre-feet)
MONO BASIN:	**241,400**	**241%**	253%	228%	100,307
OWENS RIVER BASIN:	**786,700**	**263%**	276%	250%	298,780

APRIL THROUGH MARCH RUNOFF

	MOST PROBABLE VALUE (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1971 - 2020) (Acre-feet)
MONO BASIN:	**268,100**	**227%**	241%	213%	118,156
OWENS RIVER BASIN:	**955,600**	**235%**	248%	222%	406,310

MOST PROBABLE - That runoff which is expected if median precipitation occurs after the forecast date.

REASONABLE MAXIMUM - That runoff which is expected to occur if precipitation subsequent to the forecast is equal to the amount which is exceeded on the average once in 10 years.

REASONABLE MINIMUM - That runoff which is expected to occur if precipitation subsequent to the forecast is equal to the amount which is exceeded on the average 9 out of 10 years.

TABLE 1A: RUSH CREEK STREAM ECOSYSTEM FLOWS FOR EXTREME-WET YEARS

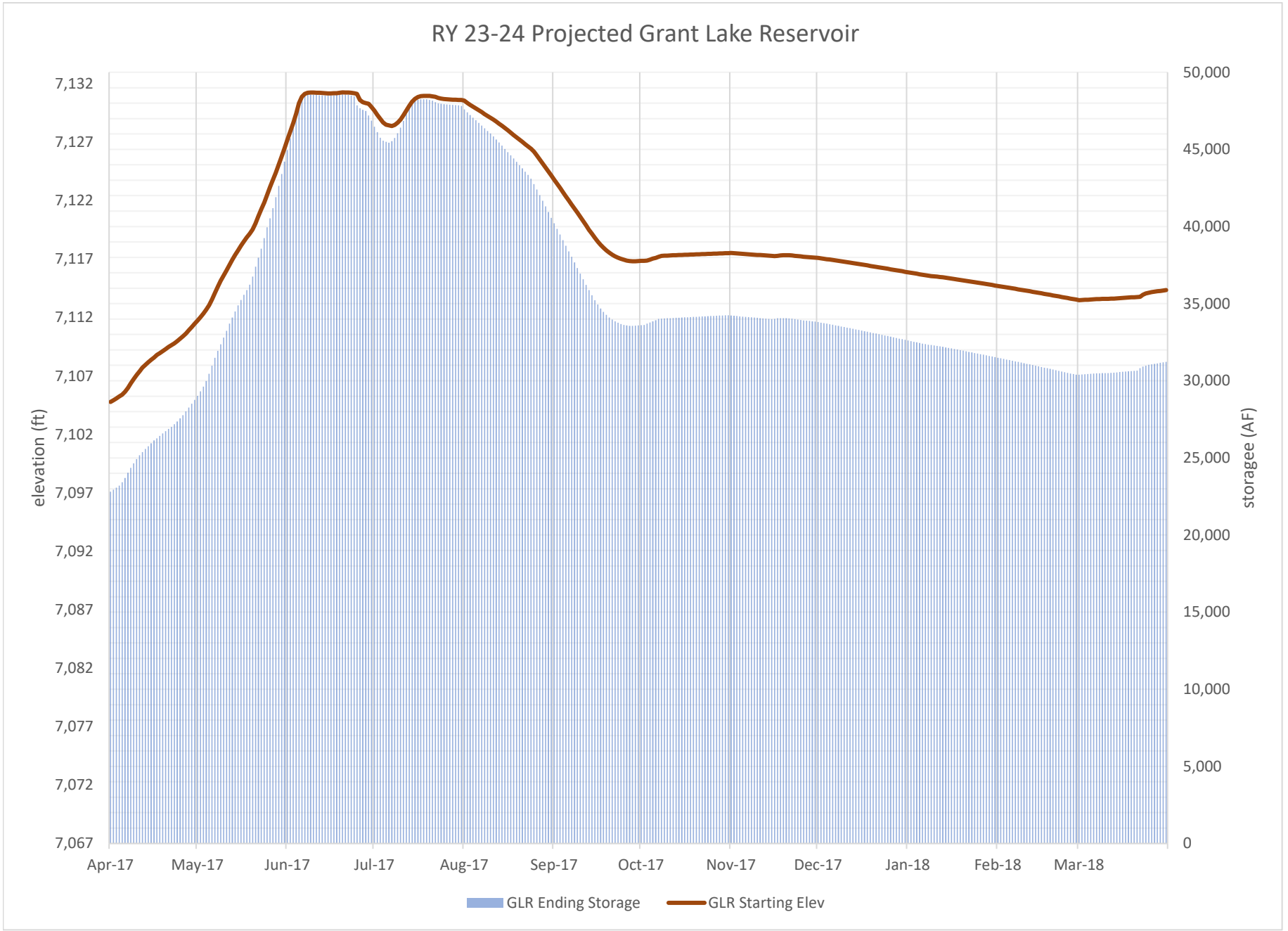
Hydrograph Component	Timing	Flow Requirement	Ramping Rate
Spring Baseflow	April 1 – April 30	40 cfs	Maximum: 10% or 10 cfs*
Spring Ascension	May 1 – May 15	40 cfs ascending to 80 cfs	Target: 5% Maximum: 25%
Spring Bench	May 16 – June 11	80 cfs	Maximum: 20%
Snowmelt Ascension	June 12 – June 22	80 cfs ascending to 220 cfs	Target: 10% Maximum: 20%
Snowmelt Bench	June 23 – August 10	220 cfs	Maximum Ascending: 20% Maximum Descending: 10% or 10 cfs*
Snowmelt Flood and Snowmelt Peak	Starting between June 23 and July 19 with the 5-day peak between June 29 and July 29	220 cfs ascending to 750 cfs, 750 cfs for 5 days, 750 cfs descending to 220 cfs	Target Ascending: 20% Maximum Ascending: 40% Maximum Descending: 10% or 10 cfs*
Medium Recession (Node)	August 11 – August 25	220 cfs descending to 87 cfs	Target: 6% Maximum: 10% or 10 cfs*
Slow Recession	August 26 – September 30	87 cfs descending to 30 cfs	Target: 3% Maximum: 10% or 10 cfs*
Fall and Winter Baseflow	October 1 – March 31	27 cfs target (25 cfs minimum and 29 cfs maximum)	Maximum: 10% or 10 cfs*
			* whichever is greater

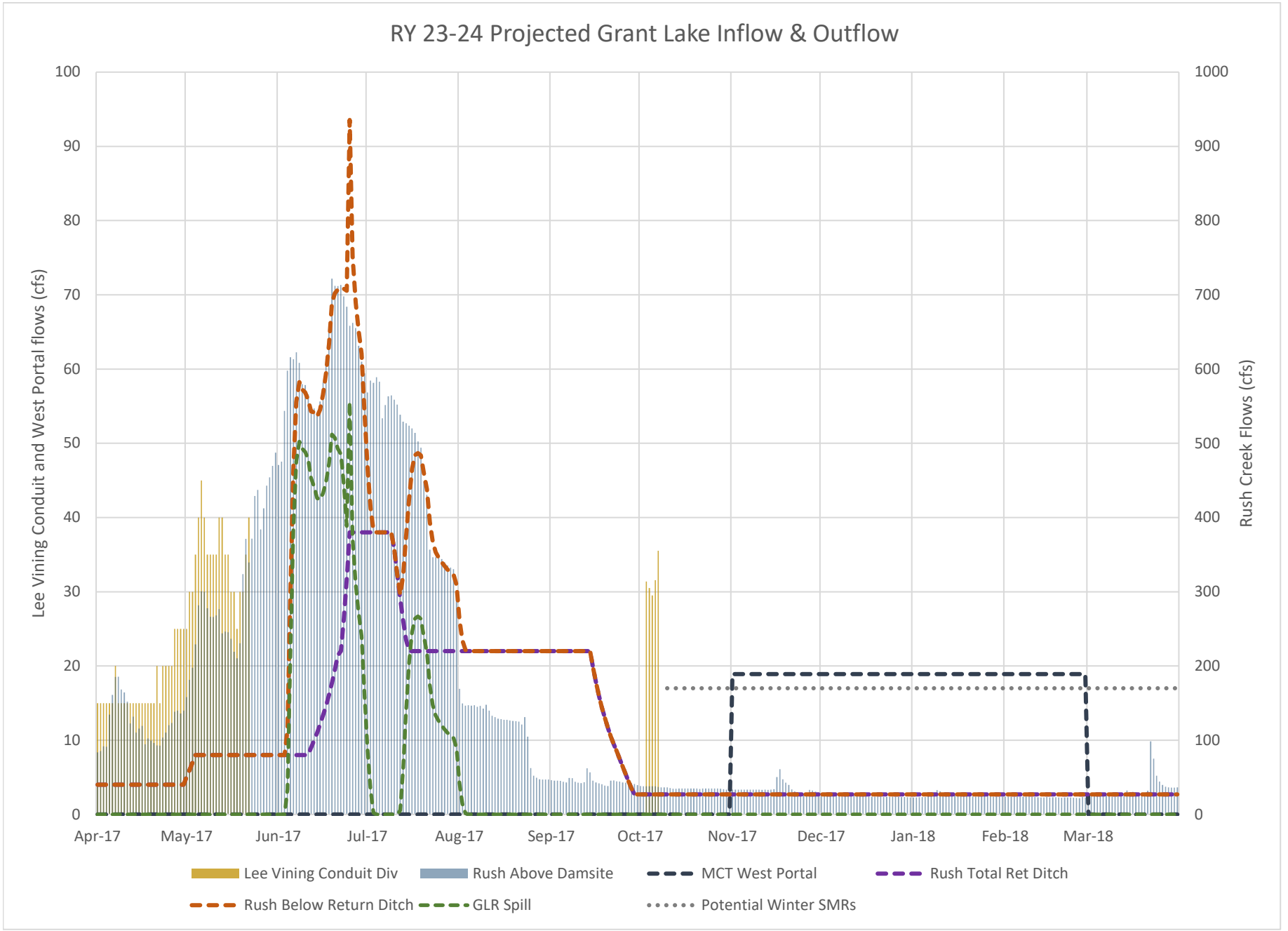
TABLE 2A LEE VINING CREEK STREAM ECOSYSTEM FLOWS

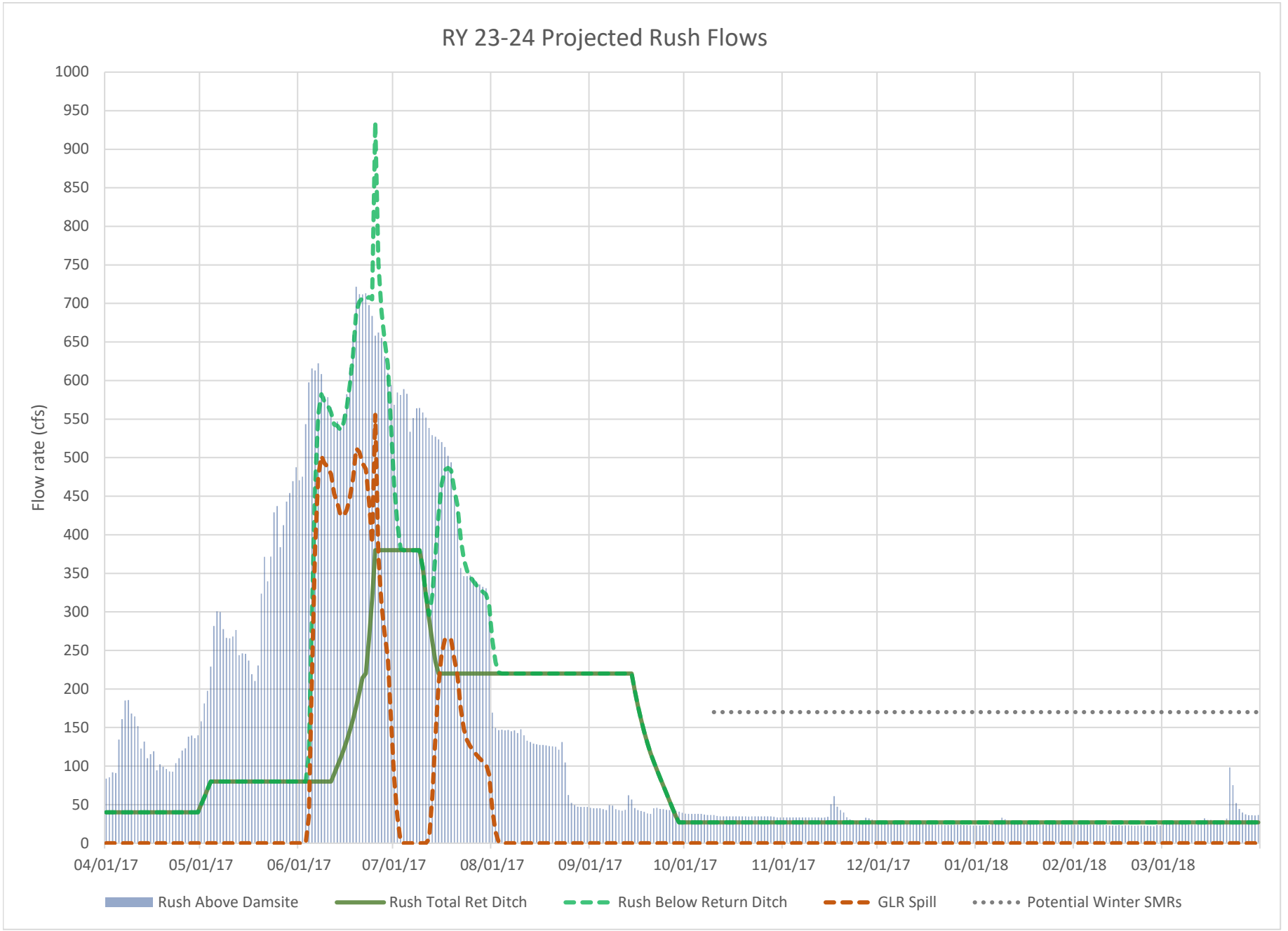
Timing: April 1 – September 30						Year-type: Extreme/Wet, Wet, Wet/Normal, Normal, Dry/Normal II				
Maximum ramping at the beginning and end of this period is 20%.										
Inflow	**Flow Requirement**									
30 cfs or less	Licensee shall bypass inflow.									
31 – 250 cfs	Licensee shall bypass flow in the amount corresponding to inflow which is displayed as blocks of 10 cfs (left-hand vertical column) and 1 cfs increments within such blocks (top horizontal row).									
	0	1	2	3	4	5	6	7	8	9
30		30	30	30	30	30	31	32	33	34
40	30	31	32	33	34	35	36	37	38	39
50	35	36	37	38	39	40	41	42	43	44
60	45	46	47	48	49	50	51	52	53	54
70	55	56	57	58	59	60	61	62	63	64
80	60	61	62	63	64	65	66	67	68	69
90	70	71	72	73	74	75	76	77	78	79
100	75	76	77	78	79	80	81	82	83	84
110	85	86	87	88	89	90	91	92	93	94
120	95	96	97	98	99	100	101	102	103	104
130	100	101	102	103	104	105	106	107	108	109
140	110	111	112	113	114	115	116	117	118	119
150	120	121	122	123	124	125	126	127	128	129
160	130	131	132	133	134	135	136	137	138	139
170	135	136	137	138	139	140	141	142	143	144
180	145	146	147	148	149	150	151	152	153	154
190	155	156	157	158	159	160	161	162	163	164
200	160	161	162	163	164	165	166	167	168	169
210	170	171	172	173	174	175	176	177	178	179
220	180	181	182	183	184	185	186	187	188	189
230	190	191	192	193	194	195	196	197	198	199
240	195	196	197	198	199	200	201	202	203	204
250	200									
251 cfs and greater	Licensee shall bypass inflow.									

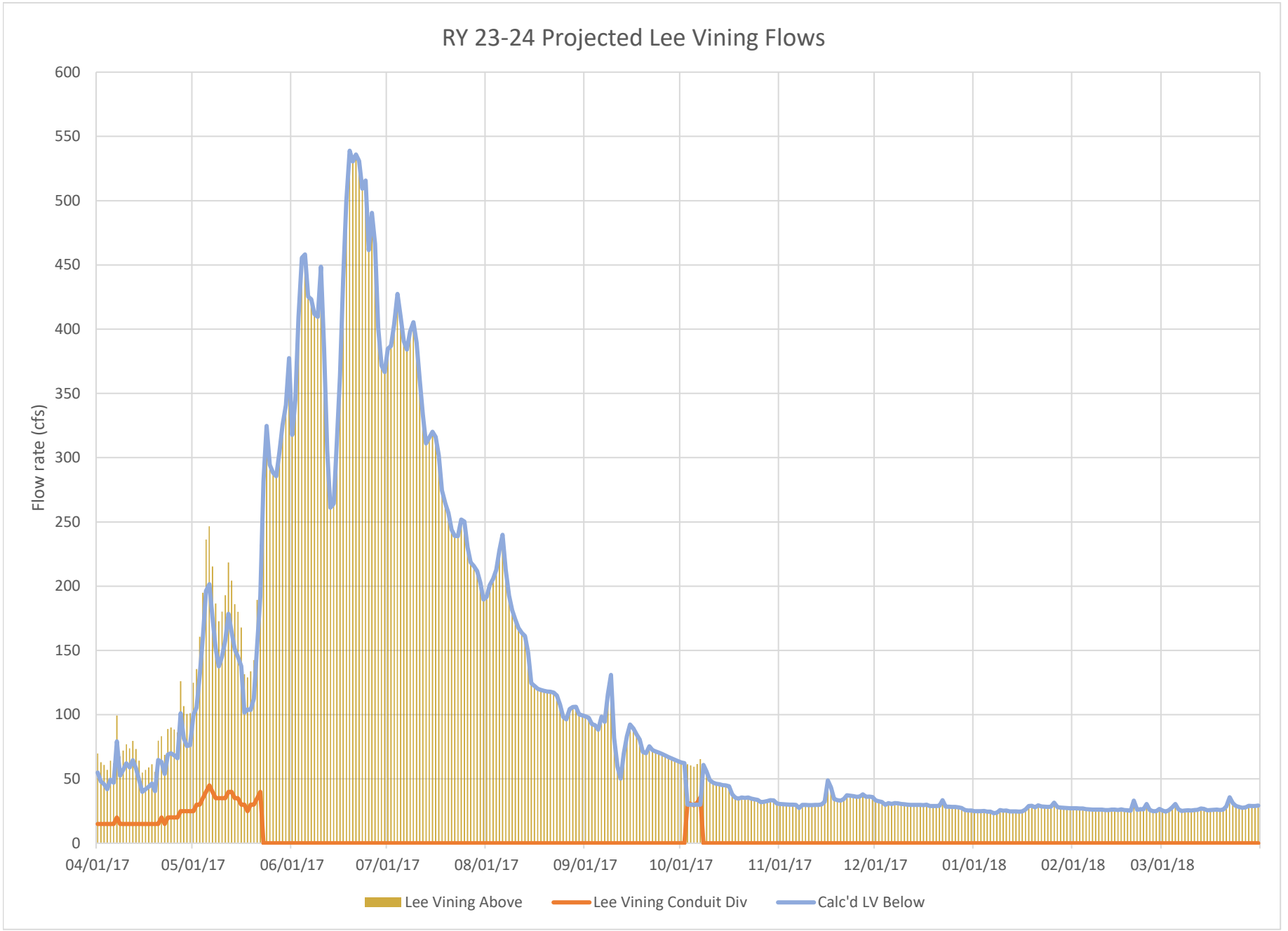
TABLE 2C: LEE VINING CREEK STREAM ECOSYSTEM FLOWS

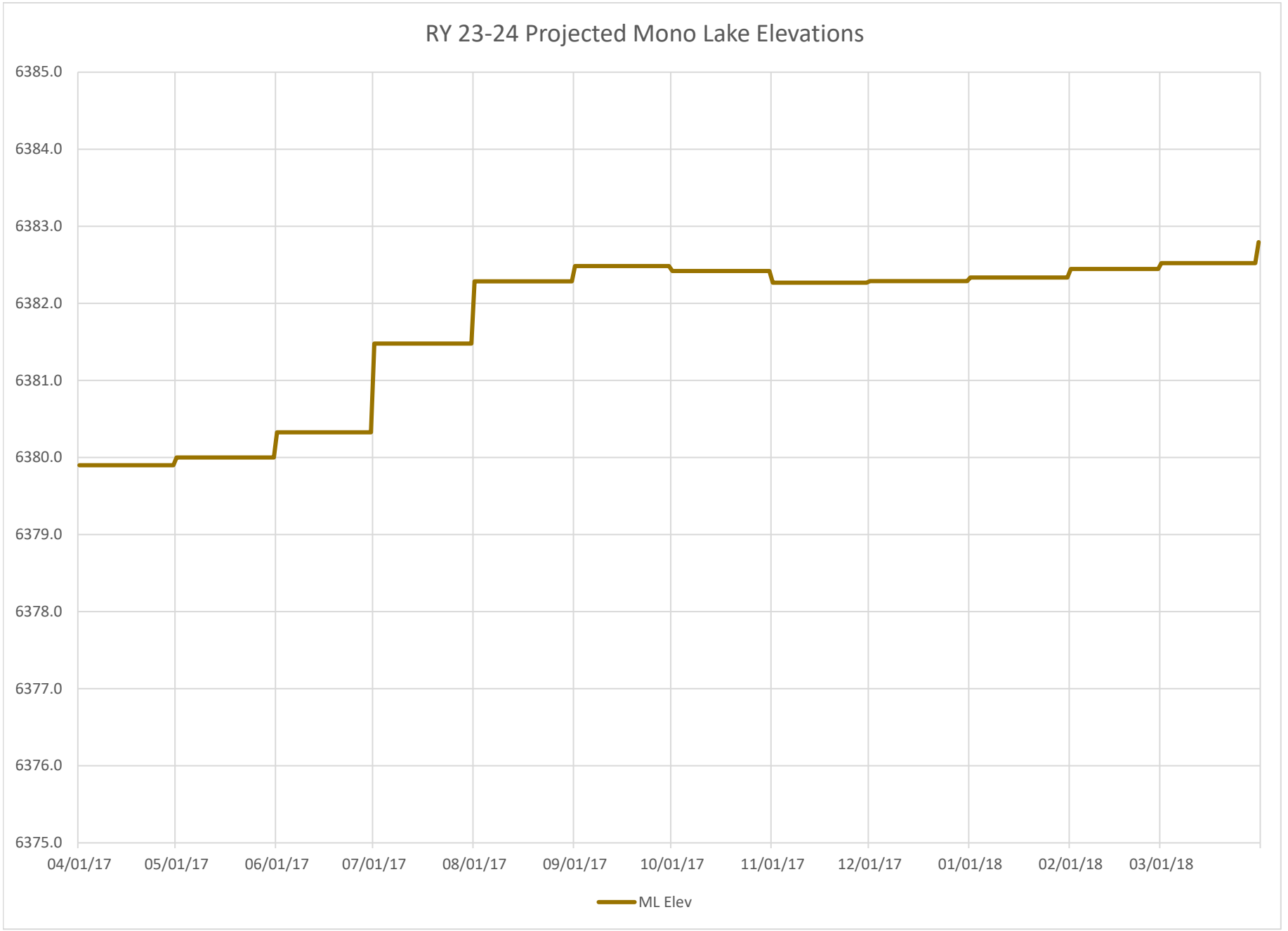
Timing: October 1 – March 31				Year-type: All
Maximum ramping at the beginning and end of this period and at all times is 20%.				
Timing	Flow Requirement			
	Extreme/Wet, Wet	Wet/Normal	Normal	Dry/Normal II, Dry/Normal I, Dry
October 1 – October 15	30 cfs	28 cfs	20 cfs	16 cfs
October 16 – October 31	28 cfs	24 cfs	18 cfs	
November 1 – November 15	24 cfs	22 cfs		
November 16 – March 31	20 cfs	20 cfs		


RY 23-24 Projected Grant Lake Reservoir
elevation (ft)
7,132
7,127
7,122
7,117
7,112
7,107
7,102
7,097
7,092
7,087
7,082
7,077
7,072
7,067
storagee (AF)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
GLR Ending Storage
GLR Starting Elev


RY 23-24 Projected Grant Lake Inflow & Outflow
Lee Vining Conduit and West Portal flows (cfs)
Rush Creek Flows (cfs)
100
90
80
70
60
50
40
30
20
10
0
1000
900
800
700
600
500
400
300
200
100
0
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Lee Vining Conduit Div
Rush Above Damsite
MCT West Portal
Rush Total Ret Ditch
Rush Below Return Ditch
GLR Spill
Potential Winter SMRs


RY 23-24 Projected Rush Flows
Flow rate (cfs)
1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
04/01/17
05/01/17
06/01/17
07/01/17
08/01/17
09/01/17
10/01/17
11/01/17
12/01/17
01/01/18
02/01/18
03/01/18
Rush Above Damsite
Rush Total Ret Ditch
Rush Below Return Ditch
GLR Spill
Potential Winter SMRs


RY 23-24 Projected Lee Vining Flows
Flow rate (cfs)
600
550
500
450
400
350
300
250
200
150
100
50
0
04/01/17
05/01/17
06/01/17
07/01/17
08/01/17
09/01/17
10/01/17
11/01/17
12/01/17
01/01/18
02/01/18
03/01/18
Lee Vining Above
Lee Vining Conduit Div
Calc'd LV Below


RY 23-24 Projected Mono Lake Elevations
6385.0
6384.0
6383.0
6382.0
6381.0
6380.0
6379.0
6378.0
6377.0
6376.0
6375.0
04/01/17
05/01/17
06/01/17
07/01/17
08/01/17
09/01/17
10/01/17
11/01/17
12/01/17
01/01/18
02/01/18
03/01/18
ML Elev