Draft Strategic Plan Appendix E – Flow Accounting

Date of Flow Accounting Procedure Compilation: October 10, 2024

Introduction and Overview for Appendix E

As described in Section 2.1.4 of the Strategic Plan, flow accounting involves verifying that Flow Measure commitments in the Strategic Plan have been met. This appendix expands on the narrative description of flow accounting provided in Table 7 of the Strategic Plan by providing a compilation of flow accounting procedures for nine water sources that are supplying Flow Measures for the Agreements to Support Healthy Rivers and Landscapes (Friant, Tuolumne, Sacramento, Feather, Yuba, American, Mokelumne, Putah, Export reductions). These flow accounting procedures are also included or referenced in Implementing Agreements and Enforcement Agreements as appropriate. The flow accounting procedures for each water source have three core components:

1. **Quantification of reference flow** - a description of the procedures and/or tools that will be used to quantify the reference operation and resulting reference flow, which is the flow that would have occurred without the Flow Measures.
2. **Measurement of Flow Measure deployment above reference flow** - a description of the procedures and/or tools for measuring the Flow Measure in relation to the reference flow, including the station where flows are measured.
3. **Verification of additionality** - a description of how the additionality of water will be verified relative to the reference operation.

In addition to the flow accounting procedures specific to each water source, Appendix E also includes accounting procedures that have cross-cutting relevance across all or a subset of water sources. These procedures are referred to generally as “Delta Accounting Procedures” and describe the following:

1. how the CVP/SWP reference operation will be determined (which is the reference operation and resulting reference flow for the Sacramento, Feather, American, and export reduction water sources);
2. how CVP/SWP operations will avoid the export of Flow Measures; and,
3. how the potential losses to the system will be addressed through identification of initial assumptions and refinement.

Definitions of terms that are cross-cutting across all flow accounting procedures and additional to the definitions in the Strategic Plan are provided below.

Real-water verification – procedures for verifying that additional water has been added relative to the reference operation.

Reference flow and reference operation - the flow or operation that would occur without Flow Measures from the Agreements to Support Healthy Rivers and Landscapes.

Appendix E - Table of Contents

Friant Draft Quantitative Flow Accounting Procedures

Date Drafted: August 1, 2024

Drafted by: FWA and Reclamation

1 Definitions

Restoration Flows = Releases from Friant Dam pursuant to the San Joaquin River Restoration Settlement and dedicated for in-stream use for purpose of fish and wildlife (§ 1707) from Friant Dam through the Sacramento-San Joaquin Delta. Restoration Flows consist of water allocated from CVP supply in Millerton Lake, Acquired Water, and Buffer Flows.

Acquired Water = water acquired by the Secretary of Interior either purchased from willing sellers or returned from an Unreleased Restoration Flow exchange under the Settlement, beyond those flows required by the Restoration Allocation and Buffer Flows.

Buffer Flows = Additional Restoration Flow releases from Friant Dam up to an additional 10 percent of the applicable Restoration Flow hydrograph.

HR&L = Agreements Supporting Healthy Rivers and Landscapes

Restoration Flows reaching Vernalis = those flows tracked from their release from Friant Dam, with no accretions allowed, only losses as measured by 7 gauges between Friant Dam and the confluence with the Merced River. This approach has been vetted with the State Board and is calculated daily by spreadsheet. Then beyond the Merced Confluence are estimated using the currently accepted loss factor of 10%. This 10% loss factor will be consistent with any loss factor developed by DWR and Reclamation for this section of the river as new data and analysis become available. Restoration Flows are dedicated for instream use only except when recaptured by the San Joaquin River Restoration Program pursuant to the Settlement. Absent recapture and after losses, Restoration Flows should become Delta outflow.

Restoration Flows eligible for Recapture = those Restoration Flows in either the Lower San Joaquin River or in the Delta shall be calculated as the Restoration Flows reaching the point of diversion (i.e. typically taken as Restoration Flows reaching Vernalis) minus a 10% uncertainty factor. This uncertainty factor is incorporated to ensure that SJRRP recapture operations do not infringe upon other water rights which might otherwise occur due to normal operational precision and flow measurement accuracy and to buffer any operational errors that may occur. This 10% uncertainty factor does not mean that Restoration Flows are not fully present — it is only applied to recapture.

Settlement = Stipulation of Settlement in NRDC, et al. v. Kirk Rodgers, et al. (San Joaquin River Restoration Settlement)

SJRRP = San Joaquin River Restoration Program

TAF = thousand acre-feet

Unreleased Restoration Flows = Restoration Flows that cannot be released into the San Joaquin River under the Restoration Administrator's recommended schedule for any reason.

2 Flow Measures

Except for those year types determined to be Critical-High or Critical-Low under the Settlement (on a rolling basis as described in the Restoration Flow Guidelines), Reclamation, in consultation with Friant Water Authority, will reduce the recapture of Restoration Flows to the extent necessary to achieve a goal

of contributing 50,000 acre-feet toward Delta outflows derived from all Friant releases during the period of February and May (Delta Outflow Goal). The maximum amount of reduced recapture in any month during the period of February through May will be up to 50% of the total Restoration Flows eligible for recapture (i.e. “recapturable”) for such month.

3 Flow Measure Accounting

3.1 Operative Flow

San Joaquin River flows without releases from Friant Dam, including flood management releases. This reference operation would not be quantified, but instead the flows from Friant contributing to Delta Outflow would be quantified as described below.

3.2 Measuring HR&L Flow Deployment above Operative Flow

Consistent with existing water rights permits requirements for the San Joaquin River Restoration Program (SJRRP), Reclamation provides accounting of daily Friant Dam releases and Restoration Flows, including key gaging stations and points of rediversion. Current downstream points of permitted rediversion include Mendota Pool, Patterson Irrigation District, Banta-Carbona Irrigation District, and Jones and Banks Pumping Plants.

Flows contributing to the Friant HR&L would be any flows released from Friant Dam measured entering the Delta at Vernalis (VNS) minus recapture that is occurring below Vernalis. The accounting of these flows is premised on the existing accounting procedures for SJRRP and as reported daily in the SJRRP Operations Spreadsheet. As the SJRRP accounting procedures are continually refined with the State Board and by potential future water right orders, they will govern and supersede. Whenever these flows are not projected to meet the Delta Outflow Goal as measured at Vernalis (VNS), recapture would be reduced up to a maximum of 50% of the eligible Restoration Flows as measured at the downstream points of rediversion listed above.

At times when Friant Dam makes releases for flood management, flows contributing to the Friant HR&L will be the proportion of Vernalis (VNS) flows attributable to Friant releases which will be calculated by flows passing Gravely Ford (GRF) relative (i.e. proportional) to all flows passing James Bypass (JBP), San Joaquin River at Stevinson (SJS) minus Chowchilla Bypass (CBP) minus SJR Below Bifurcation (SJB), Merced River near Stevinson (MST), Tuolumne River at Tuolumne City (TRT), and Stanislaus River at Koetitz (KOT) minus any recapture that is occurring. Appropriate time lags and daily average flow rates would be used in this calculation.

Consistent with the Implementing Agreement, it is understood that in some years there will not be sufficient Restoration Flows to meet the Delta Outflow Goal due certain conditions which may include, but are not limited to, channel constraints, construction, schedule of Restoration Flows, and/or deliveries to satisfy the Exchange Contract. Restoration Flows that cannot be released are accounted for and sold to Friant Contractors as Unreleased Restoration Flows consistent with the Settlement. These flows will be accounted for separately from those flows contributing to the Friant HR&L for context in future ability in meeting the Delta Outflow Goal as these constraints are alleviated.

3.2.1 Monitoring of HR&L Flow Deployment

Restoration Flows and releases from Friant Dam are reported daily by Reclamation with data incorporated from DWR and USGS on a weekly basis. This is through an email distribution of PDF and Microsoft Excel documents. Additionally, Reclamation posts key Friant Dam and Restoration Flow data on the SacPAS

website (starting September 2024), with updates made on daily and weekly basis depending on the source of data.

The San Joaquin River Restoration Program's Restoration Flow Guidelines is a living document that describes the procedures for measuring, monitoring, and reporting flows from Friant Dam, including Restoration Flows, and other guidelines to comply with the Settlement. Additionally, Reclamation is developing an updated Flow Monitoring and Management Plan to comply with existing water rights orders from the State Board and is anticipated in 2024.

Monitoring of flows below Friant Dam is already mandatory as defined in the Settlement and existing water rights orders, and locations are summarized in Table 1 below. This list is non-exhaustive of existing water rights orders and tracking performed by the SJRRP Operations spreadsheet and is subject to change pursuant to future water rights orders. Occasionally, flow gauges may be relocated, renamed, or replaced. Per existing water rights conditions, Reclamation informs the State Board of any malfunctions at gauges and provides a plan for return to operation.

Table 1. Friant HR&L Flow Monitoring Locations

Flow Monitoring Location	Settlement Reach	Gauge	CDEC Code	Operating Agency
Immediately Below Friant Dam	Head of Reach 1	Friant Dam (Millerton)	MIL	USBR
Gravelly Ford	Head of Reach 2A	SJR at Gravelly Ford	GRF	USBR
Immediately below Chowchilla Bifurcation Structure	Head of Reach 2B	Below Chowchilla Bifurcation Structure	SJB	USBR
Top of Chowchilla Bypass	N/A	Chowchilla Bypass Headworks	CBP	SLDMWA
James Bypass upstream of SJR	N/A	James Bypass	JBP	Reclamation District 1606
Below Mendota Dam	Head of Reach 3	SJR near Mendota	MEN	USBR
Below Sack Dam	Head of Reach 4A	SJR near Dos Palos	SDP	DWR
Head of Sand Slough Bypass	Head of Reach 4B and Head of Sand Slough Bypass	SJR near Washington Road	SWA	DWR
Eastside Bypass	Head of Lower Eastside Bypass	Eastside Bypass Below Mariposa Bypass	EBM	DWR
Below Lower Eastside Bypass	Head of Reach 5	SJR near Stevinson	SJS	DWR
Merced River upstream of SJR	N/A	Merced River near Stevinson	MST	DWR
At the confluence of the Merced River	Tail of Reach 5	SJR above Merced River near Newman	SMN (the lessor of a synthetic flow rate utilizing multiple gages)	USGS
Near Patterson	N/A	SJR near Patterson	SJP	DWR

Flow Monitoring Location	Settlement Reach	Gauge	CDEC Code	Operating Agency
Tuolumne River upstream of SJR	N/A	Tuolumne River at Tuolumne City	TRT	DWR
Stanislaus River upstream of SJR	N/A	Stanislaus River at Koetitz	KOT	DWR
Near Vernalis	N/A	SJR near Vernalis	VNS	USGS

Key:
DWR = California Department of Water Resources
N/A = Not Applicable
SLDMWA = San Luis and Delta-Mendota Water Authority
SJR = San Joaquin River
USBR = U.S. Bureau of Reclamation

Reclamation ensures that operational data (provisional data prior to QA/QC review) is available in real-time at the mandatory reporting locations and other locations as necessary. Additionally, Reclamation provides a regular distribution of data which tracks Friant releases, Restoration Flows, gauge error, and other flows and accretion/depletions at each of the mandatory locations. Estimated travel time and losses between gauges are detailed in the Restoration Flow Guidelines and upcoming Flow Monitoring and Management Plan. Losses between gauges are continually being refined with the State Board.

Restoration Flows are accounted for such that no accretions are incorporated. At each of the above monitoring locations, Restoration Flows are supported by an equal or greater rate of Restoration Flows at the next upstream gauge. All Restoration Flows are sourced from Friant Dam. For portions of the San Joaquin River, a pre-determined loss factor is applied when gauging does not provide adequate accuracy. Between SJB and SDP, a standardized loss factor developed between Reclamation and the San Luis Delta-Mendota Water Authority is applied. Between SMN and SJP, and SJP and VNS, a loss factor developed between Reclamation and DWR is applied. Where appropriate, additional loss factor buffers are included for conservatism where there is uncertainty. When QA/QC data is available, it is retroactively applied to Restoration Flow rates to utilize the best available information.

3.2.2 Examples of Measuring HR&L Flow Deployment

The following examples describe actual operations of SJRRP and how HR&L would result in flows under different conditions. Note that 2023, 2021, 2019, and 2017 are not shown because these years were either Wet or Critical year types, and do not have flow measures as part of the HR&L program; however, under Wet years there would still be Friant releases contributing to the Delta outflow. Additionally, these historical flows do not account for potential changes in the ability to recapture (i.e., redivert flows) in the Delta and lower San Joaquin River under existing and future permits, which may increase the action to reduce recapture of Restoration Flows as part of the HR&L program. Additionally, they do not consider changes in downstream capacity for Restoration Flows, which will increase towards the end of the first eight years of the HR&L program. Additional examples are under development to demonstrate the future conditions, and will be detailed, along with the examples below, in an attachment to be developed.

3.2.2.1 2024 – Normal-Wet

If the Friant HR&L program were implemented in 2024, the HR&L flow deployment would've been measured as approximately 48 TAF in February through May. The Restoration Year Type was Normal-Wet and the Restoration Allocation totaled 329,026 AF at Gravelly Ford in addition to 4,447 AF of Buffer Flows and 8,700 AF of Acquired Water, however, only 191,699 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 41,267 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta)

in February through May. 15,042 AF was recaptured during this same period in the lower San Joaquin River (13,471 AF) and Mendota Pool (1,570 AF) without the HR&L program. With the HR&L program, only flows in the lower San Joaquin River would've been reduced as Mendota Pool recapture is only done when flow can't be released further downstream. With the HR&L program, recapture of Restoration Flows would be reduced up to 50% per month if the 50 TAF target cannot be met. As such, recapture would've been reduced in the lower San Joaquin River by 6,736 AF (approximately 886 AF in February, 2,473 AF in March, 2,605 AF in April, and 773 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 48 TAF.

3.2.2.2 2022 – Normal-Dry

If the Friant HR&L program were implemented in 2022, the HR&L flow deployment would've been measured as approximately 25 TAF in February through May. The Restoration Year Type was Normal-Dry and the Restoration Allocation totaled 232,470 AF at Gravelly Ford in addition to 3,500 AF of Acquired Water, however, only 141,364 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 24,962 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 469 AF was recaptured during this period in the lower San Joaquin River (145 AF) and Mendota Pool (324 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 72 AF only in February (there was no recapture in other months during this period), maxing out the 50% threshold and resulting in total HR&L flow deployment of approximately 25 TAF.

3.2.2.3 2020 – Dry

If the Friant HR&L program were implemented in 2020, the HR&L flow deployment would've been measured as approximately 22.5 TAF in February through May. The Restoration Year Type was Dry and the Restoration Allocation totaled 202,197 AF at Gravelly Ford in addition to 1,517 of Buffer Flows, however, only 139,517 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 20,460 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 4,420 AF was recaptured during this period in the lower San Joaquin River (4,089 AF) and Mendota Pool (332 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 2,044 AF (approximately 900 AF in February, 210 AF in March, 343 AF in April, and 592 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 22.5 TAF.

3.2.2.4 2018 – Normal-Dry

If the Friant HR&L program were implemented in 2018, the HR&L flow deployment would've been measured as approximately 18 TAF in February through May. The Restoration Year Type was Normal-Dry and the Restoration Allocation totaled 280,258 AF at Gravelly Ford in addition to 2,129 of Acquired Water, however, only 158,003 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 9,794 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 18,112 AF was recaptured during this period in the lower San Joaquin River (16,207 AF) and Mendota Pool (1,905 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 8,069 AF (approximately 2,460 AF in February, 1,555 AF in March, 2,100 AF in April, and 1,954 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 18 TAF.

3.3 Real Water Verification

Real water released from Friant Dam and entering the Delta will be tracked consistent with existing water rights permits and tracking of Restoration Flows available for recapture, and reporting of those flows that are diverted for recapture. It is anticipated there is a low chance of redirected impacts to other water users due to requirements under existing water rights permits, existing protections of those flows, and the Settlement. Accounting of Restoration Flows through the Delta and methodology for Delta recapture is continuing to be refined with DWR and State Board, and it is anticipated these HR&L flows will result in low risk of redirected impact. If redirected impacts are identified, then reimbursement will be provided through a mutually agreeable method.

Sacramento Draft Quantitative Flow Accounting Procedures

Draft Revised: October 3, 2024

Drafted by: Thaddeus Bettner and Lee Bergfeld

1 Definitions

Biological Opinions – Current 2019 Biological Opinions and as they may be updated under the current USBR Re-initiation of Consultation process.

CDFW – California Department of Fish and Wildlife

CVO – Central Valley Project Operations

CVP – Central Valley Project

ETAW – Evapotranspiration of applied water

FAW – Flow Accounting Workgroup comprised of representatives of HRL participants, DWR, USBR, CDFW, and SWRCB staff.

HRL – Agreements Supporting Healthy Rivers and Landscapes (generally known as Voluntary Agreements/VAs)

NMFS – National Marine Fishery Service

Reference Condition – the flow, release, diversion, or operation that would occur without the HRL action.

SRSC – Sacramento River Settlement Contractors

SWRCB – State Water Resources Control Board

TAF – thousand acre-feet

USBR – United States Bureau of Reclamation

USFWS – United States Fish and Wildlife Service

WY – water year

2 Flow Measures

For the Healthy Rivers and Landscapes Program Flow Measure (Flow Measure) sourced from the mainstem Sacramento River system, below are the primary quantitative procedures for (1) measuring the deployment of the Flow Measure; and (2) confirming the Flow Measure contributions were made available or verified based on fallowing and groundwater substitution.

Sacramento River Flow Measures will occur in Dry, Below Normal, and Above Normal years based on the Sacramento Valley Water Year Hydrologic Classification for a total quantity of up to 100 TAF from the SRSC. Pursuant to the Draft Strategic Plan, the default deployment of these Flow Measures will be during April and May, assuming the deployment will not compromise temperature management on the

upper Sacramento River. Flow Measure deployment and operations will be coordinated with USBR. Water will be made available through fallowing and groundwater substitution. The SRSC expect all fallowed lands and groundwater wells will be identified and enrolled prior to the commencement of the Healthy Rivers and Landscapes Program, as well as the completion of the appropriate environmental documentation.

3 Flow Measure Accounting

For the Sacramento River Flow Measures, the governance entities (Sacramento River Governance and Systemwide Governance Committee) and SRSC, as a member, will coordinate with USBR for the release of flow from Keswick Dam during the spring months starting as early as March. Coordination will be needed to assess real-time data such as near-term/long-term hydrological forecasts, storage conditions and releases, water year classification, fish surveys/conditions, SRSC's Reference diversions, and regulatory/operational limitations to forecast the required Reference Keswick release.

3.1 Reference Flow

Reference Keswick releases are the flows resulting from meeting either minimum flow requirements, water supply including Delta requirements, or storage management for flood control, in absence of the Flow Measure. Reference Keswick releases include the resulting flows from meeting the following:

1. Minimum flows below Keswick Dam including those for temperature management,
2. Sacramento River diversions including those by the SRSC and other CVP contractors,
3. Operational target flows for the Sacramento River at Wilkins Slough,
4. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, and Biological Opinions.
5. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.

CVP Operations prepares a forecast of monthly Reference Keswick releases for the upcoming 12-month period and this forecast will be the starting point for defining the Reference Keswick release. The Reference Condition will be defined by CVP operators and discussed at Flow Operations Team (FOT) meetings. The FOT will begin meeting each year in January to discuss hydrology and water operations forecasts and will meet as needed until decisions are made to deploy Flow Measures. The FOT will begin weekly meetings approximately one week prior to deployment of any HRL Flow Measure and will continue weekly meetings until all Flow Measures are deployed for the year. Weekly meetings of the FOT will provide opportunities to discuss Flow Measure deployments and accounting for the prior week and update Reference Conditions for the coming week to ensure that the water made available under the HRL is above what would have been available absent the HRL. The State Water Board and CDFW staff will participate in weekly FOT meetings. During periods when Reference Keswick releases are changing or forecast to change during the coming week, e.g. as diversions increase and tributary flows decrease or during storage management operations for flood control, short-term forecasts and the SRSC Web Portal may be used to forecast daily Reference Keswick releases. The SRSC Web Portal includes data on observed releases, flows, diversions, and forecasts of daily Sacramento River operations.

3.2 Measuring Sacramento River Flow Measure Deployment above Reference Flow

SRSC Flow Measure Deployment in Spring Measured as Shasta Reservoir/Sacramento River Release:

As described in the Sacramento Mainstem Implementation Agreement, Healthy Rivers and Landscapes Program (Program) governance entities (Sacramento River Governance and Systemwide Governance Committee) will decide on a recommended Spring Action based on the framework in the Strategic Plan. An evaluation of Shasta Cold Water Pool will be completed to ensure any spring action does not impact winter-run salmon cold water temperature requirements that align with the applicable Biological Opinions and SWRCB water right requirements.

Weekly Flow Measure deployment coordination with USBR biologists, and Sacramento River Governance will start at least one month in advance of deployment and no later than February 1. These weekly coordination meetings are intended to allow for real-time data assessment including, but not limited to, updates on the monthly WY classification, current storage and releases, fish survey data, downstream demands, and any operational limitations.

Prior to February 1st, meetings will occur monthly, or as needed, to review fall/winter operations, ensure assets are in place for the coming year, and evaluate potential actions. Similar meetings will be occurring for the implementation of the Biological Opinions.

There are three options for Sacramento Flow Measure deployment in coordination with USBR operations. USBR will track the Flow Measures, Reference flows, and will coordinate with DWR to track Flow Measures to and through the Delta, in coordination with the Flow Operations Team. The Strategic Plan includes the default plan and flexibility brackets for each deployment. The following table describes key components for each option.

Table 1. Key Flow Accounting Components for Sacramento River HRL Flow Deployment Options

Deployment Option	Measurement Location	Reference Flow	Sacramento Flow Measure
Spring Pulse Release	Keswick	Weekly CVO forecast of Keswick release without Flow Measure	$Keswick_{actual} > Keswick_{reference}$ During pulse period
Summer, Fall, or Irrigation Pattern Release	Keswick	Seasonal CVO Keswick Release forecast updated weekly without Flow Measure	$Keswick_{actual} > Keswick_{reference}$ During specified period
Carryover for Cold-Water	SRSC Diversions	Scheduled SRSC diversions plus additional diversions that would occur absent fallowing and groundwater substitution	$SRSC\ Diversions_{actual} < SRSC\ Diversions_{reference}$ April to October

The flow gauge to be used for Sacramento Flow Measure accounting is Keswick Reservoir outflow, California Data Exchange Center station KES. An alternative flow gauge is the USGS 11370500, Sacramento River at Keswick located approximately a half mile downstream from Keswick Dam. The following sections provide additional descriptions of the process and accounting for each deployment option.

<u>Spring Pulse Release – Default Plan:</u>

1. Pursuant to the Draft Strategic Plan, pulse flows released from Keswick Dam will be targeted for the April-May timeframe to achieve specific flow targets at specific locations to provide a short-duration pulse (4-7 days).
2. Prior to any pulse flow, the Reference Keswick release for the pulse period will be identified by USBR. The Reference Keswick release will be determined weekly and discussed with the FOT.
3. USBR will make an additional release from Keswick Dam with associated ramping rates to go above and return to the Reference Keswick release.
4. The Flow Measure will be calculated as the difference between the actual Keswick Release and the Reference Keswick release for the pulse and associated ramping period.
5. The SRSC will schedule and maintain their diversion rates during the pulse period to ensure the pulse flow moves down the Sacramento River.
6. The SRSC will schedule and maintain diversion rates during the irrigation season and those diversions will be reduced by the fallowing and groundwater actions. Reduced SRSC diversions will result in reductions to actual Keswick releases during the irrigation season and a recovery of

storage in Shasta Lake. USBR and SRSC will perform the real water verification described in Section 3.1.3.

The following figure is an example of a Spring Pulse Release deployment with a Reference Keswick release and Actual Keswick release less than the Reference Keswick release throughout the remainder of the irrigation season.

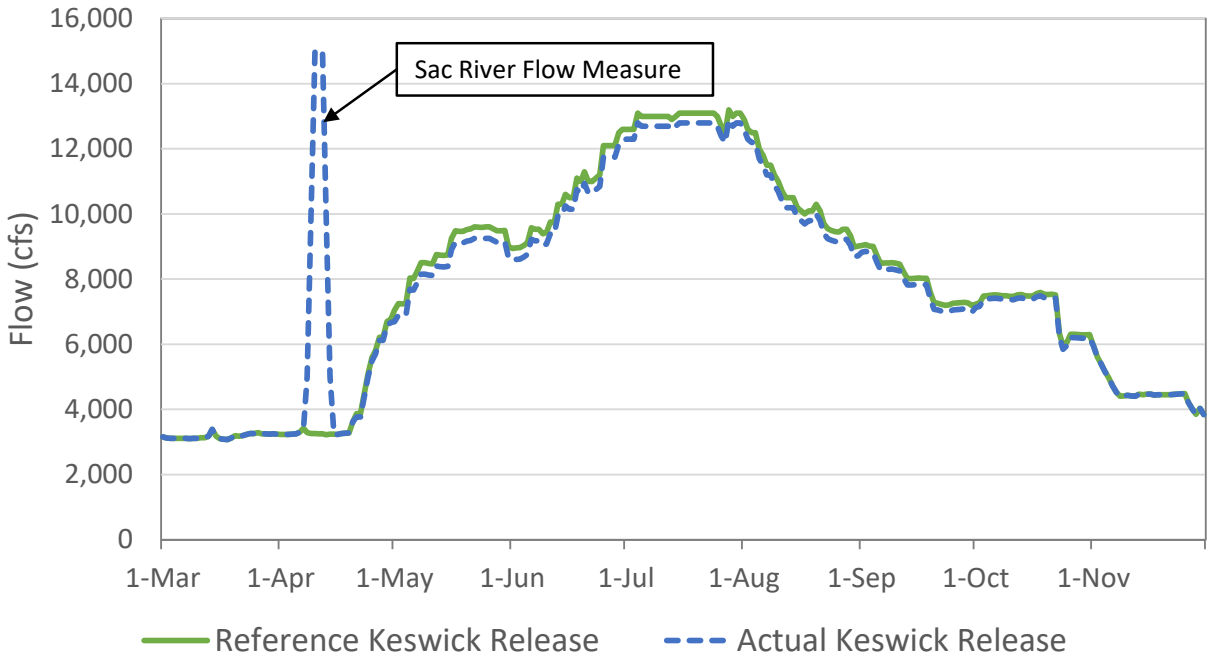


Figure 1. Example Refence and Actual Keswick Release for Spring Pulse Deployment Option

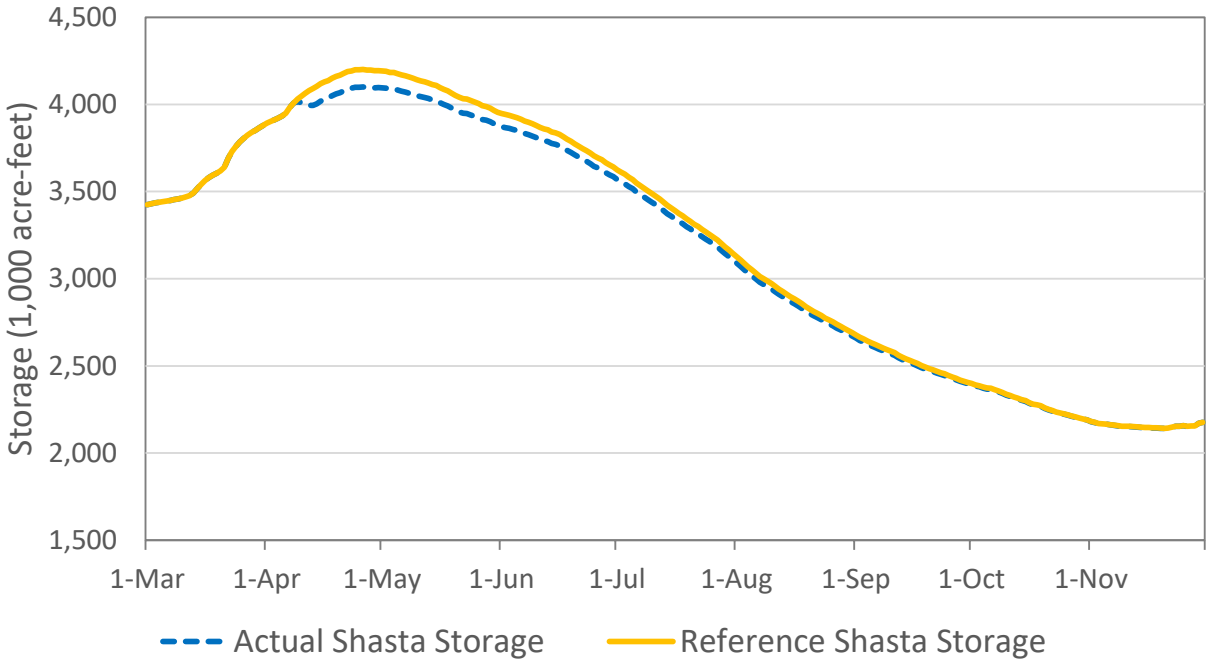


Figure 2. Example Reference and Actual Shasta Storage with Spring Pulse Release

There may be years when a Spring Pulse release occurs prior to or during storage management operations for flood control purposes. The Spring Pulse release may assist in storage management but is not additional water to the system if releases after the Spring Pulse are reduced and the reservoir fills to capacity by the end of the flood management season. During these years, the FOT will continue to meet after the Spring Pulse to discuss the post-pulse Reference releases and storage conditions to ensure the Spring Pulse release is additional water to the system during that year's flood management season. Flow measures occurring prior to flood control operations will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of recovery water from reduced local diversions.

<u>Summer, Fall, or Irrigation Pattern Release – within the Flexibility Bracket:</u>

The Summer, Fall, or Irrigation Pattern Release accounting will be dependent on the timing and duration of the release. Accounting will be simpler for shorter duration releases during periods of stable CVP operations, but the accounting process will be the same as for a Spring Pulse release. USBR will identify the weekly Reference Keswick release and discuss with the FOT. The Reference Keswick release will be closer in magnitude to the actual Keswick release for longer duration deployments. Reference SRSC diversions calculated as described below for the Carryover option will inform development of the Reference Keswick release schedule. USBR will make an additional release from Keswick Dam to go above the Reference Keswick release. The Flow Measure will be calculated as the difference between the actual Keswick Release and the Reference Keswick release for the period of flow asset deployment. The SRSC will schedule and maintain their diversion rates during the deployment period to ensure the Flow Measure moves down the Sacramento River. The approvals needed for this action are described in the Strategic Plan, Section 2.3.

The following figure is an example of the Reference Keswick release and the actual Keswick release for an irrigation season deployment.

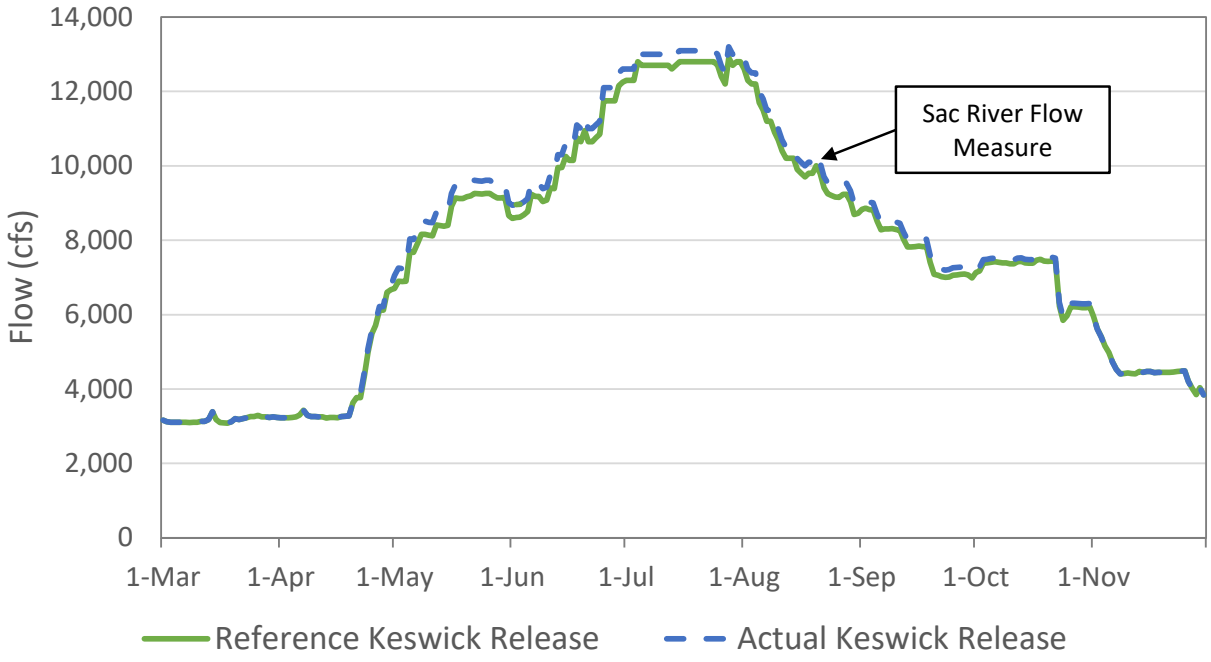


Figure 3. Example Refence and Actual Keswick Release for Irrigation Season Deployment Option

Carryover for Cold-Water:

1. SRSC will coordinate with USBR, NMFS, CDFW, and SWRCB to determine if the best use of the Sacramento Flow Measure is to maintain storage in Shasta Lake for cold water management and to increase carryover storage for future years. The Carryover deployment option will be considered when the 90 percent exceedance, March CVO forecast for Shasta Lake end of September storage is less than 2,100 TAF.
2. The approvals needed for this action are described in the Strategic Plan, Section 2.3.
3. Under the Carryover option, the actual Keswick release is expected to be less than the Reference release throughout the April through October period. Keswick release will be less by approximately the reduction in SRSC diversions due to fallowing and groundwater substitution actions.
4. The SRSC will schedule diversions during the irrigation season and those diversions will be reduced by the fallowing and groundwater substitution actions. The SRSC Reference diversion will be calculated as the scheduled diversion plus an additional diversion that would have occurred absent the fallowing and groundwater substitution. A diversion of 6 acre-feet per acre will be used to calculate the total volume of additional diversion by multiplying by the fallow and groundwater substitution acres. The additional diversion is assumed to occur on the same pattern as the actual, scheduled SRSC diversions.

5. The Flow Measure asset held in Shasta Lake will be calculated by multiplying the ETAW and decomposition credit (4.3 acre-feet per acre) by the fallowed acres and groundwater substitution pumping.

6. Sacramento Flow Measure assets carried over in storage in Shasta Lake will be subject to spill in the winter. Flow Measure assets not spilled will be available to be deployed on one of the other release patterns in the following year, in addition to any Flow Measure provided in the following year.

The following figure is an example of a Carryover deployment with a Reference Keswick release that exceeds the Actual Keswick release throughout the April through October period.

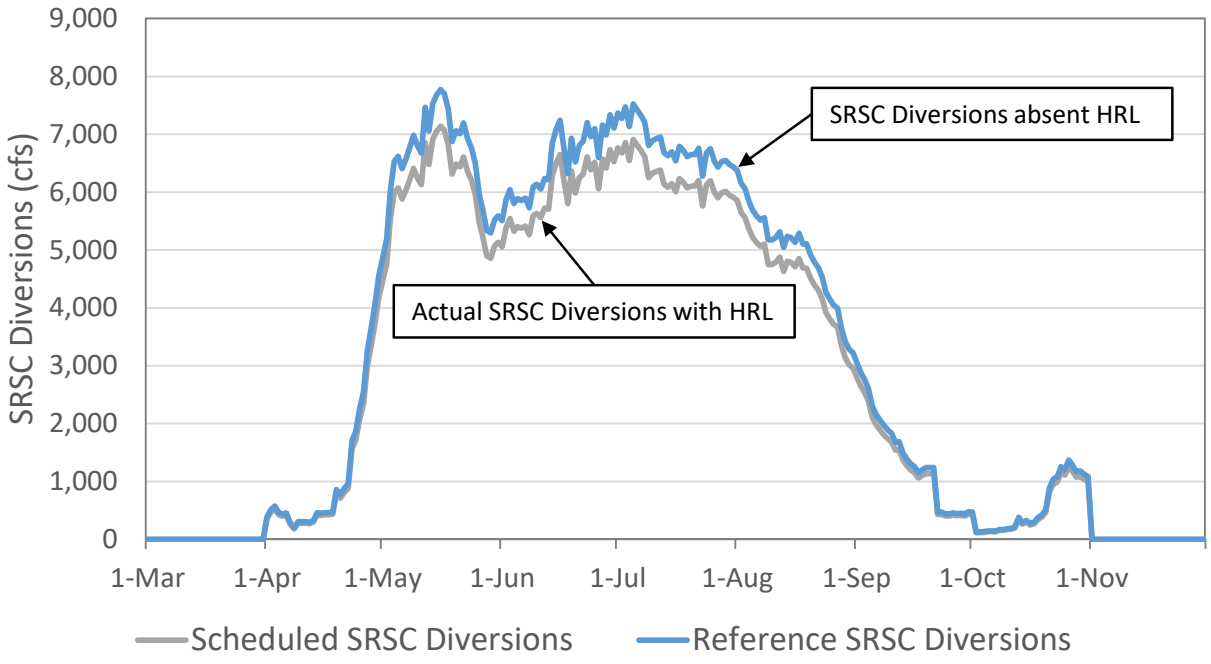


Figure 4. Example Scheduled and Reference SRSC Diversions for the Carryover Option

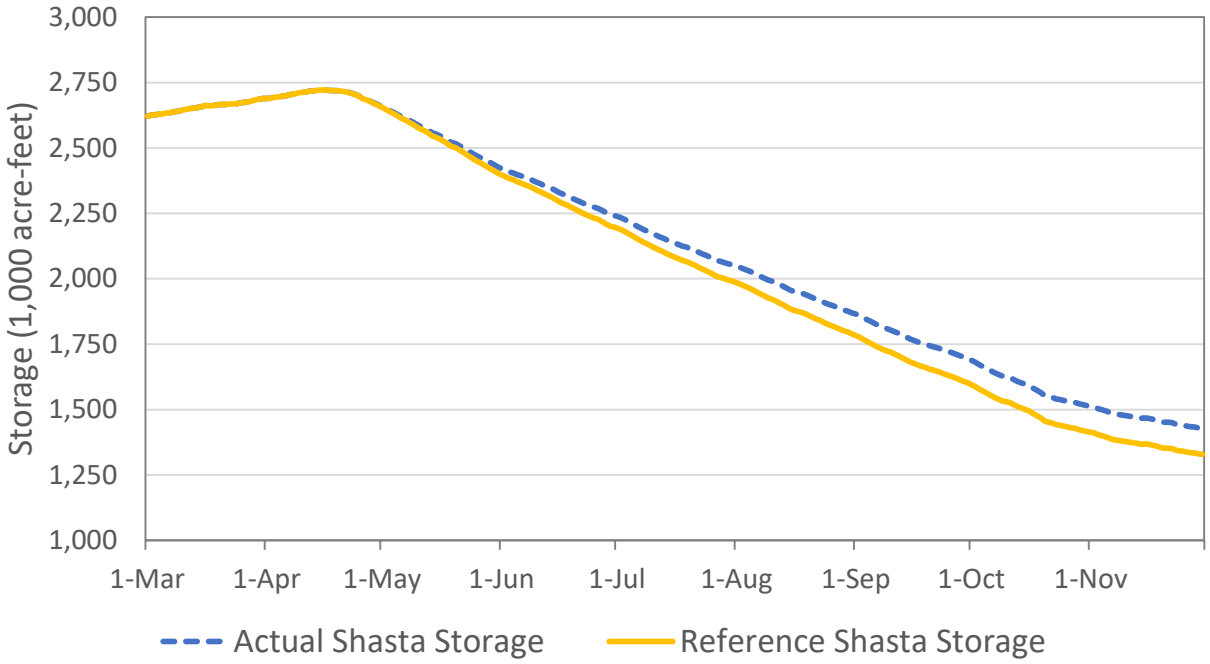


Figure 5. Example Reference and Actual Shasta Storage with Carryover for Cold-Water

Sacramento Flow Measures will be protected for Delta outflow in accordance with the Delta accounting methodologies for all deployment options.

3.3 Sacramento River HRL Real Water Verification

In general, all real water verification procedures will follow established and agreed upon methods prepared by DWR and USBR in coordination with SWRCB.

SRSC HRL Flow Contribution Measured using Cropland Fallowing:

1. Up to 100 TAF of HRL flows may be pre-released from Shasta Reservoir during spring months and then made up through reduced releases and diversions during the spring-fall irrigation and rice straw decomposition season.
2. The SRSC HRL flow contribution is presumed to be based on fallowed rice lands or other annual crops.
3. SRSC will identify parcels to be fallowed by March 1st. The SRSC will establish a long-term agreement for the fallowed parcels for the duration of the program upon adoption of the HRL Alternative by the SWRCB and completion of the environmental document.
4. The following steps are needed to verify the SRSC HRL contribution from fallowed lands each year.
    a. Reference cropland planting (without HRL) conditions – estimate crop acreages without HRL flow based on prior year crop acreage.
    b. Determine the fallowed acres by crop and calculate water made available as fallowed acres multiplied by the crop ETAW. It is assumed the majority of fallowed acres will be rice lands. For

the purpose of HRL, the agreed upon ETAW for rice is 3.3 acre-feet per acre plus 1 acre-foot per acre credit for rice straw decomposition.

c. Reporting – during the irrigation season, SRSC will report the fallowing activities to USBR including current year crop acreage.

d. Monitoring and verification – SRSC and USBR will agree on the monitoring program; SRSC will provide crop maps and access to fields; SRSC, member agencies, and USBR will conduct the field monitoring activities.

5. To minimize the socioeconomic effects on local areas, the eligible fallowed cropland acreage is limited to no more than 20% of land within the SRSC.

6. Other environmental considerations need to be assessed for the fallowed lands and irrigation/drainage ditches in the SRSC to provide forage and habitat for terrestrial wildlife and waterfowl, including the giant garter snake listed as a threatened species under ESA/CESA.

<u>SRSC HRL Flow Contribution Measured using Groundwater Substitution:</u>

1. SRSC HRL contributions from groundwater substitution can be used to supplement up to 20 TAF (20%) of the SRSC contribution from the Sacramento River.

2. To account for the HRL water made available through groundwater substitution, SRSCs will identify and coordinate with USBR on the following:

   a. The amount of increased pumping to provide HRL flow.

   b. Location and characteristics of the groundwater wells used.

   c. Historical groundwater pumping records for identified wells to establish a reference groundwater pumping volume that would occur absent the HR.

   d. A monitoring plan to assess the effects of groundwater pumping for the HRL.

   e. Mutually agreed value for the streamflow depletion factor between the SRSC, USBR, and DWR for HRL.

3. Consistency with the applicable Groundwater Sustainability Plans (GSPs) under the Sustainable Groundwater Management Act (SGMA) is crucial for the groundwater basin or nearby subbasins and the SRSCs will work with their local Groundwater Sustainability Agencies on HRL implementation.

Feather Draft Quantitative Flow Accounting Procedures

Last Updated: October 2, 2024

Drafted by: DWR

1 Definitions

Oroville Complex – The facilities include Oroville Dam, Hyatt Powerplant, Thermalito Diversion Dam, Power Canal, Forebay, Powerplant, and Afterbay. The total releases to the Feather River downstream of Oroville Complex are provisionally displayed on California Data Exchange Center website (https://cdec.water.ca.gov/dynamicapp/QueryF?s=oro) and labeled as RIV REL. It is the aggregated released flows from the Fish Barrier Dam, Fish Hatchery, and Thermalito Afterbay River Outlet.

2 Flow Measures

For Healthy Rivers and Landscapes Flow Measures (Flow Measures) sourced from the Feather River system, below are the preliminary quantitative procedures for (1) measuring Flow Measure deployment; and (2) confirming Flow Measures were made available or verified based on Feather River Service Area (FRSA) and upstream contributions through fallowing, groundwater substitution, and reservoir re-operation, consistent with the 2019 Draft Technical Information for Preparing for Water Transfer Proposal (Water Transfer White Paper) framework.

Feather Flow Measures will occur in Dry, Below Normal, and Above Normal years for a total quantity of up to 60 TAF per year, anticipated to be approximately 50 TAF from FRSA and up to 10 TAF from upstream of Lake Oroville made available by reservoir re-operation (e.g., South Feather Water and Power Agency or South Feather). Up to approximately 20% of the 60 TAF may be derived from groundwater substitution, consistent with applicable legal requirements. The proposed deployment of Feather Flow Measures will be provided during March through May from the Oroville Complex with the FRSA/South Feather supporting contribution made available through fallowing, groundwater substitution, and reservoir re-operation, and verified throughout the remainder of the water year (WY).

3 Flow Measure Accounting

For Flow Measures associated with fallowing, groundwater substitution, and upstream reservoir re-operation, DWR will release the flow from Oroville Complex during the spring months starting as early as March. Coordination is needed to assess real-time data such as near-term/long-term hydrological forecasts, storage conditions and releases, water year classification, fish surveys/conditions, and regulatory/operational limitations to determine the required reference release and then add the proposed Flow Measures above the necessary releases to meet the SWP's obligation.

To compensate for DWR's Oroville Complex releases for deploying the Flow Measures, DWR will verify FRSA fallowing and groundwater substitution actions supporting the deployment during the irrigation period following the framework outlined in the Water Transfer White Paper.

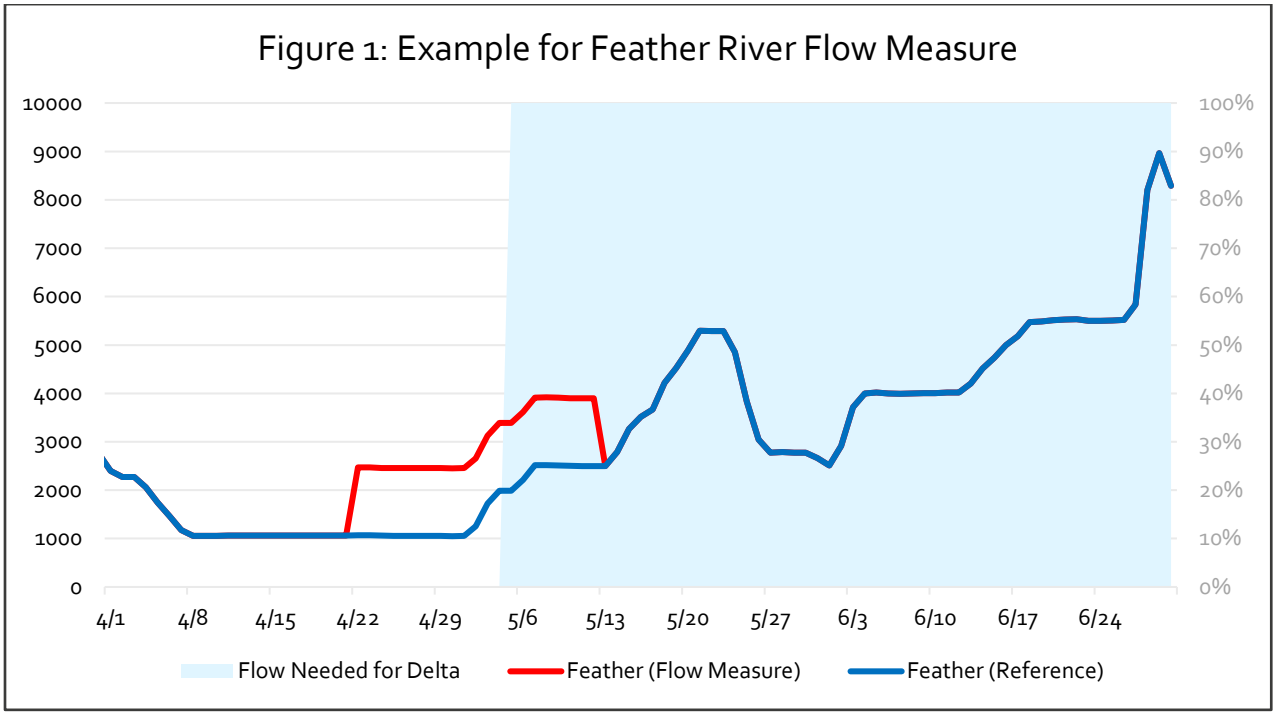
The timing of the Flow Measure contributions from upstream reservoirs associated with reservoir re-operation will typically occur the following summer and early fall months after the Flow Measure deployment to the Feather River is made from Oroville. In such cases, DWR will release the volume associated with re-operation from the Oroville Complex during the spring months starting as early as

March. To compensate for DWR's releases associated with such flows, DWR will verify the upstream reservoir re-operation consistent with the Water Transfer White Paper. Decisions for reservoir re-operation to release the Flow Measure contribution flow from Ponderosa Dam into Lake Oroville are primarily dependent on the South Feather's reservoir operational criteria. Flows required by other agreements such as the Water Storage Investment Program are not intended to count towards the Feather River Flow Measures.

3.1 Reference Flow

Reference flows are the flows resulting from meeting requirements of either flood control or water supply including Delta requirements absent the Feather Flow Measure. Any changes in the flow are in accordance with the United States Army Corps of Engineers (USACE) Water Control Manual and the 1983 Department of Fish and Wildlife (DFW) Agreement. Reference flow includes the following:

6. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, Biological Opinions, and Incidental Take Permits.
7. Flows needed to meet DFW's Feather River instream requirements.
8. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.



3.2 Measuring Feather Flow Measure Deployment above Reference Flow

<u>Flow Measure Deployment in Spring Measured as Oroville Release:</u>

1. Weekly Flow Measure deployment coordination with DWR biologists, water transfer team, and Feather River Tributary Governance will start in advance of deployment and no later than January 15. These weekly coordination meetings are intended to allow for real-time data assessment

including, but not limited to, updates on the monthly WY classification, current storage and releases, fish survey data, downstream demands, and any operational limitations. At the same time, DWR will meet with CDFW regarding planned flow deployment to ensure compliance with the Incidental Take Permit for Long-term State Water Project Operations in the Delta and Suisun Marsh.

2. DWR will deploy the Flow Measure, including flows associated with upstream reservoir re-operation, through an increase in the release of water from Oroville Complex during the spring months starting as early as March which is typically prior to the complete verification of the Flow Measure. The repayment of the deployment will follow the water transfer framework described in the Water Transfer White Paper. During the drier months, the Flow Measure could be temporarily stored in Lake Oroville prior to its deployment.
3. The Flow Measure will be deployed above the reference flows and will be demonstrated as an increase to the total Feather River releases from the Oroville Complex. DWR will track the total releases that includes the Feather River reference flow and Flow Measure flow and will coordinate with DWR/USBR's Delta tracking of the Flow Measure deployments.
    a. Demonstrate Flow Measure deployments.
        i. Prior to any Flow Measure deployment, an identification of the reference flow will be performed.
        ii. An additional release increase will demonstrate Flow Measure deployment and will include associated ramping rates above the reference flow.
    b. Demonstrate Flow Measure deployment flows in accordance with the Delta Accounting Procedures.
    c. Flow measures occurring prior to flood control operations, will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of recovery water from reduced local diversions.

3.3 Feather Flow Measure Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper which were prepared by DWR and USBR in coordination with the State Water Board.

<u>Flow Measures using Cropland Fallowing:</u>

1. The Feather Flow Measure from the FRSA is presumed to be based on fallowed rice fields.
2. To account for the water made available through cropland fallowing, FRSA contractors must provide the following <u>by March 1st</u>:
    a. Identify the parcels to be fallowed.
    b. A mutually agreeable methodology for reimbursement, in the event of any volume shortage determined after the final verification.
3. The following steps are needed to verify that the Feather Flow Measure was made available from FRSA fallowed rice fields during the typical irrigation season:
    a. Cropland with planting (without Flow Measure) conditions – estimate crop acreages without Flow Measure.
    b. Verify available water – based on the acreage to volume relationship as mutually agreed.

    c. Reporting – during the typical irrigation period, FRSA contractor(s) must report the fallowing activities to DWR.
4. Monitoring and verification – FRSA contractor(s) and DWR agree on the monitoring program; FRSA will provide crop maps and access to fields, and DWR will conduct the field monitoring activities. To minimize the socioeconomic effects on local areas, the eligible fallowed cropland acreage is limited to 20% of recent harvested crop acreage by FRSA contractors.
5. Other environmental considerations need to be assessed for the rice fields and irrigation/drainage ditches in FRSA to provide forage and habitat for terrestrial wildlife and waterfowls, including the giant garter snake listed as a threatened species under ESA/CESA.

Flow Measures using Groundwater Substitution:

1. To account for the Flow Measure made available through groundwater substitution, FRSA contractor(s) must provide the following by March 1st:
    a. The proposed amount of increased groundwater pumping to provide Flow Measure for spring deployment.
    b. A mutually agreeable value for the streamflow depletion factor.
    c. A mutually agreeable methodology for reimbursement, in the event of any volume shortage determined after the final verification.
2. Consistency with the applicable Groundwater Sustainability Plans (GSPs) under the Sustainable Groundwater Management Act (SGMA) is crucial for the groundwater basin or nearby subbasins.
3. Other components needed to verify Flow Measure contribution:
    a. Documentation of surface water rights to the quantity the amount of surface water diversion forgone by additional groundwater pumping.
    b. Location and characteristics of the groundwater wells used.
    c. Historic groundwater pumping records to establish an appropriate baseline groundwater pumping volumes that would occur absent the Flow Measure.
    d. During the typical irrigation period, FRSA contractor(s) must report the flow meter measurements to DWR.
    e. A monitoring plan designed to assess the Flow Measure effects.
    f. A mitigation plan designed to alleviate possible injury to other legal users of water.

Flow Measures using Reservoir Re-Operation:

1. Flow Measures associated with upstream reservoir re-operation will be made available at upstream reservoirs when that reservoir releases water in excess of what would be released annually under normal operations. The Flow Measure must be released at a time when the flow can be re-released through Oroville Complex for downstream benefits.
2. To account for the water made available through reservoir re-operation, upstream reservoirs operators must provide the following by March 1st:
    a. An upstream reservoir operations baseline includes normal operating conditions, normal end-of-season storage, and typical release patterns.
    b. Factors such as annual hydrology, agency demand, and instream requirements are needed to develop a variety of hydrologic baseline conditions.

   c. Information needs to be provided to ensure the quantity of Flow Measure water as the additional storage is released.
   d. Other information includes but not limited to recent years' reservoir operating data, historic and forecast inflows and water demands, instream requirements, and flood control diagram.
3. Reservoir release, storage data, and gauge records downstream of reservoir will be required during the deployment period to verify the Flow Measure.
4. Refill criteria are required to ensure that the refill of vacated space from a Flow Measure does not injure other legal users of water. The refill can take place during conditions in agreement with DWR and USBR. Typically, refill occurs during periods when any downstream reservoir has filled or reached flood control operations and when Delta is in excess condition. The refill period can span several years if the hydrology in subsequent years is insufficient to allow refill.

Yuba Draft Quantitative Flow Accounting Procedures

Date Drafted: 12/20/2023

Revised 02/12/2024, 07/23/24

Drafted by: S. Grinnell

1 Definitions

"Accord Accounting" means the flow accounting defined in Exhibit 1 "Accounting Principles" of the WPA.

"**HRL**" means the Healthy Rivers and Landscapes Program

"HRL Reference Flows" mean (1) the Yuba River flow at the Marysville Gage that would have been present without any YWA HRL Component B operations; or (2) "Baseline Flow" in the Accord Accounting for use when determining YWA's HRL Component A deployment.

"Released Transfer Water" means the average daily flows measured at the Marysville Gage that are greater than the Accord Baseline Flows. "Released Transfer Water" is further described in Section 4.2 of the Accord Accounting along with a description of Accord Baseline Flows

"Refill" is a condition of reduced releases from New Bullards Bar Reservoir as a result of the release of YWA HRL Component A or B flows as compared with the releases that would occur with YWA operations for HRL Reference Flows. These reduced releases typically result from diversions to New Bullards Bar Reservoir storage to fill space evacuated as a result of HRL releases.

"**SVI**" means the Sacramento Valley Index as Published by DWR in Bulletin 120

"**VA Component A**" means the Released Transfer Water that occurs during April, May and June and is not accounted as Delivered Transfer Water nor accounted as backed into Project storage as defined in the Accord Accounting

"**VA Component B**" means water that is made available under the YWA Implementation Agreement through releases of stored water from New Bullards Bar Reservoir to achieve an end of September Storage of 600,000 AF and which are not releases to comply with the Accord required instream flows other water right terms, FERC license requirements and USACE required releases.

"WPA" means the WA-DWR Yuba Accord Water Purchase Agreement, as amended.

"YRDP" means the Yuba River Development Project.

"**Yuba Accord**" means the Lower Yuba River Accord consisting of the WPA, a Fishery Agreement as implemented by SWRCB Water Right Order 2008-0025, and Conjunctive Use Agreements between YWA and its Member Units.

2 Flow Measures

The YWA HRL Implementation Agreement includes two quantifiable water components:

- VA Component A, Accord Released Transfer Water occurring in April, May and June that cannot be backed into SWP or CVP storage upstream from the Delta or exported by DWR; and

- VA Component B, storage releases from New Bullards Bar Reservoir that occur by operating to a new target storage level for September 30th of 600,000 AF, 50,000 AF below the Accord target storage of 650,000 AF and which are not releases to comply with the Accord required instream flows, other water right terms and FERC license requirements.

Both HRL Components are to be provided in SVI Above Normal, Below Normal and Dry water year types and will be accounted for three flow conditions based on mean daily flow at USGS Gage 11421000, Yuba River near Marysville:

- Accord Baseline flows (the baseline used for Accord transfer releases and described in the Accord Accounting
- VA Reference Flows (the flows that occur with operation to the Yuba Accord required flows that are the Reference flow for HRL storage releases
- Recorded flows at the gage that includes the HRL storage releases.

3 Flow Measure Accounting

3.1 Reference Flows

VA operations are intended to be supplemental to the Yuba Accord flows and YRDP operations. The YWA Reference Flow includes two sets of flows for comparison to HRL deployment flows. The reason for two sets of Reference flows is to account for the two types (Components A and B) of YWA HRL Program flows.

YWA HRL Program Component A flows are accounted against the HRL Reference Flow ("Baseline" in Accord Accounting terms) for the Yuba Accord, which include the following and are more fully described In Exhibit 1 to the WPA–

- RD-1644 Interim required flows (Water Right Order 2003-0016);
- Target storage in New Bullards Bar Reservoir for 9/30 of no more than 705 TAF;
- FERC license-required flows and operational terms for Project 2246
- New Bullards Bar Reservoir Water Control Manual;
- Water Service Agreements to the eight Member Units, and
- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

YWA HRL Program Component B flows are accounted against the HRL Reference Flows that would occur absent a YWA HRL deployment, which include –

- Yuba Accord Required Flows (SWRCB Water Right Order 2008-0025);
- Target storage in New Bullards Bar Reservoir for 9/30 of 650TAF;
- FERC license required flows and operational terms for Project 2246;
- New Bullards Bar Reservoir Water Control Manual;
- Water Service Agreements to the eight Member Units; and

- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

3.2 Measuring YWA HRL Deployment above Reference Flow

VA Component A flows are Released Transfer Water under the Accord in April, May and June that cannot be backed into north-of-Delta CVP or SWP storage or exported from the Delta. HRL Component B flows are deployed by releasing water from New Bullards Bar Reservoir that would otherwise remain in storage at the end of September between 650,000 AF and 600,000 AF (elevation 1,881.45 ft msl and elevation 1,867.63 ft msl), resulting in an end of September storage to achieve a total of 50,000 AF to contribute to Delta outflow. The YWA HRL proposal includes accounting for refill of storage releases for both the YWA Components A and B that are compensated volumes and are determined to have impacted CVP and SWP water supplies. However, refilling of YWA HRL Component A evacuated storage will be tracked and calculated in the Yuba Accord accounting while YWA HRL Component B refill will be tracked using a separate refill accounting specific to the Component B releases. Refill impacts will be repaid with future YRDP storage releases.

Accord Released Transfer Water flows dedicated to Delta outflow (YWA HRL Flow Component A Water) accounting principles are already documented in the Yuba Accord Exhibit 1 Accounting Principles except for specific terms listed below to provide for the differences between the YWA HRL Program flows and the Accord transfer program. The Yuba Accord transfer program accounting is meant to ensure that only water that is released and exported for delivery to a participating water user is accounted, while HRL program accounting is intended to determine volumes of water exiting the Yuba River that will result in Delta outflow (with the cooperation of the CDWR and the USBR). The specific terms applicable to YWA HRL Component A flows compared to Yuba Accord Delivered Transfer Water are,

- YWA HRL Component A flows will meet the requirements of Accord Released Transfer Water
- YWA HRL Component A flows are Released Transfer Water that occur only in April, May and June
- YWA HRL Component A flows can be accounted for in Balanced Conditions, Excess Conditions or under Excess with Restrictions
- YWA Component A flows are accounted for on the day the flow occurs and do not include any backing of this water into north-of-Delta CVP or SWP storage for later release

Scheduling of HRL Component B releases will be based on the information available at the time releases are scheduled and may need to be adjusted through the springtime for changing conditions. YWA will prepare forecasts of operations of the YRDP and resulting flows for release of HRL water. These forecasts will be compared to forecasts that are prepared for Yuba Accord operations (including Accord baseline operations) to determine the additional storage releases that are accounted for HRL purposes. Springtime Accord Released Transfer Water (as defined in the WPA accounting) will also be forecast as required in the WPA and will be accounted as HRL Component A through the Accord accounting.

YWA will prepare preliminary operations plans for release of HRL water in coordination with DWR, USBR and CDFW and as required for coordination with other HRL agreements. Prior to April 1, the earliest possible date for release of HRL Component B water, YWA will meet with CDFW, DWR and USBR to discuss and formulate the preliminary operations plan using information provided by DWR and USBR on Delta conditions and SWP and CVP forecasted operations. YWA may begin a release from New Bullards Bar Reservoir for HRL purposes as early as April 1 based on this planning. YWA will revise the plan as new forecast information is available but will finalize the plan in most years no later than May 15th.

3.3 Real Water Verification

As described above, HRL Component A releases to meet the requirements for Accord Released Transfer Water (as determined by DWR, with concurrence by USBR), have been affirmed by the SWRCB to be new water to the system that meets the requirements of Water Code section 1736 to not result in injury to legal users of water. HRL Component B will also meet the requirements of Released Transfer Water. Verification for both components will be done through submission to DWR and USBR of the previously used Accord Accounting spreadsheets and supporting documentation, augmented to include HRL flow tracking and accounting.

Released Transfer Water is detailed in the Accord Accounting, through the definition of a Baseline (VA Reference Flow is the term used herein), without transfer flow determination that employs two control points: (1) end-of-day New Bullards Bar Reservoir storage recorded by YWA and reported on the California Data Exchange Center (CDEC) website; and (2) Mean daily flows calculated (for HRL reference flow determination) and measured and reported at the USGS Gage 11421000 Yuba River near Marysville.

Two measurements are used to determine the Reference Flow condition (Baseline flows in Accord Accounting terms):

- The end-of-September New Bullards Bar Reservoir storage of 705 TAF, originally included as a term in the YWA-PG&E Power Purchase Contract that ran from 1966 to 2016, defines the storage condition for calculating the YWA HRL Component A deployment reference flow.
- The Mean Daily Flow at the USGS Gage 11421000 Yuba River near Marysville, with YWA operations to comply with SWRCB Decision 1644 Interim flow requirements. In some instances, the USGS Gage “Yuba River Below Englebright Dam Near Smartsville” #11418000 is also used for calculating Reference Flow conditions

Different measurements, at the same control points are used to determine the HRL Reference Flow for YWA HRL Component B deployment:

- An end-of-September New Bullards Bar Reservoir storage of 650TAF, as used for the Yuba Accord WPA, defines the storage condition for calculating the HRL Component B deployment reference flow. YWA HRL Component B deployment will be determined as the amount of storage evacuated, if, without the YWA HRL Component B deployment, end-of-September New Bullards Bar Reservoir storage would have been between 650TAF to 600TAF.
- The mean daily flow at USGS gage 11421000, Yuba River near Marysville, with YWA operations to comply with the Accord required instream flows, as implemented by SWRCB Order 2008-0025.

American Draft Quantitative Flow Accounting Procedures

Date Drafted: January 9, 2024

Updated: July 29, 2024

Drafted by: Michelle Banonis, Regional Water Authority

1 Definitions

Call Year: a year type in which outflow will be provided and "called for" after assessing operational conditions and constraints and conferral among the American River Parties, in coordination with Reclamation. Call years will occur in three out of eight AN or BN year and three out of eight D or C year types. Therefore, depending on resulting water year types over the eight-year term of the HR&LP, there could be six call years.

HR&LP Releases: The amount of water released by Reclamation out of Folsom Reservoir for the purpose of meeting the American River HR&LP flow commitments.

Replenishment: The amount of water made available by American River Parties made equal to the amount of HR&LP releases by Reclamation out of Folsom Reservoir.

Master Flow Ledger (MFL): A document that will be updated regularly to keep an accounting of HR&LP Releases and Replenishment and will serve as a ledger that will tally and summarize the total amount of HR&LP releases by Reclamation and replenishment provided by each American River Party during the current reporting period and the total over the term of the HR&LP. It is anticipated that the accounting will look similar to what has been reported in the past for water transfers. During flow deployment and replenishment, this information will be provided on a monthly basis.

Reference Flow and/or Reference Operation: The flow or operation that would normally occur without HR&LP flow measures.

2 Flow Measures

Folsom Reservoir Releases

Reclamation, which operates Folsom Reservoir, will operate the reservoir to provide the American River Parties' flow contributions to the Lower American River in March through May of a call year. This will include the quantities below for the identified water year types.

Upstream Reservoir Releases

American River Parties with reservoirs upstream of Folsom Reservoir will operate their reservoirs to collectively contribute 10 TAF per year to augment Lower American River (LAR) flows in Above Normal (AN) and Below Normal (BN) water years[1]. Calls for this water will be made in a total of three AN or BN water years during the eight-year term of the HR&LP, provided that recommendations from the American River Parties, in coordination with Reclamation, warrant a call year.

[1] Based on the Sacramento River Index.

Groundwater Contributions

American River Parties with groundwater pumping capabilities will collectively contribute 30 TAF per year to augment LAR flows in Dry (D) and (Critical) C water years. Calls for this water will be made in a total of three C or D water years during the eight-year term of the HR&LP, provided that recommendations from the American River Parties, in coordination with Reclamation, warrant a call year.

Dry Year Water from Either or Both Upstream Reservoir Operation and Groundwater

Provided funding is made available, replenishment of an additional 10 TAF per year to augment LAR flows in D years may occur from upstream reservoir operation, groundwater, or both, in a total of 3 years.

These flow measures are also discussed in Section 2.6.1 of the Draft Strategic Plan.

3 Flow Measure Accounting

3.1 Reference Flow

Lower American River

Reference flow releases in the Lower American River are the flows resulting from meeting either flood control or water supply including Delta requirements in absence of the American River Flow Measure, and are controlled by Reclamation through the operation of Folsom Reservoir. The reference Folsom releases include the resulting flows from meeting the following:

1. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, and Biological Opinions.
2. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.
3. The March 29, 2021 Memorandum of Understanding between the United States of America Department of the Interior, Bureau of Reclamation and Sacramento Water Forum for Coordination of Communication and Information-Sharing Activities Related to Lower American River Operations (Water Forum-Reclamation MOU).
4. SWRCB's D893 Decision on Major Applications to Appropriate Water from American River System.

Upstream Reservoirs

Reservoirs upstream of Folsom Reservoir are managed by upstream water providers, and Reference Flow releases are made to meet many existing requirements including but not limited to:

1. Consumptive demands within their service territories.
2. Non-consumptive (hydropower) uses.
3. Terms and conditions of applicable water rights (i.e. points and seasons of diversion, places of use, etc.).
4. Federal Energy Regulatory Commission (FERC) licenses, including, as applicable, water quality certifications, minimum instream flow requirements, recreational flow or lake level requirements, etc.
5. California Department of Fish and Wildlife Streamflow Modification Agreements

6. Division of Safety of Dams requirements.
7. Applicable contractual or legally binding agreements

The reservoir operators regularly update their projected operational and spill releases primarily based on an ensemble of hydrologic projections. Those reservoir operators that provide hydropower generation must also consider energy market forecasts in their ensemble projections. Early in the water year the range of hydrologic and energy market projections vary widely. By the summertime, the hydrologic factors are well established, but energy markets will still fluctuate widely depending on a number of influencing factors such as heat waves, high energy demands, transmission outages, or supply constraints.

A key factor for determining Reference Flows is a carryover storage target that the modeling and constraints described above must consider. A volume and pattern of release is estimated for each scenario to achieve a certain carryover target. Those projections must be regularly updated to account for uncertainties and observed conditions. The HR&LP flow commitments are modeled in addition to the Reference Flows and generally result in a lower carryover storage than would have otherwise been targeted absent those added releases. The future daily anticipated Reference Flows and additional HR&LP Flows would be included in an accounting sheet and updated monthly with the observed values as well as the updated deterministic projections.

Groundwater

Groundwater suppliers in the American River region provide water through conjunctive use, meaning the aquifer is recharged and surface water diversions are used during times of plentiful water supply, and groundwater is pumped during dry times. Therefore, conditions that create a referenced baseline[2] consists of groundwater production in D and C years, along with used surface water entitlements. This program of conjunctive use is made consistent with permits and regulatory requirements, including:

1. Sustainable Groundwater Management Act.
2. State Water Resources Control Board – Department of Drinking Water permits, Public Water System Number 3410020, permit number 01-09-06-PER-003 and subsequent amendments.
3. Department of Toxic Substance & Control permits through California Environmental Protection Agency.
4. Total Coliform Rule.

3.2 HR&LP Flow Deployment above Reference Flow

Deployment, Folsom Reservoir Releases

In March through May, provided it is a call year, Reclamation will provide a spring pulse flow release of from Folsom Reservoir, based on the water year type identified, measured at Nimbus Dam, in addition to releases required to meet Central Valley Project obligations.

Deployment and Replenishment, Upstream Reservoir Releases

[2] Groundwater use in combination with reduced surface diversions are not deemed “reference flow” for this purposes of this document. This is because there is variability of where groundwater is pumped and where surface water diversions are reduced and depending on whether an agency is upstream or downstream of Folsom Reservoir (discussed in 3.1.3).

In March through September, operators upstream of Folsom Reservoir will replenish the flows made by Reclamation at Folsom Dam by making additional releases from reservoirs, beyond Reference Flow to meet existing instream flow obligations above Folsom Reservoir, consumptive demands and other requirements described above. Replenishment releases above Reference Flow would have otherwise remained in upstream storage and will be documented in the MFL as set forth below in section 3.1.3.

Deployment and Replenishment, Groundwater Contributions

Starting as early as March, American River Parties will pump groundwater to replenish the flows made by Reclamation and Replenishment will be complete within 12 months following the date that water is called for. The amount of additional groundwater pumped beyond baseline (explained further in 3.1.3) will provide an equivalent reduction in diversions, which will result in the same amount of outflow in the American River. In addition, there may be pumping beyond that identified for the HR&LP for water transfers, which would not be included in the baseline or accounting discussed here.

In Dry years, the additional 10TAF of deployment and replenishment will follow one or both of the processes outlined above.

3.3 Measurement and Real Water Verification

Deployment, Folsom Reservoir Releases

- All Reference and HR&LP Releases from Folsom Reservoir will be measured at the lowest point of control by Reclamation at Nimbus Dam.
- Prior to the HR&LP Flow Deployment from Folsom Reservoir, Reclamation will provide their anticipated operational releases (Operations Plan) for both the Reference and HR&LP Release scenarios. This operations plan will be an estimate of releases and is intended to be a best guess of future conditions. Actual releases will vary from the Operations Plan depending on hydrology, upstream operations, flood management, consumptive demands, and instream flow requirements.
- To verify the deployment of HR&LP flow measures on a monthly basis, Reclamation will provide accounting of Reference and HR&LP releases on a daily time step, specific to the American River Parties' contributions.
- This monthly accounting will include the Reference Flow prior to the commencement of, and at the conclusion of, the spring HR&LP Releases.
- Reclamation will confirm the flow releases and regularly provide it in writing to the American River Parties for inclusion in the MFL.
- Flow measures occurring prior to flood control operations will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of replenished water from local HR&LP flow actions.

Deployment and Replenishment, Upstream Reservoir Releases

- All Reference and HR&LP Releases from Upstream Reservoirs will be measured at existing gauge or meter locations at the lowest point of control by the Upstream Reservoir Operators. (We will provide these as needed. For example Placer County Water Agency releases and measures at Oxbow Powerhouse on the Middle Fork American River).
- Prior to the HR&LP Flow Deployment from Upstream Reservoirs, the operators will provide their anticipated operational releases (Operations Plan) for both the Reference and HR&LP Release

scenarios. This Operations Plan will be an estimate of releases and is intended to be a best guess of future conditions. Actual releases will vary from the Operations Plan depending on hydrology, flood management, consumptive demands, energy demands, and instream flow requirements.

- To verify the deployment of HR&LP flow measures, the operators will provide accounting of Reference and HR&LP releases, specific to the American River Parties' contributions. This will be tallied in a spreadsheet such as is provided in Section 4.
- This monthly accounting will include the Reference Flow prior to the commencement of, and at the conclusion of, the spring HR&LP Releases.
- The Upstream Operators will confirm the flow releases and regularly provide it in writing to the American River Parties for inclusion in the MFL.
- Flow released from upstream reservoirs for Replenishment will appear in Folsom Reservoir as storage to replenish prior releases from Folsom Reservoir to meet the HR&LP Flow Deployment.
- At the conclusion of the Replenishment period, upstream operators, in coordination with the Reclamation, will confirm the Replenishment that was provided and put the final tally in the MFL.

Deployment and Replenishment, Groundwater Contributions

- Prior to foregoing surface water diversions and increasing groundwater pumping in a call year for Replenishment, American River Parties with groundwater pumping capabilities, in coordination with Reclamation, will determine baseline groundwater pumping for the participating agencies.
- Baseline groundwater pumping will be determined for each participating agency by averaging the most recent three years of groundwater pumping in non-groundwater substitution (transfer) years and non-curtailment years. Unless an outstanding issue makes this three-year average unreasonable, in which case the participating agency will propose an alternative to Reclamation and seek agreement. If a year is determined to be unrepresentative, American River Parties will request it be removed from the three-year average.
- Baseline determinations will not include groundwater well maintenance pumping actions.
- Credit for replenishment will be given for groundwater pumping that exceeds baseline groundwater pumping.
- Groundwater providers will show a regular accounting of pumping above their baseline and will provide this information in the MFL.
- Groundwater providers will use existing monitoring well loggers to measure and account for well production and will provide this information for inclusion in the MFL.
- Increasing groundwater pumping and foregoing surface water diversions below Folsom Reservoir will result in increased outflow from the Lower American River. In order for replenishment to be realized, Reclamation would reduce releases from Folsom Reservoir by an equivalent amount of foregone diversions.
- Increasing groundwater pumping and foregoing surface water diversions at or above Folsom Reservoir will result in increased storage in Folsom Reservoir. This would provide direct replenishment of flows to the reservoir, which would be accounted for by those groundwater providers and Reclamation.
- Total surface water entitlements will be compared with groundwater replenishment made available to determine foregone diversions.
- Groundwater replenishment through pumping is a direct reduction observed through surface water diversions. The accounting will indicate what actual diversions were and the pumping will

be added to that total to show what diversions would have been in absence of the HR&LP contribution.

- At the conclusion of the Replenishment period, groundwater providers, in coordination with the ORG, will confirm the Replenishment that was provided for inclusion in the MFL.

4 Supplemental Information

Below is an example accounting tracker spreadsheet. This is the type of spreadsheet that would be used to report out on reservoir operations to make outflow available for the HR&LP[3]. The column headings provide the following information:

Upstream Reservoirs[4] Heading:
Upstream Reoperation: The quantification of upstream water providers' additional release of flows from upstream reservoirs to Folsom Reservoir to replenish flows released by Reclamation to meet HR&LP needs.

Cumulative Upstream Reoperation: The total amount of additional flow released by upstream water providers to Folsom Reservoir as of the specified date.

Upstream Reservoir Storage (Reference): The planned storage at the specified upstream reservoir absent releases made to replenish Folsom Reservoir for the HR&LP. This reference operation may be variable depending on water year type, local conditions, power demands, operational constraints, or other circumstances.

Upstream Reservoir Storage (HRLP): The storage at the specified upstream reservoir including evacuated storage made to replenish Folsom Reservoir for the HR&LP.

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
3/1/2018	0	0	165,045	165,045
3/2/2018	0	0	165,353	165,353
3/3/2018	0	0	165,605	165,605
3/4/2018	0	0	165,824	165,824
3/5/2018	0	0	165,872	165,872
3/6/2018	0	0	165,952	165,952
3/7/2018	0	0	165,992	165,992
3/8/2018	0	0	166,367	166,367
3/9/2018	0	0	166,856	166,856
3/10/2018	0	0	167,394	167,394
3/11/2018	0	0	168,032	168,032

[3] This tracking spreadsheet should be highly coordinated with Reclamation's tracking spreadsheet.

[4] Upstream reservoirs for the American River that may make flows available to Folsom Reservoir for the HR&LP may include Hell Hole (PCWA), French Meadows (PCWA), Jenkinson (EID), Weber (EID), Stumpy Meadows (GDPUD), and Sugar Pine (FPUD). The specific reservoir names will be provided in the tracking spreadsheet but are not included here as this is intended to be an example only.

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
3/12/2018	0	0	168,760	168,760
3/13/2018	0	0	171,684	171,684
3/14/2018	0	0	173,402	173,402
3/15/2018	0	0	174,593	174,593
3/16/2018	0	0	175,751	175,751
3/17/2018	0	0	176,497	176,497
3/18/2018	0	0	176,978	176,978
3/19/2018	0	0	177,524	177,524
3/20/2018	0	0	178,103	178,103
3/21/2018	0	0	183,047	183,047
3/22/2018	0	0	197,776	197,776
3/23/2018	0	0	202,508	202,508
3/24/2018	0	0	204,947	204,947
3/25/2018	0	0	206,386	206,386
3/26/2018	0	0	207,322	207,322
3/27/2018	0	0	208,611	208,611
3/28/2018	0	0	210,339	210,339
3/29/2018	0	0	212,291	212,291
3/30/2018	0	0	214,570	214,570
3/31/2018	0	0	216,932	216,932
4/1/2018	0	0	219,442	219,442
4/2/2018	0	0	221,892	221,892
4/3/2018	0	0	224,265	224,265
4/4/2018	0	0	226,024	226,024
4/5/2018	0	0	228,492	228,492
4/6/2018	0	0	237,270	237,270
4/7/2018	0	0	258,456	258,456
4/8/2018	0	0	263,978	263,978
4/9/2018	0	0	267,037	267,037
4/10/2018	0	0	269,230	269,230
4/11/2018	0	0	270,895	270,895
4/12/2018	0	0	271,862	271,862
4/13/2018	0	0	272,242	272,242
4/14/2018	0	0	272,835	272,835

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
4/15/2018	0	0	273,617	273,617
4/16/2018	0	0	274,212	274,212
4/17/2018	0	0	274,392	274,392
4/18/2018	0	0	275,070	275,070
4/19/2018	0	0	275,441	275,441
4/20/2018	0	0	275,172	275,172
4/21/2018	0	0	275,590	275,590
4/22/2018	0	0	276,533	276,533
4/23/2018	0	0	277,620	277,620
4/24/2018	0	0	278,683	278,683
4/25/2018	0	0	280,109	280,109
4/26/2018	0	0	281,731	281,731
4/27/2018	0	0	283,377	283,377
4/28/2018	0	0	284,712	284,712
4/29/2018	0	0	285,575	285,575
4/30/2018	0	0	285,522	285,522
5/1/2018	0	0	285,741	285,741
5/2/2018	0	0	285,861	285,861
5/3/2018	0	0	286,133	286,133
5/4/2018	0	0	287,148	287,148
5/5/2018	0	0	287,922	287,922
5/6/2018	0	0	289,011	289,011
5/7/2018	0	0	290,079	290,079
5/8/2018	0	0	291,169	291,169
5/9/2018	0	0	292,463	292,463
5/10/2018	0	0	293,417	293,417
5/11/2018	0	0	294,239	294,239
5/12/2018	0	0	295,082	295,082
5/13/2018	0	0	295,738	295,738
5/14/2018	0	0	296,160	296,160
5/15/2018	0	0	296,782	296,782
5/16/2018	0	0	297,171	297,171
5/17/2018	0	0	297,693	297,693
5/18/2018	0	0	297,982	297,982

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
5/19/2018	0	0	298,293	298,293
5/20/2018	0	0	298,382	298,382
5/21/2018	0	0	298,050	298,050
5/22/2018	0	0	297,519	297,519
5/23/2018	0	0	297,108	297,108
5/24/2018	0	0	297,341	297,341
5/25/2018	0	0	297,678	297,678
5/26/2018	0	0	298,197	298,197
5/27/2018	0	0	298,595	298,595
5/28/2018	0	0	299,016	299,016
5/29/2018	0	0	298,361	298,361
5/30/2018	0	0	298,196	298,196
5/31/2018	0	0	297,653	297,653
6/1/2018	0	0	296,980	296,980
6/2/2018	0	0	296,252	296,252
6/3/2018	0	0	295,677	295,677
6/4/2018	0	0	294,840	294,840
6/5/2018	0	0	293,918	293,918
6/6/2018	0	0	292,939	292,939
6/7/2018	0	0	292,852	292,852
6/8/2018	0	0	292,155	292,155
6/9/2018	0	0	291,644	291,644
6/10/2018	0	0	291,496	291,496
6/11/2018	0	0	290,811	290,811
6/12/2018	0	0	289,859	289,859
6/13/2018	0	0	289,139	289,139
6/14/2018	0	0	288,422	288,422
6/15/2018	0	0	287,703	287,703
6/16/2018	0	0	287,211	287,211
6/17/2018	0	0	286,725	286,725
6/18/2018	0	0	286,305	286,305
6/19/2018	0	0	285,921	285,921
6/20/2018	0	0	285,360	285,360
6/21/2018	0	0	284,943	284,943

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
6/22/2018	0	0	284,288	284,288
6/23/2018	0	0	284,030	284,030
6/24/2018	0	0	283,673	283,673
6/25/2018	0	0	283,216	283,216
6/26/2018	0	0	282,777	282,777
6/27/2018	0	0	282,210	282,210
6/28/2018	0	0	281,762	281,762
6/29/2018	0	0	280,991	280,991
6/30/2018	0	0	280,088	280,088
7/1/2018	0	0	279,560	279,560
7/2/2018	0	0	279,106	279,106
7/3/2018	0	0	278,499	278,499
7/4/2018	0	0	277,992	277,992
7/5/2018	0	0	276,958	276,958
7/6/2018	0	0	275,734	275,734
7/7/2018	0	0	274,537	274,537
7/8/2018	0	0	273,342	273,342
7/9/2018	0	0	272,211	272,211
7/10/2018	0	0	271,058	271,058
7/11/2018	0	0	269,339	269,339
7/12/2018	0	0	267,621	267,621
7/13/2018	0	0	265,873	265,873
7/14/2018	0	0	264,555	264,555
7/15/2018	0	0	263,147	263,147
7/16/2018	0	0	261,780	261,780
7/17/2018	0	0	260,753	260,753
7/18/2018	0	0	259,617	259,617
7/19/2018	0	0	258,351	258,351
7/20/2018	0	0	257,056	257,056
7/21/2018	0	0	255,845	255,845
7/22/2018	0	0	254,562	254,562
7/23/2018	0	0	252,841	252,841
7/24/2018	0	0	250,922	250,922
7/25/2018	0	0	249,085	249,085

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
7/26/2018	0	0	247,256	247,256
7/27/2018	0	0	245,441	245,441
7/28/2018	0	0	244,441	244,441
7/29/2018	0	0	242,840	242,840
7/30/2018	0	0	240,962	240,962
7/31/2018	0	0	239,150	239,150
8/1/2018	200	200	237,506	237,306
8/2/2018	200	400	235,854	235,454
8/3/2018	200	600	234,457	233,857
8/4/2018	200	800	233,350	232,550
8/5/2018	200	1,000	232,181	231,181
8/6/2018	200	1,200	230,792	229,592
8/7/2018	200	1,400	228,929	227,529
8/8/2018	200	1,600	227,001	225,401
8/9/2018	200	1,800	225,754	223,954
8/10/2018	200	2,000	224,508	222,508
8/11/2018	200	2,200	223,162	220,962
8/12/2018	200	2,400	221,817	219,417
8/13/2018	200	2,600	220,572	217,972
8/14/2018	200	2,800	219,232	216,432
8/15/2018	200	3,000	217,595	214,595
8/16/2018	200	3,200	216,401	213,201
8/17/2018	200	3,400	215,181	211,781
8/18/2018	200	3,600	214,035	210,435
8/19/2018	200	3,800	212,750	208,950
8/20/2018	200	4,000	211,490	207,490
8/21/2018	200	4,200	210,305	206,105
8/22/2018	200	4,400	209,095	204,695
8/23/2018	200	4,600	208,778	204,178
8/24/2018	200	4,800	208,678	203,878
8/25/2018	200	5,000	208,678	203,678
8/26/2018	200	5,200	208,678	203,478
8/27/2018	200	5,400	208,578	203,178
8/28/2018	200	5,600	201,708	196,108

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
8/29/2018	200	5,800	200,494	194,694
8/30/2018	200	6,000	199,208	193,208
8/31/2018	200	6,200	198,045	191,845
9/1/2018	200	6,400	196,646	190,246
9/2/2018	200	6,600	195,368	188,768
9/3/2018	200	6,800	194,108	187,308
9/4/2018	200	7,000	192,833	185,833
9/5/2018	200	7,200	192,297	185,097
9/6/2018	200	7,400	192,183	184,783
9/7/2018	200	7,600	192,085	184,485
9/8/2018	200	7,800	190,890	183,090
9/9/2018	200	8,000	190,288	182,288
9/10/2018	200	8,200	190,288	182,088
9/11/2018	200	8,400	187,142	178,742
9/12/2018	200	8,600	185,869	177,269
9/13/2018	200	8,800	184,581	175,781
9/14/2018	200	9,000	183,469	174,469
9/15/2018	200	9,200	182,022	172,822
9/16/2018	200	9,400	180,709	171,309
9/17/2018	200	9,600	179,389	169,789
9/18/2018	200	9,800	178,116	168,316
9/19/2018	200	10,000	176,877	166,877
9/20/2018	0	10,000	176,116	166,116
9/21/2018	0	10,000	175,013	165,013
9/22/2018	0	10,000	174,015	164,015
9/23/2018	0	10,000	173,104	163,104
9/24/2018	0	10,000	172,112	162,112
9/25/2018	0	10,000	171,118	161,118
9/26/2018	0	10,000	170,113	160,113
9/27/2018	0	10,000	169,110	159,110
9/28/2018	0	10,000	168,091	158,091
9/29/2018	0	10,000	167,146	157,146
9/30/2018	0	10,000	166,083	156,083
10/1/2018	0	10,000	165,531	155,531

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
10/2/2018	0	10,000	165,174	155,174
10/3/2018	0	10,000	164,996	154,996
10/4/2018	0	10,000	165,044	155,044
10/5/2018	0	10,000	164,859	154,859
10/6/2018	0	10,000	164,650	154,650
10/7/2018	0	10,000	164,442	154,442
10/8/2018	0	10,000	164,256	154,256
10/9/2018	0	10,000	163,965	153,965
10/10/2018	0	10,000	163,713	153,713
10/11/2018	0	10,000	163,494	153,494
10/12/2018	0	10,000	163,248	153,248
10/13/2018	0	10,000	163,002	153,002
10/14/2018	0	10,000	162,800	152,800
10/15/2018	0	10,000	162,545	152,545
10/16/2018	0	10,000	162,098	152,098
10/17/2018	0	10,000	161,741	151,741
10/18/2018	0	10,000	161,453	151,453
10/19/2018	0	10,000	161,677	151,677
10/20/2018	0	10,000	161,454	151,454
10/21/2018	0	10,000	161,237	151,237
10/22/2018	0	10,000	161,007	151,007
10/23/2018	0	10,000	160,778	150,778
10/24/2018	0	10,000	160,550	150,550
10/25/2018	0	10,000	160,312	150,312
10/26/2018	0	10,000	160,087	150,087
10/27/2018	0	10,000	159,851	149,851
10/28/2018	0	10,000	159,647	149,647
10/29/2018	0	10,000	159,417	149,417
10/30/2018	0	10,000	159,184	149,184
10/31/2018	0	10,000	158,948	148,948
11/1/2018	0	10,000	158,728	148,728
11/2/2018	0	10,000	158,501	148,501
11/3/2018	0	10,000	158,248	148,248
11/4/2018	0	10,000	158,038	148,038

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
11/5/2018	0	10,000	157,677	147,677
11/6/2018	0	10,000	157,381	147,381
11/7/2018	0	10,000	157,129	147,129
11/8/2018	0	10,000	156,981	146,981
11/9/2018	0	10,000	156,542	146,542
11/10/2018	0	10,000	156,305	146,305
11/11/2018	0	10,000	155,546	145,546
11/12/2018	0	10,000	154,617	144,617
11/13/2018	0	10,000	153,449	143,449
11/14/2018	0	10,000	152,398	142,398
11/15/2018	0	10,000	151,450	141,450
11/16/2018	0	10,000	150,617	140,617
11/17/2018	0	10,000	150,027	140,027
11/18/2018	0	10,000	149,429	139,429
11/19/2018	0	10,000	148,496	138,496
11/20/2018	0	10,000	147,634	137,634
11/21/2018	0	10,000	146,807	136,807
11/22/2018	0	10,000	146,914	136,914
11/23/2018	0	10,000	147,238	137,238
11/24/2018	0	10,000	148,203	138,203
11/25/2018	0	10,000	147,906	137,906
11/26/2018	0	10,000	147,287	137,287
11/27/2018	0	10,000	146,820	136,820
11/28/2018	0	10,000	146,948	136,948
11/29/2018	0	10,000	147,187	137,187
11/30/2018	0	10,000	146,875	136,875
12/1/2018	0	10,000	146,503	136,503
12/2/2018	0	10,000	145,781	135,781
12/3/2018	0	10,000	144,428	134,428
12/4/2018	0	10,000	143,452	133,452
12/5/2018	0	10,000	142,823	132,823
12/6/2018	0	10,000	141,711	131,711
12/7/2018	0	10,000	140,504	130,504
12/8/2018	0	10,000	139,588	129,588

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
12/9/2018	0	10,000	138,712	128,712
12/10/2018	0	10,000	137,448	127,448
12/11/2018	0	10,000	136,380	126,380
12/12/2018	0	10,000	135,687	125,687
12/13/2018	0	10,000	134,912	124,912
12/14/2018	0	10,000	134,526	124,526
12/15/2018	0	10,000	134,281	124,281
12/16/2018	0	10,000	133,964	123,964
12/17/2018	0	10,000	133,766	123,766
12/18/2018	0	10,000	133,585	123,585
12/19/2018	0	10,000	133,258	123,258
12/20/2018	0	10,000	133,003	123,003
12/21/2018	0	10,000	133,155	123,155
12/22/2018	0	10,000	133,078	123,078
12/23/2018	0	10,000	133,076	123,076
12/24/2018	0	10,000	134,221	124,221
12/25/2018	0	10,000	134,814	124,814
12/26/2018	0	10,000	134,477	124,477
12/27/2018	0	10,000	134,214	124,214
12/28/2018	0	10,000	133,605	123,605
12/29/2018	0	10,000	133,289	123,289
12/30/2018	0	10,000	133,088	123,088
12/31/2018	0	10,000	132,596	122,596
1/1/2019	0	10,000	131,754	121,754
1/2/2019	0	10,000	131,138	121,138
1/3/2019	0	10,000	130,605	120,605
1/4/2019	0	10,000	129,899	119,899
1/5/2019	0	10,000	129,797	119,797
1/6/2019	0	10,000	129,927	119,927
1/7/2019	0	10,000	129,675	119,675
1/8/2019	0	10,000	129,338	119,338
1/9/2019	0	10,000	129,894	119,894
1/10/2019	0	10,000	129,894	119,894
1/11/2019	0	10,000	129,671	119,671

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
1/12/2019	0	10,000	128,981	118,981
1/13/2019	0	10,000	127,897	117,897
1/14/2019	0	10,000	127,133	117,133
1/15/2019	0	10,000	126,043	116,043
1/16/2019	0	10,000	127,600	117,600
1/17/2019	0	10,000	130,628	120,628
1/18/2019	0	10,000	131,254	121,254
1/19/2019	0	10,000	131,951	121,951
1/20/2019	0	10,000	134,612	124,612
1/21/2019	0	10,000	135,920	125,920
1/22/2019	0	10,000	136,026	126,026
1/23/2019	0	10,000	135,747	125,747
1/24/2019	0	10,000	135,259	125,259
1/25/2019	0	10,000	134,437	124,437
1/26/2019	0	10,000	133,689	123,689
1/27/2019	0	10,000	132,956	122,956
1/28/2019	0	10,000	131,927	121,927
1/29/2019	0	10,000	131,079	121,079
1/30/2019	0	10,000	130,438	120,438
1/31/2019	0	10,000	129,441	119,441
2/1/2019	0	10,000	128,675	118,675
2/2/2019	0	10,000	130,632	120,632
2/3/2019	0	10,000	131,919	121,919
2/4/2019	0	10,000	132,500	122,500
2/5/2019	0	10,000	132,086	122,086
2/6/2019	0	10,000	131,171	121,171
2/7/2019	0	10,000	129,952	119,952
2/8/2019	0	10,000	128,754	118,754
2/9/2019	0	10,000	127,756	117,756
2/10/2019	0	10,000	126,882	116,882
2/11/2019	0	10,000	125,573	115,573
2/12/2019	0	10,000	124,225	114,225
2/13/2019	0	10,000	124,819	114,819
2/14/2019	0	10,000	134,976	124,976

Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HR&LP)
2/15/2019	0	10,000	137,357	127,357
2/16/2019	0	10,000	138,153	128,153
2/17/2019	0	10,000	138,061	128,061
2/18/2019	0	10,000	137,586	127,586
2/19/2019	0	10,000	136,748	126,748
2/20/2019	0	10,000	136,138	126,138
2/21/2019	0	10,000	135,026	125,026
2/22/2019	0	10,000	133,872	123,872
2/23/2019	0	10,000	132,813	122,813
2/24/2019	0	10,000	131,608	121,608
2/25/2019	0	10,000	130,757	120,757
2/26/2019	0	10,000	129,944	119,944
2/27/2019	0	10,000	129,792	119,792
2/28/2019	0	10,000	129,963	119,963
3/1/2019	0	10,000	129,589	119,589

Mokelumne Draft Quantitative Flow Accounting Procedures

Date Updated: July 22, 2024

Drafted by: EBMUD

1 Definitions

EBMUD – East Bay Municipal Utility District, agency that operates Pardee and Camanche dams on the Mokelumne River.

Joint Settlement Agreement (JSA) – 1998 agreement between EBMUD, California Department of Fish and Wildlife, and U.S. Fish and Wildlife Service that set minimum flow requirements for the Mokelumne River. These flow requirements were incorporated into Revised Water Right Decision 1641 and thereby into the Mokelumne River water rights of EBMUD and Woodbridge Irrigation District (WID).

PCC – Mokelumne River Partnership Coordinating Committee. See Appendix 2 (Governance Procedures) for more detail.

SWGC – The Systemwide Governance Committee of the Healthy Rivers and Landscapes Program.

Other capitalized terms used in this Appendix are defined in Appendix 1.

2 Flow Measures

As described in Appendix 1, the Implementing Entities will provide the HRL Flow Contribution. The HRL Flow Contribution is defined in Section I.A.3 of Appendix 1. The HRL Flow Contribution is available in three Mokelumne HRL Year Types ("Dry", "Below Normal", and "Normal and Above"). The Mokelumne HRL Year Type index is defined in Appendix 1 in Section I.A.3(a) and Table 6. For purposes of implementing the HRL Flow Contribution, the PCC will be responsible for making the Mokelumne HRL Year Type determination in the manner set forth in Appendix 2, Section 3.

The Mokelumne River Implementation Agreement also includes a Delta Contribution, in the form of additional funding for the Water Purchase Program, as described in Section III.C of Appendix 1. More details on accounting for this component are included in Section 5 below.

3 Flow Measure Accounting

3.1 Existing Flow Requirements

The Mokelumne River HRL Flow Contribution will be additive to Existing Flow Requirements. "Existing Flow Requirements," which is defined in Section I.A.2 of Appendix 1, means the sum of the following: (1) the minimum regulatory flows specified by the JSA and D-1641 and Permit 10478, plus (2) any additional flows necessary to meet senior downstream water rights while simultaneously maintaining the minimum required regulatory flows.

3.1.1 Minimum Regulatory Flows Specified by the JSA and D-1641

In 1998, EBMUD entered into a long-term partnership with the CDFW and USFWS by signing the JSA for the Mokelumne River. Per the JSA, EBMUD must provide certain minimum regulatory flows specified in

the JSA from Camanche Dam. The State Water Resources Control Board (SWRCB) amended EBMUD's Mokelumne River water rights to require it to provide specified flow requirements at Camanche Dam and made corresponding changes to the water rights of WID to ensure a specified portion of the Camanche Dam releases passed below Woodbridge Dam (Revised Water Rights Decision 1641, March 15, 2000 (D-1641), pp. 170-179.) The JSA and D-1641 flow requirements are incorporated into this Implementation Agreement without change; see Appendix 1, Tables 1, 2, 3, and 4 under the column heading of "Existing Flow Requirements (JSA / D-1641 Component)." The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.2 Additional Flows Necessary to Meet Downstream Water Rights (Diversions)

EBMUD needs to maintain the minimum regulatory flows described above and also simultaneously ensure sufficient flows are available to meet senior downstream water rights. To accomplish this, EBMUD releases additional flows from Camanche Dam for senior downstream diversions when and to the extent such additional releases are necessary to maintain the minimum regulatory flows at the compliance points designated in the JSA and D-1641. Water diverted by downstream riparian diverters and individual appropriators is not measured by EBMUD directly and is estimated based on historical monthly average losses observed on the river. Figure 1 is a schematic representation of Mokelumne River diverters throughout the watershed. EBMUD estimates that there are more than 100 such diverters along the lower Mokelumne River between Camanche Dam and the confluence with the Consumnes River. The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.3 Buffer Water (Losses)

EBMUD also releases buffer water to assure that sufficient water reaches senior downstream users. Water is "lost" from river flows due to several factors such as direct evaporation from the water surface, evapotranspiration from riparian phreatophytes, and seepage from the stream bed into the groundwater basin. The net effect of these losses is generally referred to as channel losses or carriage water loss. The components that make up the losses are not directly measured. Furthermore, the quantity and rate of losses vary with soil properties and geology, groundwater levels, and total seasonal flow in the river. For the purposes of HRL flow accounting, EBMUD is estimating the channel losses between Camanche and Woodbridge Dams based on all available historical monthly average observed losses, by JSA year type. The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.4 Water Right Permit 10478 Term 20: Mitigation Measure Fish-1

Mitigation Measure Fish-1 (MMRP Fish-1), which is Term 20 of Permit 10478, was added by the State Water Board as a condition to EBMUD's Permit 10478 in its Order WR 2016-0019-EXEC dated August 2, 2016 ("*Order Approving A Petition For Extension Of Time Until 2040 And Approving Petitions For Changes In Place Of Use, Purpose Of Use, And Permit Terms And Issuing An Amended Permit")*. Term 20 requires that EBMUD release additional fishery flows, over and above the JSA flows, to ensure that flows remain in the Mokelumne River to maintain adequate water depths for salmon passage. EBMUD releases from Camanche Dam up to a total of 2,000 acre-feet of additional water above required releases during the September through February period in Below Normal and Dry JSA water year types to facilitate adult salmonid fish passage below Woodbridge Dam. The HRL flow accounting includes this water within the Existing Flow Requirements.

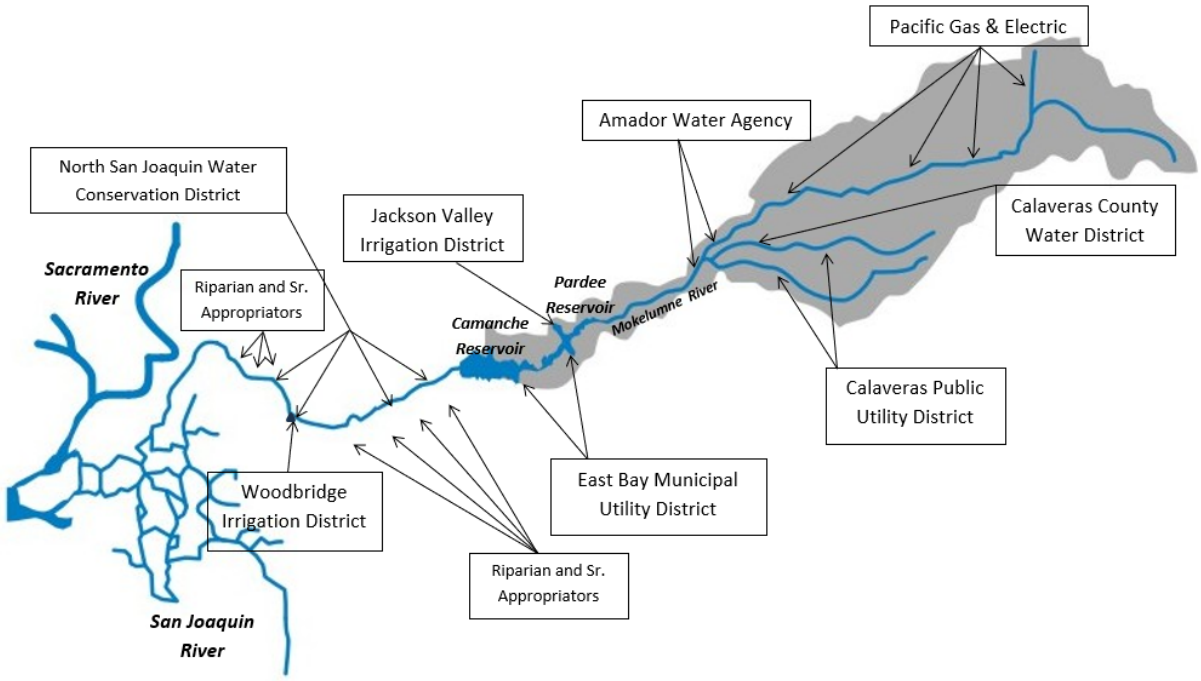


Figure 1. Mokelumne River Diverters

3.2 Decision Making Timeline, Adaptive Management, and Uncertainty

Figure 2 shows the timeline for decision making and deployment of flows on the Mokelumne River. Since the HRL Flow Contribution includes a Spring block of water in the March through May timeframe, but the ultimate HRL Year Type determination occurs in April (based on the April 1 Department of Water Resources [DWR] Bulletin 120 Report – see Appendix 2, Section 3.3.1), it is expected that the PCC will be making decisions about deployment of HRL flows while the final Mokelumne HRL Year Type designation is still uncertain. Thus, there is a degree of uncertainty in the Spring, when the majority of the HRL Flow Contribution is required, regarding the ultimate year type designation, and correspondingly, what volume of HRL Flow Contribution will be required. In addition, evolving conditions on the Mokelumne River and coordination with Systemwide Governance could lead to changes in what deployment of flows is considered optimal for benefiting the ecosystem in a given year. The timeline shown in Figure 2 indicates how the Mokelumne River governance will adaptively manage flows to maximize ecosystem benefits while ensuring that the Mokelumne is providing its HRL Flow Contribution.

Figure 2. Timeline for Mokelumne River HRL Decision Making and Flow Releases

Month	Mokelumne HRL Year Type Determination	HRL Flow Asset Decision-Making	HRL Flow Measures Block Releases
February	The PCC will make an initial Mokelumne HRL Year Type determination based on available unimpaired runoff projections including EBMUD's own data and the February release of DWR Bulletin 120	By mid-February each year, the PCC will design and propose one or more daily flow schedules for the Spring Block release to apply in March through May, based on the Mokelumne HR&L Year Type initially determined using the best available estimates of runoff in the Mokelumne River. Draft proposals will be shared with SWGC for systemwide planning	
March	The PCC will make a revised Mokelumne HRL Year Type determination based on available unimpaired runoff projections including EBMUD's own data and the March release of DWR Bulletin 120	If the PCC determines that the Spring Block releases should begin in March or early April, the PCC will develop an interim daily flow schedule for the Spring Block release by early March. Draft proposals will be shared with SWGC for systemwide planning	Spring Block Release (if applicable)
April	The PCC will finalize the determination based on DWR's April 1st Bulletin 120 median unimpaired runoff forecast for the Mokelumne River	By mid-April each year, after release of DWR's April 1st Bulletin 120, the PCC will revise the proposed Spring Block release as necessary and designate a daily flow schedule for the Spring Block release to apply in April and /or May. Draft proposals will be shared with SWGC for systemwide planning. Last chance for SWGC input prior to submitting plan to SWRCB as final	Spring Block Release
May			Spring Block Release
September		In August-September of each year, the PCC will design and designate a daily flow schedule for the Fall Block release, using HR&L assets available for the Mokelumne HR&L Year Type defined by estimated runoff in the Mokelumne River in DWR's April 1st Bulletin 120, to apply in October. Draft proposals will be shared with SWGC for systemwide planning	
October			Fall Block Release

In the early Spring of each year, EBMUD will work with the PCC to develop daily release schedules that include both the Existing Flow Requirements under the applicable JSA Year Type and the HRL Flow for the Mokelumne HRL Year Type. EBMUD will assist the PCC in developing a baseflow projection corresponding to the applicable Mokelumne HRL Year Type designation (see Figures 3a and 3b that show hypothetical examples of base flow projections for "Normal and Above" and "Dry" Mokelumne HRL Year Types, respectively). The PCC may approve two or more alternative schedules that can be implemented based on changing conditions. For example, Figure 3d depicts two hypothetical alternative schedules in the "Dry" Mokelumne HRL Year Type example: the preferred Plan A represents a short duration six-day pulse, and the alternative contingency Plan B represents a longer pulse possible due to an increase in baseflow in May. Contingency plans may be necessary because of the uncertainty with how conditions in the spring may evolve and the uncertainty related to how much precipitation can still fall in late winter through spring.

Given uncertainty related to the year type designation, the PCC may also consider alternatives for different year types; for example, the PCC could meet in February and develop schedules for both "Dry" and "Normal and Above" HRL Year Types. As the water year unfolds and conditions change, the PCC can then decide which schedule to implement. The PCC may also decide to make changes in response to SWGC recommendations, evolving conditions, or to shift flows to October for fall attraction pulses within the Flexible Range of Block Releases from Camanche Dam specified in Appendix 1, Tables 1 through 4.

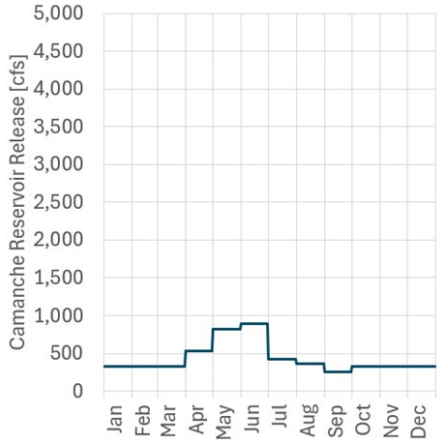
To provide some context, in Figure 3e an example "Normal and Above" year hydrograph from 2005 is plotted along with the hypothetical PCC preferred plan. The flood control releases depicted on the chart would not be accurately forecasted in the beginning of February when the PCC begins to plan deployment of the HRL Flow Contribution. Thus, to implement the preferred Plan A, releases would have ramped up earlier in April than actually occurred. Then the planned fall attraction pulses would still have been implemented, regardless of the volume of spring flood control releases.

Similarly, Figure 3f shows an actual hydrograph from a dry year, 2007, along with the hypothetical preferred Plan A. In this example, the preferred Plan A includes a short duration pulse at the end of April that would require additional releases from the reservoir above all other minimum required releases shown.

The final determination of Mokelumne HRL Year Type will be made in April based on the April 1 Bulletin 120 Report (see Appendix 2, Section 3.3.1). If the final HRL Year Type requires a greater volume of releases than had been previously planned, the PCC would reconvene to develop an adjusted flow plan for May and the fall to make necessary releases and ensure compliance.

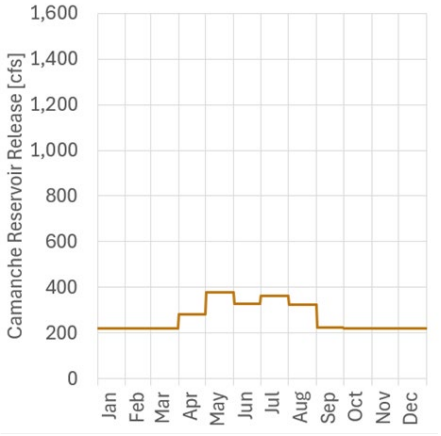
As the timeline shows, the fall block of releases would be made in October. The PCC will then submit an annual report, as described below, that demonstrates it has met both its Existing Flow Requirements and HRL Flow Contribution. This report will include information on the PCC decision making and plans for deployment of flows to demonstrate the intentionality of the HRL releases.

HRL Normal and Above Year Type



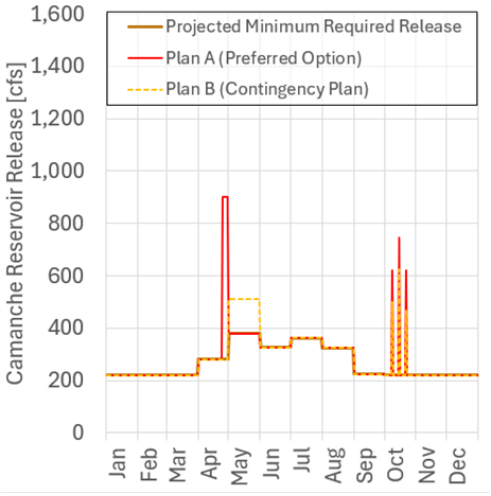
(a)

HRL Dry Year Type

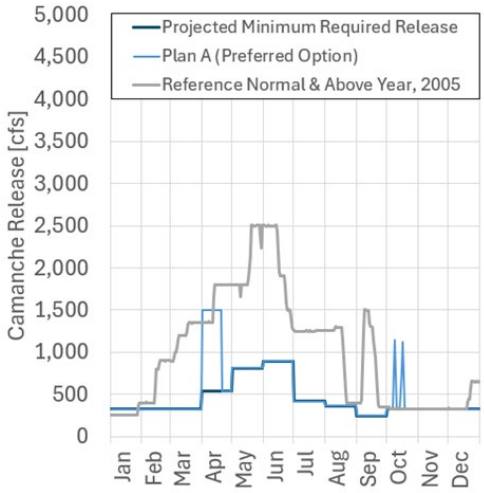


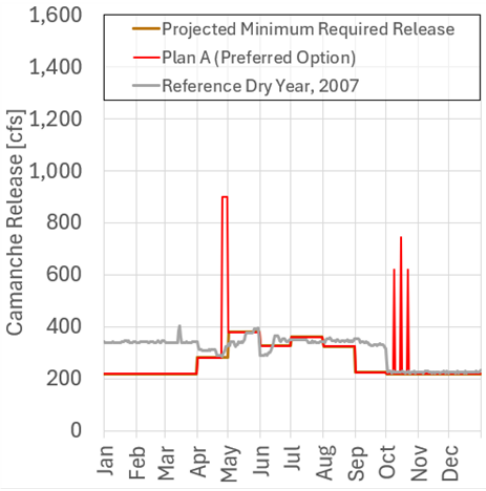
(b)

(c)



(d)





(e) (f)

Figure 3. Example Graphics for hypothetical HRL Normal and Above and Dry Year Types demonstrating: Hypothetical Baseflow Projection (a) and (b); Possible PCC Plans shown (c) and (d); Historical Daily Average Flow Example in (e) Normal & Above Year 2005 and (f) Dry Year 2007 Provided for Reference.

3.3 Measuring HRL Flow Contribution above Existing Flow Requirements

The JSA and D-1641 establish a set of minimum release requirements from Camanche Dam, and a separate set of minimum expected flows below Woodbridge Dam. To provide the required flow below Woodbridge Dam, EBMUD coordinates with WID and releases sufficient water from Camanche Dam to satisfy the needs of diverters below Camanche Dam down to Woodbridge Dam, including WID's diversion, plus buffer water. Thus, during the irrigation season EBMUD may need to make higher releases from Camanche Dam to maintain minimum flows required below Woodbridge Dam because of diversions between Camanche and Woodbridge.

EBMUD has developed the attached spreadsheet, Table 1, to calculate the Existing Flow Requirements and to track the HRL Flow Contribution on a monthly basis. Table 1 includes a calculation of the required releases from Camanche Dam to satisfy both JSA flow requirements (Camanche Dam releases, and flow below Woodbridge Dam), accounting for senior downstream diversions, plus the Term 20 (MMRP Fish 1), all of which together constitute the Existing Flow Requirements. The table then shows the additional flow assets to be released as the HRL Flow Contribution, based on the direction of the PCC and in accordance with Appendix 1, Section I.B.

The total release from Camanche Dam necessary to meet Existing Flow Requirements plus the HRL Flow Contribution is then calculated, which can subsequently be compared against actual Camanche Dam releases on a seasonal (March-May; October) or annual time period to demonstrate that EBMUD released the full HRL Flow Contribution from Camanche Dam required during that time period as described in Section 3.1.3 below.

Following is additional detail on the columns in Table 1:

Year and month – the particular year and month during the HRL term.

Column [1] – ***JSA Year Type***. This column contains the JSA Year Type applicable during the month, determined as provided in Appendix 1, Table 5.

Column [2] – ***JSA/D-1641 Minimum Release from Camanche Dam in CFS***. This column contains the minimum required release from Camanche Dam. It matches the value in "Release from Camanche Dam (CFS)" column of Appendix 1, Tables 1 through 4, whichever table is applicable to the JSA Year Type in effect during the month as indicated in Column [1].

Column [3] – ***Additional JSA Releases in CFS***. Additional releases under the JSA may be required based on one or more of the following JSA provisions: (1) releases required by Footnote 5 of the Mokelumne River Minimum Flow Schedule which is Attachment 1 to the JSA, (2) releases required to meet the "gainsharing" obligation of Section F.2 of the JSA, or (3) adaptive management as authorized in D-1641.

Column [4] – ***JSA/D-1641 Flow Below Woodbridge Dam in CFS***. This column contains the required flow below Woodbridge Dam. It matches the values in the table on page 178 of D-1641 as applicable to the JSA Year Type in effect during the month as indicated in Column [1].

Column [5] – ***Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams in CFS.*** This column contains the estimated losses and riparian and senior appropriator diversions between Camanche and Woodbridge Dams that EBMUD must take into account to provide sufficient releases to reach Woodbridge Dam. It is based on average historical data and JSA year type.

Column [6] – ***Scheduled WID Diversions in CFS***. This column contains Woodbridge Irrigation District scheduled diversions which WID provides pursuant to its agreements with EBMUD. This column may be updated during the month as WID adjusts its schedule.

Column [7] – ***Calculated Camanche Dam Release Necessary to Meet JSA/D1641 and Prior Rights in CFS***. This column contains the total release from Camanche Dam needed to meet the minimum regulatory flows specified by the JSA and D-1641 in effect at a given time, plus any additional flows necessary to meet downstream senior water rights and associated carriage losses. This column contains the following calculations:

During Apr-Sep, the value is the greater of Columns [3]+[4]+[5]+[6] or Columns [2]+[3].

During Oct-Mar, the value is Columns [2]+[3].

Column [8] – ***Other Release Requirements – Water Right Permit 10478 Term 20 (MMRP FISH-1) in acre-feet.*** This column contains the required volume of additional releases from Camanche Dam, up to a total of 2,000 acre-feet, during the September through February period in "Below Normal" and "Dry" JSA Year Types to facilitate adult salmonid fish passage below Woodbridge Dam as required by Term 20 of EBMUD's Permit 10478.

Column [9] – ***Other Release Requirements – Water Right Permit 10478 Term 20 (MMRP FISH-1) in CFS.*** This column contains the rate of release required during a given month necessary to provide the total volume stated in Column [8].

Column [10] – ***Existing Flow Requirements in CFS.*** This column contains the Existing Flow Requirements defined in Appendix 1. It is calculated by adding the required releases to meet JSA/D-1641 requirements in Column [7] to EBMUD's Term 20 release requirements in Column [9].

Column [11] – ***Mokelumne HRL Year Type***. This column contains the Mokelumne HRL Year Type applicable during the month, determined as provided in Appendix 1, Table 6.

Column [12] – ***HRL Flow Contribution in acre-feet***. This column contains the volume of the applicable HRL Flow Contribution to be released during that month as determined by the PCC. It is based on and consistent with the values in the "HRL Flow Contribution" columns of Appendix 1, Tables 1 through 4, whichever table is applicable to the Mokelumne HRL Year Type in effect during the month as indicated in Column [11].

Column [13] – ***HRL Flow Contribution in CFS.*** This column contains the rate of release required during a given month necessary to provide the total volume stated in Column [12].

Column [14] – ***Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements and HRL Flow Contribution in CFS***. This column contains the calculation of the total flow necessary to release from Camanche Dam to include both the Existing Flow Requirements and the HRL Flow Contribution. This column is the sum of Columns [10]+[13].

Column [15] – ***Measured Camanche Dam Average Monthly Release in CFS***. This column contains the monthly average measured flow rate at Camanche Dam (USGS Gage # 11323500).

3.4 Real Water Verification

The Mokelumne River HRL compliance point for purposes of verifying the release of the HRL Flow Contribution will be Camanche Dam measured at USGS Gage #11323500. As described in Appendix 1, Section I.A.3.b, EBMUD will be responsible for meeting its HRL Flow Contribution during each of three time periods as indicated in the "Flexible Range of Block Releases from Camanche Dam": (1) a March through May time period; (2) an October time period; and (3) an annual time period.

For each year of the HRL Program term, EBMUD will prepare an annual report documenting its compliance with the HRL Flow Contribution for each of these three periods after accounting for any adaptive management approved by the SWRCB. The Annual Report will include a narrative discussion of how the HRL block flows were apportioned by the PCC, including lengths of time and flowrates for floodplain inundation in the Spring and a description of any fall pulse flows. The Annual Report will also include Tables 1, 2, and 3 to demonstrate compliance.

Table 1, Columns [1] through [14] are used to calculate the minimum Camanche Dam release and therefore will be completed before or concurrently with the release of flows from Camanche Dam during each successive month. Columns [1] through [10] will be used to calculate EBMUD's Existing Flow Requirements. Columns [11] through [13] will be used to calculate the HRL Flow Contribution. Columns [12] and [13] will state the total acre-feet and monthly average flow of the HRL Flow Contribution for each month as determined by the PCC and in accordance with the flow measure commitments as described in Appendix 1, Section I.B. Column [14] will state the total minimum Camanche Dam release on a monthly basis, inclusive of that month's Existing Flow Requirements and HRL Flow Contribution. Column [15] will be completed after each month concludes and will state the actual average monthly Camanche Dam release measured at USGS Gage #11323500.

Table 2 will be used to convert the monthly flow rates to monthly volumes in order to determine compliance. For each month in which HRL Flow Contribution releases are required, the monthly flow rates shown as "Measured Camanche Dam Average Monthly Release" (Column [15] of Table 1) and "Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements and HRL Flow Contribution" (Column [14] of Table 1) will be multiplied by the number of days in that month to calculate a total monthly volume for that month for each metric.

Next, Table 3 sums these monthly volumes into the three time periods used to determine compliance with HRL flow measures (March through May, October, and Annual). If the volume of actual measured releases for each of the three time periods is greater than the volume of required releases for the corresponding time period, then EBMUD is in compliance.

Examples

Following are two hypothetical examples, using hypothetical data, to demonstrate how the tables work in practice. The first example shows a year where the Mokelumne would be in compliance with its HRL Flow Commitments.

Table 1 calculates the Existing Flow Requirements and shows the HRL Flow Contribution, by month.

[remainder of page intentionally left blank]

Example 1, Table 1

-	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Month	**JSA/D-1641 Release Requirements**							**Other Release Requirements**			**Mok. River VA Flow Contribution**			**Camanche Dam Releases**	
Month	**JSA Year Type**	**Minimum Release from Camanche Dam** **JSA / D1641**	**Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)** **JSA / D1641**	**Flow Below Woodbridge Dam** **JSA / D1641**	**Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams** ***Estimated DATA**	**Scheduled WID Diversion** ***Scheduled / Planned DATA**	**Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights** **Apr-Sep: =max([2]+[3] or [3]+[4]+[5]+[6])** **Oct-Mar: =[2]+[3]**	**Water Right Permit 10478 Term 20 (MMRP Fish-1)**	**Water Right Permit 10478 Term 20 (MMRP Fish-1)**	**Existing Flow Requirements (Appx. 1, § I.A.2)** **=[7]+[9]**	**Mokelumne VA Water Year Type (Appx. 1, Table B.X.1-F)**	**VA Flow Contribution (Appx. 1, § I.A.3)**	**VA Flow Contribution (Appx. 1, § I.A.3)**	**Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & VA Flow Contribution**	**Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)**
-	**(WYT)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(AF)**	**(CFS)**	**(CFS)**	**(WYT)**	**(AF)**	**(CFS)**	**(CFS)**	**(CFS)**
January	Normal	325	N/A	100	10.99	0.00	325.00	N/A	N/A	325.00	Normal	N/A	N/A	325.00	1445.00
February	Normal	325	N/A	100	42.76	0.21	325.00	N/A	N/A	325.00	Normal	N/A	N/A	325.00	600.30
March	Normal	325	N/A	100	64.88	0.00	325.00	N/A	N/A	325.00	Normal	3375.72	54.90	379.90	2017.00
April	Normal	325	200	150	81.44	20.30	525.00	N/A	N/A	525.00	Normal	19470.04	327.20	852.20	3158.00
May	Normal	325	100	300	24.89	97.23	522.12	N/A	N/A	522.12	Normal	16355.94	266.00	788.12	2243.00
June	Normal	325	N/A	300	89.04	117.83	506.88	N/A	N/A	506.88	Normal	N/A	N/A	506.88	1923.00
July	Normal	100	N/A	25	14.45	175.16	214.61	N/A	N/A	214.61	Normal	N/A	N/A	214.61	2187.00
August	Normal	100	N/A	25	66.35	184.94	276.29	N/A	N/A	276.29	Normal	N/A	N/A	276.29	1073.00
September	Normal	100	N/A	25	82.58	158.20	265.78	N/A	N/A	265.78	Normal	N/A	N/A	265.78	736.20
October	Normal	325	N/A	100	22.46	99.39	325.00	N/A	N/A	325.00	Normal	5798.37	94.30	419.30	1235.00
November	Normal	325	N/A	100	26.80	1.73	325.00	N/A	N/A	325.00	Normal	N/A	N/A	325.00	583.00
December	Normal	325	N/A	100	63.33	0.00	325.00	N/A	N/A	325.00	Normal	N/A	N/A	325.00	331.10

Table 2 then converts the monthly flows to volumes.

Example 1, Table 2

Month	Days	Measured Camanche Dam Average Monthly Release (Volume, AF)	Measured Camanche Dam Average Monthly Release (Flow, cfs)	Mokelumne River HRL Flow Contribution (Volume, AF)	Mokelumne River HRL Flow Contribution (Flow, cfs)	Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution (Volume, AF)	Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution (Flow, cfs)
January	31	88,850	1,445	0.00	0.00	19,984	325.00
February	28	33,339	600	0.00	0.00	18,050	325.00
March	31	124,021	2,017	3375.72	54.90	23,359	379.90
April	30	187,914	3,158	19470.04	327.20	50,710	852.20
May	31	137,917	2,243	16355.94	266.00	48,460	788.12
June	30	114,427	1,923	0.00	0.00	30,161	506.88
July	31	134,474	2,187	0.00	0.00	13,196	214.61
August	31	65,976	1,073	0.00	0.00	16,988	276.29
September	30	43,807	736	0.00	0.00	15,815	265.78
October	31	75,937	1,235	5798.37	94.30	25,782	419.30
November	30	34,691	583	0.00	0.00	19,339	325.00
December	31	20,359	331	0.00	0.00	19,984	325.00

Finally, Table 3 compares the measured releases to the required releases on a seasonal and annual basis and shows that the Mokelumne would be in compliance for that year.

Example 1, Table 3: Compliance Determination

Timing	Measured	HRL Releases	Total Required Releases	Compliance?	HRL Flow Flexibility Range	Actual Percentage
March-May	449,852	39201.7	122,528	YES	70-90%	87%
October	75,937	5798.366	25,782	YES	10-30%	13%
Annual	1,061,712	45000.06	300,050	YES	-	-

The second example shows a year where the Mokelumne would not be in compliance. Again, this uses hypothetical data to demonstrate the function of the tables.

Example 2, Table 1

-	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Month	**JSA/D-1641 Release Requirements**							**Other Release Requirements**			**Mok. River VA Flow Contribution**			**Camanche Dam Releases**	
Month	**JSA Year Type**	**Minimum Release from Camanche Dam** **JSA / D1641**	**Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)** **JSA / D1641**	**Flow Below Woodbridge Dam** **JSA / D1641**	**Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams** ***Estimated DATA**	**Scheduled WID Diversion** ***Scheduled / Planned DATA**	**Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights** **Apr-Sep: =max([2]+[3] or [3]+[4]+[5]+[6])** **Oct-Mar: =[2]+[3]**	**Water Right Permit 10478 Term 20 (MMRP Fish-1)**	**Water Right Permit 10478 Term 20 (MMRP Fish-1)**	**Existing Flow Requirements (Appx. 1, § I.A.2)** **=[7]+[9]**	**Mokelumne VA Water Year Type (Appx. 1, Table B.X.1-F)**	**VA Flow Contribution (Appx. 1, § I.A.3)**	**VA Flow Contribution (Appx. 1, § I.A.3)**	**Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & VA Flow Contribution**	**Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)**
-	**(WYT)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(AF)**	**(CFS)**	**(CFS)**	**(WYT)**	**(AF)**	**(CFS)**	**(CFS)**	**(CFS)**
January	Below Normal	250	N/A	100	43.28	4.95	250.00	N/A	N/A	250.00	N/A	N/A	N/A	250.00	342.20
February	Below Normal	250	N/A	100	50.25	0.64	250.00	N/A	N/A	250.00	N/A	N/A	N/A	250.00	270.10
March	Below Normal	250	N/A	100	56.16	52.16	250.00	N/A	N/A	250.00	Dry	1500.32	24.40	274.40	269.40
April	Dry	220	N/A	150	73.34	68.96	292.30	N/A	N/A	292.30	Dry	3373.93	56.70	349.00	315.10
May	Dry	220	N/A	150	90.22	126.83	367.06	N/A	N/A	367.06	Dry	2625.56	42.70	409.76	384.90
June	Dry	100	N/A	20	93.69	135.02	248.71	N/A	N/A	248.71	N/A	N/A	N/A	248.71	270.90
July	Dry	100	N/A	20	97.26	172.75	290.01	N/A	N/A	290.01	N/A	N/A	N/A	290.01	313.20
August	Dry	100	N/A	20	98.29	149.35	267.64	N/A	N/A	267.64	N/A	N/A	N/A	267.64	285.00
September	Dry	100	N/A	20	87.67	148.09	255.76	N/A	N/A	255.76	N/A	N/A	N/A	255.76	275.40
October	Below Normal	250	N/A	100	57.62	60.81	250.00	N/A	N/A	250.00	Dry	2502.58	40.70	290.70	325.20
November	Below Normal	250	N/A	100	48.71	4.24	250.00	N/A	N/A	250.00	N/A	N/A	N/A	250.00	265.90
December	Below Normal	250	N/A	100	58.30	3.76	250.00	N/A	N/A	250.00	N/A	N/A	N/A	250.00	255.20

Again, Table 2 converts the monthly flows to volumes.

Example 2: Table 2

Month	Days	Measured Camanche Dam Average Monthly Release (Volume, AF)	Measured Camanche Dam Average Monthly Release (Flow, cfs)	Mokelumne River HRL Flow Contribution (Volume, AF)	Mokelumne River HRL Flow Contribution (Flow, cfs)	Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution (Volume, AF)	Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution (Flow, cfs)
January	31	21,041	342	0	0	15,372	250
February	28	15,001	270	0	0	13,884	250
March	31	16,565	269	1500.319	24.4	16,872	274.4
April	30	18,750	315	3373.934	56.7	20,767	349
May	31	23,667	385	2625.559	42.7	25,195	409.7595
June	30	16,120	271	0	0	14,799	248.7075
July	31	19,258	313	0	0	17,832	290.0063
August	31	17,524	285	0	0	16,456	267.6369
September	30	16,387	275	0	0	15,219	255.7598
October	31	19,996	325	2502.582	40.7	17,874	290.7
November	30	15,822	266	0	0	14,876	250
December	31	15,692	255	0	0	15,372	250

Finally, Table 3 shows that in this example, the Mokelumne would need additional water released from Camanche Dam to be in compliance for the Spring HRL block because the measured releases are not greater than the total required releases.

Example 2, Table 3: Compliance Determination

Timing	Measured	HRL Releases	Total Required Releases	Compliance?	HRL Flow Flexibility Range	Actual Percentage
March-May	58,981	7499	62,834	NO	70-90%	75%
October	19,996	2502	17,874	YES	10-30%	25%
Annual	215,822	10002	204,519	YES	-	-

3.5 Mokelumne River Delta Contribution

As described in Appendix 1, Section III.C, the Mokelumne River HRL program also includes a payment to the systemwide Water Purchase Program as part of its Delta contribution.

Appendix 1 of the Global Agreement establishes a Mokelumne Delta contribution of 5 TAF, 5 TAF, and 7 TAF in "dry," "below normal" and "above normal" Sacramento Valley Index year types, respectively. However, the Mokelumne River already has a separate, existing year type designation based on the JSA that does not perfectly align with the Sacramento Valley Index. In some cases, the release of HRL Flow Contributions during Mokelumne HRL dry years will coincide with Sacramento Valley Index critically dry years when no Mokelumne River HRL Delta inflows are required. Similarly, many JSA "normal and above" years correspond with Sacramento Valley Index "wet" years when no HRL Delta inflows are required. There are also challenges with measuring Mokelumne River inflows to the Delta due to tidal influences and other issues.

The Mokelumne HRL program includes several components to ensure that this Delta contribution is met. First, the PCC will coordinate with DWR and USBR regarding Delta conditions as it makes decisions on the deployment of the Mokelumne HRL Flow Contribution. The primary concern in allocating the HRL Flow Contribution will be maximizing ecological benefits; but all else being equal, the PCC will prioritize times when the Delta is expected to be in "excess" conditions rather than "balanced" conditions to ensure that more releases contribute to Delta outflow.

In addition, EBMUD has committed to provide additional funding to the Systemwide Water Purchase Program to obtain additional water for Delta inflow. Appendix 1 to the Global Agreement provides that if long-term modeling indicates the Mokelumne HRL Flow Contribution is expected to result in increased Delta outflows, relative to the pre-HRL Program baseline, of less than the Delta contribution (5 TAF, 5 TAF, and 7 TAF, in "dry," "below normal," and "above normal" years, respectively, determined by the Sacramento Valley Index), then EBMUD would make a payment to the SWGC to fund the purchase of the volume difference. EBMUD can also reduce the amount of water that must be purchased in "below normal" and "above normal" year types if the long-term modeling shows higher average flows in "dry" and "critically dry" years. Based on its modeling (described in more detail in Appendix 1, Section III.C), EBMUD has determined that such payments would be needed in below normal and above normal Sacramento Valley Index year types. More details on these payments can be found in Appendix 1, Section III.C.

Tuolumne Draft Quantitative Flow Accounting Procedures

Date Drafted: March 15, 2024

Drafted by: Tuolumne Parties (Modesto ID, SFPUC, Turlock ID)

1 Definitions

La Grange Diversion Dam – A diversion dam on the Tuolumne River downstream of Don Pedro Reservoir, located at approximately river mile 52. (Approximately 52 river miles upstream from the confluence of the Tuolumne and San Joaquin rivers.)

La Grange stream gage – USGS stream flow gage 11289650 on the Tuolumne River immediately downstream of La Grange Diversion Dam.

Infiltration Galleries (IGs) – Diversion structures in the Tuolumne River at approximately river mile 25.5, between La Grange and Modesto. One IG has been constructed; another is expected to be constructed by year 6 of the Tuolumne VA implementation. The IGs are expected to begin operation by year 6 of the Tuolumne VA implementation. See description of the operation of the IGs in 2.1.2 below.

1995 FERC settlement flows – The current minimum instream flow requirements included in the 1995 FERC Settlement Agreement for the Don Pedro Project. These are the current minimum flow requirements for the Don Pedro Project. The point of compliance for these flows is the La Grange stream gage.

Tuolumne VA required flows - The minimum instream flow requirements that are proposed for the Tuolumne VA. The Tuolumne VA required flows occur from January through June. The point of compliance for Tuolumne VA required flows is the La Grange stream gage. They also include a maximum diversion rate for the IGs in June, once the IGs become operational.

2 Flow Measures

2.1 Tuolumne VA Required Flows

The Tuolumne VA required flows are instream flow requirements that will be met at the La Grange stream gage on the Tuolumne River. Once the IGs become operational, the Tuolumne VA required flow requirements will also include a maximum diversion rate at the IGs. The schedule of required flows for the Tuolumne VA represents an increase over the 1995 FERC settlement flows during the January through June period. The current instream flow requirements are described in the 1995 Settlement Agreement and are included in the 1996 FERC license for the Don Pedro Project. The volume of required flow in the Tuolumne VA flow schedule that is greater than the volume of 1995 FERC settlement flows in the January through June period is the volume of the Tuolumne VA flow measures. The Tuolumne VA required flows and the 1995 FERC settlement flows are shown on Tables A through G.

2.2 Infiltration Galleries

The Infiltration Galleries (IGs) are diversion structures in the Tuolumne River at approximately river mile 25.9, between La Grange and Modesto. These are intended to be used as part of the updated FERC license from June through October 15th of each year. The June operation of the IGs is included in the Tuolumne VA. The IGs are not operational yet; they are expected to be operating by year 6 of the Tuolumne VA implementation. The IGs will be used to provide additional flow in the river between La Grange Diversion Dam and the IGs, while allowing diversion of that additional flow at the IGs for use within Turlock Irrigation District (TID). The operation of the IGs does not change the volume of irrigation

water delivered to TID; it moves the location of some diversion from La Grange Diversion Dam to the IGs, which allows greater flow in approximately the upper 26.5 miles of the Tuolumne River, which is the gravel-bedded reach; this is expected to create benefits for *O. mykiss* in this reach of the river. The flow volume described for the Tuolumne VA required flow is the same whether the IGs are operated or not.

2.3 FERC Relicensing

The Don Pedro Project is currently in the relicensing process with FERC, and the updated license is expected to include the Tuolumne VA required flow schedule from January through June, in addition to updated flow requirements from July through December. When the updated license takes effect, the 1995 FERC settlement flows from January through June will continue to be used as the reference operation for comparison to the volume of the Tuolumne VA required flow, as described in Section 3 below.

The July through December flows in the updated license are not included in the Tuolumne VA. The current FERC license for the Don Pedro Project also includes minimum flow requirements from July through December, and these flows are similarly not included in the Tuolumne VA. If the effective FERC license requires greater minimum flow than the Tuolumne VA during any period from January through June, the greater requirement will govern, unless FERC indicates otherwise.

2.4 Water Year Type Selection

The Tuolumne VA required flows are determined according to water year type using the five water year types (Wet, Above Normal, Below Normal, Dry and Critical) that are described in D-1641 for the San Joaquin Index (SJI). Each year, the water year type that is used to determine the required instream flows will be updated along with the hydrologic forecast in the period from February through May. Beginning each year with the February update to the SJI, the value associated with the 90% exceedance forecast will be used to choose the water year type for the Tuolumne VA for the month. The 90% exceedance values of the March and April SJI updates will be used to update the water year type for the Tuolumne VA. Then the 75% exceedance value of the May update to the SJI will determine the water year type used for the Tuolumne VA in May, June, and the following January, and will remain in effect until the following February SJI update is available.

Until the FERC relicensing of the Don Pedro Project is complete, water year type selection for the period from July through December of each year will be done as described for the 1995 FERC settlement flows. The water year type selection procedure in the updated license is expected to match that described for the Tuolumne VA.

3 Flow Measure Accounting

3.1 Reference Flow

The reference flow for comparison to the flow with the Tuolumne VA implemented is the estimated flow at the La Grange stream gage if the required flows in the 1995 FERC settlement flows were met, including required base flows and pulse flows from the 1995 FERC settlement flows and flood control releases that are estimated to occur along with those required flows. This reference flow will not be protected during implementation of the Tuolumne VA.

Interpolation water is a component of the 1995 FERC settlement flows that is released in the fall of years when it is required. Because it is does not occur in the period from January through June, interpolation water is not included in the reference flow that is used for comparison to the Tuolumne VA flow.

A spreadsheet model will be used to estimate the total flow at the La Grange stream gage using real-time inputs from measured hydrology and water supply deliveries while assuming that the required flows at the La Grange stream gage are the 1995 FERC required flows. The model inputs will include:

- Full Natural Flow (or unimpaired flow) of the Tuolumne River at La Grange
- Water deliveries in the Modesto and Turlock canals and the aqueduct from the Hetch Hetchy Reservoir to the San Francisco Bay Area
- Diversion from the Tuolumne River at the Infiltration Gallery

3.2 Measuring VA Flow Deployment above Reference Flow

During implementation of the Tuolumne VA, the actual flows at the La Grange stream gage (USGS gage 11289650) will be compared to those simulated for the reference operation as described in 3.1.1. Tuolumne VA flows will be assessed daily, and the volume of required flow in the Tuolumne VA that is greater than the simulated total reference flow will be identified for the day for downstream protection. If the simulated total reference flow is greater than the required Tuolumne VA flow, no protection will be applied for the day. If flood releases are made during implementation of the Tuolumne VA flow, no protection will be applied for the day.

The daily volumes to be protected may be summarized using a different timescale (i.e., weekly or monthly) for communication to the parties that are involved in protecting VA flow (e.g., DWR, Reclamation and SWRCB). Details related to the protection of VA flows are expected to be fully described by those parties in early 2024.

3.3 Real Water Verification

The real water contributions to flow at the La Grange stream gage that result from implementing the Tuolumne VA will be identified by comparison to the simulated reference operation, as described in 3.1.1 and 3.1.2 above. There is no additional action (e.g., fallowing or groundwater substitution) required to produce these flows.

The Tuolumne parties, DWR, Reclamation and other parties are currently discussing an accounting mechanism to determine the need for additional flow contributions, as defined and set forth in the MOU for the Tuolumne VA. The Tuolumne parties expect to use the finalized accounting mechanism annually to determine whether an additional voluntary flow contribution is indicated; In each year, Tuolumne parties expect to contribute either one third of the value that is indicated in the accounting, or the maximum value that is indicated by SJI water year type in the Tuolumne VA MOU, whichever is less. These additional voluntary flow contributions, when made, will be in addition to the Tuolumne VA flows, and will not be protected.

Putah Draft Quantitative Flow Accounting Procedures

Date Drafted: 7/9/2024

Drafted by: Alex Rabidoux

1 Definitions

Accord Flows: Means the instream flow requirements as stipulated in the Putah Creek Accord settlement as shown in Table 19 of the Draft VA Strategic Plan. The Accord Flows also include a spring pulse, fall pulse, and respective ramp down flows which are detailed in notes (a)-(d) in Table 19 of the Draft VA Strategic Plan.

Water Year: The water year is defined as October 1 of the prior year to September 30 of the current year. The annual flow component for Putah Creek will be accounted for on a water year basis.

Putah Creek VA Flows: Means the instream flow component in Section 2 (Flow Measures) that is distinct and applied on top of the existing Accord Flows.

Lower Putah Creek: Defined as the portion of Putah Creek starting at the Putah Diversion Dam and extending downstream to the confluence with the Toe Drain (Tule Canal) in the Yolo Bypass.

Drafting Note: Yolo County Flood Control & Water Conservation District (YCFC&WCD) has engaged the Department of Water Resources in substantive discussions about becoming a signatory to this Agreement through operations that would augment streamflows in Putah Creek. Those discussions have involved conceptual proposals that are described in the Yolo Attachment to the Enforcement Agreement but are not part of the Agreement as of March 29, 2024. Placeholders have been inserted to appropriately account for any Cache Creek VA Flows, should an Agreement with YCFC&WCD move forward.

Cache Creek VA Flows (*placeholder*): Means the potential flow component provided by the YCFC&WCD to Putah Creek, separate, from the Solano County Water Agency's (SCWA's) Putah Creek VA flow. The flow may be used to complement the Putah Creek VA flow, but it will be a separate and distinct volume of water (in addition to the 6-7 TAF volume for Putah Creek VA flow).

2 Flow Measures

The Putah Creek VA includes one quantifiable water component which is the addition of 6,000 – 7,000-AF per year of water during critical, dry, below normal, or above normal water years as shown in Table 1 of the Draft VA Strategic Plan.

All flows will be calculated as daily average flows (releases) into Putah Creek at the Putah Diversion Dam. The total flow into Lower Putah Creek will follow the equation below.

$Q_{Total} = Q_{AF} + Q_{PC\_VA} + Q_{FLOOD}$

Q_{Total} = Daily average flow into Lower Putah Creek as measured at the Putah Diversion Dam.
Q_{AF} = Instream flow to meet the required Accord flows.
Q_{PC_VA} = Supplemental Putah Creek VA Flows that are in addition to the required Accord Flows.
Q_{FLOOD} = If flood releases are being released from Monticello Dam (Lake Berryessa), this will be included as a separate and distinct flow / pass-thru.
Q_{CC_VA} = Supplemental Cache Creek VA Flows (*placeholder)*, are a separate addition of flow from YCFC&WCD, distinct from the Accord and Putah Creek VA Flows.

3 Flow Measure Accounting

3.1 Reference Flow

The Reference Flow on Lower Putah Creek is determined by the Putah Creek Accord flow compliance points at the Putah Diversion Dam (PDD), Interstate 80 (I-80), and periodically at the Los Rios Check Dam (Check Dam) near the confluence with the Toe Drain. Table 1 below provides additional detail on how each flow compliance location is measured. Tables 2 and 3 show the required Accord Flows under Non-Drought and Drought Year classifications specific to Putah Creek. SCWA staff make daily corrections as needed, to ensure compliance with the Accord. In addition to the tables below, the Accord requires additional water for Spawning and Supplemental Flows, which are all part of the required Accord flows.

Table 1 – Flow Measurement for each Flow Compliance Locations

Location	Description of Flow Measurements
PDD	Standard USBR hydraulic charts and equations for (a) Venturi and (b) Radial Gate operations. Daily and near real-time (SCADA) instrumentation. Site is telemetered and reported on the SCWA website.
I-80	Stream gage station, with frequent (monthly-weekly) flow wading measurements. Rated only for compliance flows, up to 100-cfs. Site is telemetered and reported on the SCWA website.
Check Dam	Periodic observations and flow measurements. Stage sensor deployment at the upstream side of the check dam. Dam leakage is estimated at 1-5-cfs, depending on water height. Anticipate using weir equations to estimate low flow over the check dam. Site is telemetered (stage) and reported on the SCWA website.

Table 2 – Putah Creek Accord Flows (Non-Drought Year)

Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	20	25	25	25	16	26	46	43	43	43	34	20
I-80	5	10	10	15	15	25	30	20	15	15	10	5
Check Dam	> 0	5	5*	> 0	> 0	> 0	5	5	> 0	> 0	> 0	> 0

**The 5-cfs requirement is for December 1 – 15.*

Table 3 – Putah Creek Accord Flows (Drought Year)

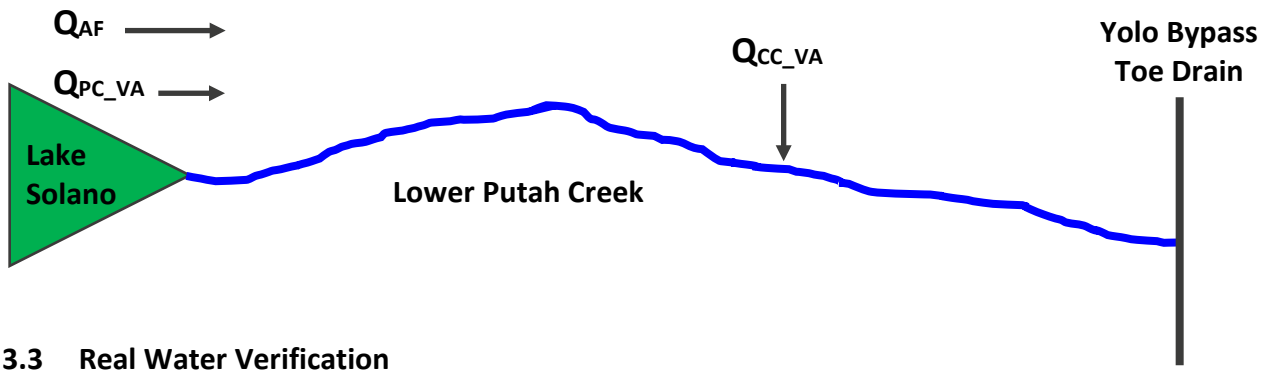
Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	15	25	25	25	16	26	46	33	33	33	26	15
I-80	2	2	2	2	2	2	2	2	2	2	2	2

For Putah Creek a Drought Year is defined as total storage in Lake Berryessa less than 750,000-AF as of April 1.

3.2 Measuring VA Flow Deployment above Reference Flow

The Accord Flow and Putah Creek VA Flow will be measured at the PDD as Total Flow into Lower Putah Creek (Q_{Total}). All flows released from the PDD are measured using either a Venturi Meter for low flows (under 100-cfs) or using standard Radial Gate Equations for high flows (above 100-cfs). All measurements are recorded every 15-mins and provide the basis for calculating daily average flows. The Accord flows are checked daily, to ensure flow compliance at each of the downstream locations. Table 1 above lists the specific flow measurements conducted at each Putah Creek Accord compliance location. Putah Creek VA flows would be scheduled as supplemental flows on top of the Accord flows. SCWA will work in coordination with the VA Science Committee, CDFW, DWR, UC Davis, and other Putah Creek stakeholders to ensure the VA flows are used to maximize the environmental benefit to the region. In addition to the Putah Creek VA flows, YCFC&WCD may be contributing separate Cache Creek VA flows to Lower Putah Creek. The Cache Creek VA flows will be measured just upstream of their release into Lower Putah Creek. The exact location and measurements details are still being worked on by YCFC&WCD. However, SCWA and YCFC&WCD will closely coordinate the respective Putah and Cache VA flows, to maximize the environmental benefit to the Yolo-Solano region.

Figure 1 – Schematic of the Accord and VA Flows for Lower Putah Creek



3.3 Real Water Verification

As described above, flow measurements at the PDD are recorded every 15-mins and provide the basis for daily average flows. The total flow release at the PDD into Lower Putah Creek would be comprised of Q_{AF} (Putah Creek Accord Flows) and Q_{PC_VA} (Putah Creek Voluntary Agreement Flows). Total daily average flow values are then calculated and submitted to the US Bureau of Reclamation (USBR) as part of USBR's Reservoir Operations Monthly Reports. SCWA also stores this data in a SQL Server Database. The flow data is summed into a monthly Solano Project Water Accounting Spreadsheet, as part of our Water Rights Reporting to the State Water Resources Control Board (SWRCB). SCWA will amend our existing monthly Solano Project Water Accounting Spreadsheet, to track the supplemental Putah Creek VA flow. SCWA may also choose to modify our SQL Server Database, to show the daily supplement Putah Creek VA flow as well. The Cache Creek VA flow will be separately monitored and accounted for by YCFC&WCD, but in close coordination with SCWA.

4 Delta Water Accounting

4.1 Putah Creek Connectivity to the Delta

Lower Putah Creek enters the Sacramento – San Joaquin Delta at the western boundary of the Yolo Bypass. From the western boundary, water travels approximately 2-miles to the Los Rios Check Dam, a

seasonal dam on Lower Putah Creek that is owned by CDFW and operated by Los Rios Farms, an adjacent landowner and tenant farmer within CDFW's Yolo Bypass Wildlife Area. The Check Dam is typically operated from late April through mid-November and is a permanent barrier in Lower Putah Creek when in operation. When the Check Dam boards are removed, water travels 1 additional mile to the confluence of the Toe Drain. From the confluence of Lower Putah Creek and the Toe Drain, tidally connected water can travel 2.7-miles downstream to the Lisbon Weir. Lisbon Weir is a partial dam on the Toe Drain, also owned by CDFW within the Yolo Bypass Wildlife Area. Lisbon Weir allows for tidal connectivity during high tides but prevents draining of the upstream channel during low tides. The result is the Toe Drain upstream of Lisbon Weir is significantly tidally muted, in comparison to downstream conditions. The purpose of Lisbon Weir is to check-up water within the Yolo Bypass to support water conveyance within the Yolo Bypass Wildlife Area from upstream of I-80 down to Lisbon Weir, an area of over 10,000 acres. Downstream of Lisbon Weir, the Toe Drain continues for another 9-miles until reaching the Stair Step Region of the Cache Slough Complex. From the Stair Step Region, the Toe Drain tidally connects with Cache Slough and ultimately the Sacramento River at Rio Vista. The hydrological distance between Lower Putah Creek and the Sacramento River is approximately 25-miles, traversing through the Yolo Bypass and Delta tidal channels.

4.2 Putah Creek influence on CVP/SWP Operations

As discussed in Section 4.1.1 above, Lower Putah Creek has a complex and highly muted connection to the Sacramento River and Sacramento – San Joaquin Delta, traversing through 25-miles of Yolo Bypass and Delta tidal channels. Along both the Toe Drain and the Delta tidal channels, there are numerous water diversions for both agriculture as well as Fall flood up for the wildlife refuges, which significantly reduces the influence of Putah Creek to the Delta. DWR and USGS have tidal flow gages at the Toe Drain at Lisbon Weir and Cache Slough at Ryer Island, that show long periods of tidally averaged negative (upstream) flow during the summer and fall months, further reducing the influence of Putah Creek to the Delta. Putah Creek is also one of the smallest watersheds to the Sacramento River, representing about 1% of the Sacramento River outflow.

With regards to CVP/SWP (Project) Operations, Putah Creek's outflow is not currently included in the Net Delta Outflow Index (NDOI) as its contribution is within the error of the model. Even with the additional flows from the Healthy Rivers and Landscape Program (SCWA and YCFC&WCD), the contributions are still expected to be within the error of the model. Instead, the intended benefit of flow measures on Putah Creek will be to benefit salmonid and other native fish species in Lower Putah Creek as well as the Yolo Bypass. Within the Yolo Bypass, Lower Putah Creek is the only suitable watershed where salmonids can access both cold water and suitable habitat for spawning.

Delta Exports Draft Quantitative Flow Accounting Procedures

Updated: 10/1/2024 by DWR

1 Definitions

2019 BiOps – The operational requirements, terms and conditions from the United States Fish and Wildlife Service's Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project, Service File No. 08FBTD00-2019-F-0164 and the National Marine Fisheries Service's Biological Opinion on Long-term Operation of the Central Valley Project and the State Water Project, Consultation Tracking Number: WCRO-2016-00069 for the long-term operation of the CVP and SWP or concisely known as the 2019 biological opinions (BiOps) from USFWS and NMFS.

Exports – total combined pumping at the Jones Pumping Plant and the Clifton Court Forebay (CCF) inflow minus Byron-Bethany Irrigation District withdrawals.

Foregone Exports – Volume of water that could be exported under the Reference Operation but is not exported.

Projects – The combined facilities and operations of the State Water Project and the Central Valley Project.

Reference flow and reference operation - that flow or operation that would occur absent the Flow Measures set forth in the Agreements to Support Healthy Rivers and Landscapes.

Unstored flows – The volume of water available for Project export under the Bureau of Reclamation's and DWR's water rights that are in excess of storage withdrawals.

2 Flow Measures

A memorandum of understanding (MOU) dated March 29, 2022, outlined the Export Flow Measure volumes that the SWP and CVP (Projects) would provide to enhance Delta outflow through the Healthy Rivers and Landscapes Program (Program). These volumes are dependent on the Sacramento Valley Water Year Index and are summarized as follows:

Table 2: Export Flow Measure Volumes by Sacramento Valley Water Year Index

Critical	Dry	Below Normal	Above Normal	Wet
0 TAF	125 TAF	125 TAF	175 TAF	0 TAF

The primary window for the Export Flow Measure is the March through May period, where the initiation of the action may occur as early as March and will be based primarily on the most recent Bulletin 120 (B120) Forecast but may also include other forecasts of the Sacramento Valley Water Year Index (SVI). Projects will begin implementing the Export Flow Measure through reductions in exports based on the 90% exceedance hydrology in March and the 75% exceedance hydrology in April. The Flow Measure will transition to using the 50% exceedance hydrology in May, consistent with the final water year type determination.

To supply the volumes, the Projects will export less water from the Delta through Clifton Court Forebay and Jones Pumping Plant (exports) than compared to the Reference Operation (defined in Section 3.1.1).

Flows required by other agreements such as the Water Storage Investment Program are not intended to count towards the Export Flow Measure.

3 Flow Measure Accounting

3.1 Reference Operation

Section 4.1 in the Term Sheet to the 2022 MOU states that, "VA Flow Measures will be additive to the Delta outflows required by Revised Water Rights Decision 1641 (Revised D-1641) and resulting from the 2019 Biological Opinions (BiOps), although the 2019 Biological Opinions may be modified, including to resolve litigation concerning those opinions". The 2019 BiOps are in the process of being updated as the MOU anticipated. A Biological Assessment (BA) of the Proposed Action was released November 8, 2023. The Projects expect new BiOps to be issued by FWS and NMFS in 2024.

The Projects propose to use the 2024 BiOps as the Reference Operation for the Export Flow Measure. This means that the volumes in Table 1 would be additive to the flows resulting from the 2024 BiOps. This proposal is based on the following considerations:

- An expectation that the 2024 BiOps will be the same as the proposed action in the BA
- If that expectation is correct, the 2024 BiOps will rely almost exclusively on predetermined criteria based on biological or abiotic factors, with limited use of risk assessments and real-time decision making.
- Accounting for the Export Flow Measure will be facilitated by having a reference operation that is consistent with the regulations in place and being implemented at the time of the action.

In addition to being based on the BiOps and D-1641, the Reference Operation for the Export Flow Measure includes an accounting methodology to track the additional Delta inflow from upstream Healthy Rivers and Landscapes Flow Measures to ensure that exports do not divert any of the additional flow. This accounting methodology is fully described in the Delta Accounting Procedures (included in Appendix E to the Strategic Plan). A short summary is described below to provide the context for the Reference Operation upon which the Export Flow Measure will be additive.

As per the Delta Accounting Procedures, tributary Flow Measure deployment plans will be used to develop regulatory offsets that reflect the incremental flow and water quality differences that would occur with additional Program inflows. These offsets will be used during real-time Project operations to demonstrate that Program flows are not exported. The resulting export operation, including regulatory offsets, would become the reference operation from which the Export Flow Measure would be measured. The reference operation will provide a regulatory offset for each applicable requirement and will reflect water quality and flow changes expected with additional upstream Program flows entering the Delta, as described in the Delta Accounting Procedures. A breakdown of key operational criteria that will need to be evaluated to perform this calculation follows.

1. Available export capacity at Project export facilities.

    a. Physical capacity for Clifton Court Forebay (CCF) inflow and Jones pumping.

    b. The U.S. Army Corps of Engineers permit, which limits inflow to CCF.

2. Storage and facility limitations downstream of the export facilities, when applicable.

    a. Capacity of downstream canals and aqueducts.

    b. Available unused storage in San Luis Reservoir, O'Neill Forebay and the State Water Project's Southern Reservoirs.

    c. Direct demand at times when capacity or storage constraints limit the ability to store pumped water.

3. Old and Middle River Index requirements (OMRI) with applicable regulatory offset to reflect upstream Program contributions.

    a. A default OMRI of –5,000 cfs will be used, unless a prescriptive action (a Condition of Approval in the 2024 ITP, or a conservation measure in the 2024 BiOps) requires an OMRI less negative than –5,000 cfs.

    b. Any Export reductions for species not covered by the 2019 BiOps would be counted toward meeting the Export Flow Measure. In other words, for the 2024 BiOps, longfin export constraints would be excluded as a reference operation, and export reductions made for longfin would count toward the Export Flow Measure.

4. Requirements in SWRCB Decision 1641 (D-1641) with applicable regulatory offset to reflect upstream HR&L contributions.

    a. Habitat Protection Outflow Requirements (X2).

    b. Requirements for Percent of Inflow Diverted (E/I).

    c. Agricultural water quality requirements at Jersey Point and Emmaton.

    d. Water quality along the OMR corridor and Jersey Point and Bethel Island. These locations are used as guidance for compliance with the water quality objectives for M&I, requiring year-round 250 mg/l Chloride and a specific number of days of 150 mg/l Chloride.

    e. Curtailment of combined Project exports to no greater than the San Joaquin River flow at Vernalis for 30 days from mid-April to mid-May, or to no less than 1,500 cfs when the flow at Vernalis is below 1,500 cfs.

5. Minimum combined exports of 1,500 cfs .

6. Availability of Unstored water. Stored Project water will not be used for meeting the Export Flow Measure when in balanced conditions. No cuts to exports will be made for the Export Flow Measure when the Projects are making storage withdrawals to manage Delta requirements.

3.2 Measuring Export Flow Measure Deployment above Reference Operation

Flows for the Export Flow Measure will be made available through foregone exports, where foregone exports will be determined based on actual export volume and what could have been exported under the Reference Operation[5].

3.3 Real Water Verification

When Project exports are lower than the exports defined by the reference operation, the difference between those will represent the export contribution volumes the Projects have provided through export reduction.

The Delta Accounting Procedures section provides a methodology for developing regulatory offsets for daily operations and after-the-fact assessment and true-up. With this methodology, it is expected that any identified redirected impacts would be reimbursed through the true-up process.

[5] Maintenance and/or repair of facilities will be allowed during the Export Flow Measure action without affecting the determination of Reference Flow.

PWA Water Purchase Program

Last Updated: September 2024

Lead Drafter: Andy Chu, DWR

1 Definitions

2 Flow Measures

Flow Measures described in the Public Water Agency (PWA) Water Purchase Program will be obtained through a free market program for single-year transfers, subject to applicable law.

The table below shows the flow contributions in acre-feet from the PWA Water Purchase Program.

Water Year	**Critical**	**Dry**	**Below Normal**	**Above Normal**	**Wet**
Fixed Price	3	63.5	84.5	99.5	27
Sacramento Valley North of Delta	*0*	*10*	*10*	*10*	*0*
Central Valley Project South of Delta	*0*	*17.5*	*31.5*	*40*	*0*
Westland Water District South of Delta	*3*	*6*	*15*	*19.5*	*27*
State Water Project South of Delta	*0*	*30*	*30*	*30*	*0*
Market Price	0	50	60	83	0

3 Flow Measure Accounting

In general, the water purchase through the PWA Water Purchase Program follows a typical water transfer transaction initiated by a willing seller who has legal water rights to a supply of water of interest to a potential buyer. The framework outlined in the Draft Technical Information for Preparing Water Transfer Proposals dated December 2019 (Water Transfer White Paper) provides helpful guidelines on flow accounting and real water verification for cropland idling, groundwater substitution, and reservoir reoperation types of water transfers. Flow purchases will be developed through a variety of mechanisms and generally follow typical water transfer protocols:

- Forgone Exports at the South Delta: For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".
- Cropland idling water transfers, as described in the Water Transfer White Paper, make water available by reducing the consumptive use of surface water applied for crop irrigation. Examples of cropland idling flow accounting procedures can be found in the Feather and Sacramento Flow Measures description.

- Groundwater substitution water transfers, as described in the Water Transfer White Paper, make surface water available for transfer by increasing groundwater pumping to reduce surface water diversions. Examples of groundwater substitution flow accounting procedures can be found in the American, Feather, and Sacramento Flow Measures description.
- Reservoir Reoperation (or Storage Release) makes water available for transfer by increasing in reservoir release from the seller reservoir beyond the baseline release under normal operations. Examples of reservoir reoperation flow accounting procedures can be found in the Yuba and Feather Flow Measures description.

3.1 Reference Flow

For water sources listed in Appendix E of the Strategic Plan, the reference flow should be similar. Otherwise, the reference flow generally covers the following areas - minimum instream flow requirements, flood risk reduction needs, and other existing downstream demand without the Flow Measure.

3.2 Measuring Purchased Flow Deployment above Reference Flow

Flow contributions listed in the above table need to be measured above the reference flow at the established water source or gauging station. Necessary coordination is required for the timing of flow deployment.

3.3 HR&L Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper, which was prepared by DWR and USBR in coordination with SWRCB. For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in “Quantitative Flow Accounting Procedures for Delta Exports”.

References

Draft Technical Information for Preparing Water Transfer Proposals, dated December 2019, prepared by California Department of Water Resources and Bureau of Reclamation, California-Great Basin Region, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf

State Water Purchase Program

Last Updated: September 2024

Lead Drafter: Erik Loboschefsky, DWR

4 Definitions

5 Flow Measures

Flow Measures described in the State Water Purchase Program will be obtained from willing sellers as further described in the State Water Purchase Program Memorandum of Understanding[6].

The table below shows the flow contributions in acre-feet from the State Water Purchase Program.

Water Year	Critical	Dry	Below Normal	Above Normal	Wet
State Water Purchases*	65	108	9	52	123

*State to permanently acquire 65TAF of water in all water year types to contribute to meeting the flow targets. After applying this 65TAF in all water years a gap of 43TAF will persist in D years and a gap of 58TAF will persist in W years; however, there will be a surplus of 56TAF in BN years and a surplus of 13TAF in AN years. D and W year gaps to filled by redistributing a portion of the PWA (Public Water Agency) water purchase contribution from BN and AN years, and through additional State water purchases in W years. (March 2022 MOU)

6 Flow Measure Accounting

In general, the State Water Purchase Program will fund water purchases to enhance instream flow that may include water right sales or water transfers, including long-term water transfers, from willing sellers who have legal rights to a supply of water. The framework outlined in the Draft Technical Information for Preparing Water Transfer Proposals dated December 2019 (Water Transfer White Paper) provides helpful guidelines on flow accounting and real water verification for cropland idling, groundwater substitution, and reservoir reoperation types of water transfers. The guidelines will inform accounting and real water verification protocols for any water transfers or water right sales from such sources. Flow purchases accounting will be developed through a variety of mechanisms including, where applicable, typical water transfer protocols:

- Cropland idling water transfers, as described in the Water Transfer White Paper, make water available by reducing the consumptive use of surface water applied for crop irrigation. Examples of cropland idling flow accounting procedures can be found in the Feather and Sacramento Flow Measures description.

[6] Memorandum of Understanding between the California State Water Resources Control Board, the California Natural Resources Agency, and the California Department of Water Resources for the purpose of specifying responsibilities for implementing the Healthy Rivers and Landscapes Program State Water Purchase flow measures.

- Groundwater substitution water transfers, as described in the Water Transfer White Paper, make surface water available for transfer by increasing groundwater pumping to reduce surface water diversions. Examples of groundwater substitution flow accounting procedures can be found in the American, Feather, and Sacramento Flow Measures description.
- Reservoir Reoperation (or Storage Release) makes water available for transfer by increasing in reservoir release from the seller reservoir beyond the baseline release under normal operations. Examples of reservoir reoperation flow accounting procedures can be found in the Yuba and Feather Flow Measures description.
- Forgone Exports at the South Delta: For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".

6.1 Reference Flow

For water sources listed in Appendix E of the Strategic Plan, the reference flow should be similar. Otherwise, the reference flow generally covers the following areas - minimum instream flow requirements, flood risk reduction needs, and other existing downstream demand without the Flow Measure.

6.2 Measuring Purchased Flow Deployment above Reference Flow

Flow contributions listed in the above table need to be measured above the reference flow at the established water source or gauging station. Necessary coordination is required for the timing of flow deployment.

6.3 HR&L Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper, which was prepared by DWR and USBR in coordination with SWRCB. For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".

References

Draft Technical Information for Preparing Water Transfer Proposals, dated December 2019, prepared by California Department of Water Resources and Bureau of Reclamation, California-Great Basin Region, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf

Delta Accounting Procedures

Last Updated: August 2, 2024

Drafted by: DWR and Reclamation

Introduction

The purpose of this document is to provide a foundation for a framework to account for and demonstrate that water made available under the Healthy Rivers and Landscapes Program (HRLP) is (1) "new" water to the system, (2) contributes to Delta Outflow. This demonstration method should not be interpreted as a commitment by the Central Valley Project (CVP) or State Water Project (SWP) to make up for any potential losses or illegal diversion of the "new" HRLP water to the system, either upstream of the Delta or in-Delta. Additional coordination is required with the State Water Board to identify mechanisms within its authority, any additional data needs, or other efforts that would be required to ensure protection of water being made available under the HRLP, consistent with the March 2022 MOU. This accounting document also does not fully address increased flows from the San Joaquin River that would occur with implementation of the Bay-Delta Water Quality Control Plan (WQCP) update.

Background

The SWP and CVP (collectively referred to as "Projects") play a substantial role in managing the Sacramento River and San Joaquin River systems. The Projects ensure "In-Basin Uses" are met before developing water supply for their respective water supply contractors. In-Basin Uses include many legal uses of water in the Sacramento Basin and specified DWR and Reclamation settlement contractors. The Projects also meet applicable Delta flow and water quality objectives pursuant to the WQCP before developing water supply for their contractors. The current WQCP, as implemented through Water Rights Decision 1641 (D-1641), requires the Projects to meet the quantitative Delta flow and water quality standards established by the State Water Board. As set forth below, the Projects are also required to meet standards and take actions to comply with the Endangered Species Act and California Endangered Species Act. DWR and Reclamation closely coordinate Project operations to meet their obligations.

The availability of unregulated flow for diversion by the water projects is determined based on whether the Delta is in "excess" or "balanced" conditions as defined under the Coordinated Operation Agreement. The Delta is in "balanced conditions" when releases from upstream reservoirs plus any unregulated flow approximately equals the water supply needed to meet Sacramento Valley In-Basin Uses, including applicable Delta Standards, plus exports. The Delta is considered to be in "excess conditions" when releases from upstream reservoirs plus unregulated flows exceed Sacramento Valley In-Basin Uses, including applicable Delta standards, plus exports.

Unregulated flows are first used to meet Sacramento Valley In-Basin Uses, including applicable Delta standards, then the Projects may divert any remaining flows. Operations on other upstream tributaries where CVP and SWP facilities do not exist within the Delta watershed can influence the amount of unregulated water available. In balanced conditions, when unregulated flows are insufficient to meet Sacramento Valley In-Basin Uses, including applicable Delta standards, the Projects release (pass through), reservoir inflows downstream. If this volume of flow is still insufficient to meet standards, then the Projects release previously stored Project Water. When stored Project water is released, this water is not available for diversion by water rights holders subject to Term 91.

In addition to Sacramento Valley In-Basin Uses, including applicable Delta standards, and the terms of their water rights permits, DWR and Reclamation operate the Projects pursuant to Biological Opinions (BiOps) issued by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for the long-

term operation (LTO) of the CVP and SWP, pursuant to the Endangered Species Act (ESA). DWR also operates the SWP pursuant to an Incidental Take Permit (ITP) issued by the California Department of Fish and Wildlife for the long-term operations of the SWP. Together, the BiOps and the SWP-specific ITP require DWR and Reclamation to substantially alter the manner in which they jointly operate the SWP/CVP facilities for protection of listed species. Operating to the BiOps and ITP tends to limit the Project exports in the winter and spring and can further increase the occurrence of excess conditions due to these restrictions on exports.

Under most circumstances, flow volumes within the Delta are managed by the Projects, through meeting Delta standards and managing upstream storage withdrawals and exports. As the Projects are the water conveyance facilities with the greatest control over Delta flow volumes, the Projects will play a critical role in operating, consistent with the terms in the MOU, to account for the enhanced flows released under the HRLP to appear as Delta Outflow. This document explains the framework of a methodology that will demonstrate how the Projects are not diverting the enhanced HRLP flows, while giving operators a clear and defensible target as a basis for day-to day operational decisions.

Enhanced HRLP Flows Considered in this Document

This document only addresses the following HRLP flow contributions:

- Sacramento River
- Feather River
- Yuba River
- American River
- Mokelumne River
- Putah Creek
- Friant Division operations on Upper San Joaquin River
- Tuolumne River
- CVP/SWP Export Reduction
- Water purchases

Additional implementation and accounting methodology would be developed in the future for any flow contributions not listed above. The specific accounting approach for each HRLP water source is described in the Draft Strategic Plan – Appendix E (Flow Accounting). The accounting approach for any payback and avoidance of redirected impacts resulting from tributary-specific refill are described in tributary-specific Implementing Agreements.

The HRLP proposal includes flow contributions through several water purchase programs. The source for these water purchases could be reservoir reoperation, demand reduction (e.g., fallowing), groundwater substitution or export cuts. The Delta Accounting Framework addresses each of these sources separately as appropriate for their circumstances.

Accounting Framework Overview

Accounting of enhanced flow under the HRLP proposal generally consists of four fundamental components (Figure 1):

1. The accounting for enhanced Delta inflows from the contributing Delta tributaries.

2. Adjustments for losses and travel time
3. The accounting for enhanced tributary flows as increased Delta outflow (i.e. not exported by the Central Valley Project (CVP) or the State Water Project (SWP) or diverted by other in-Delta water diverters).
4. The accounting of enhanced Delta Outflow from export cuts under the Export VA

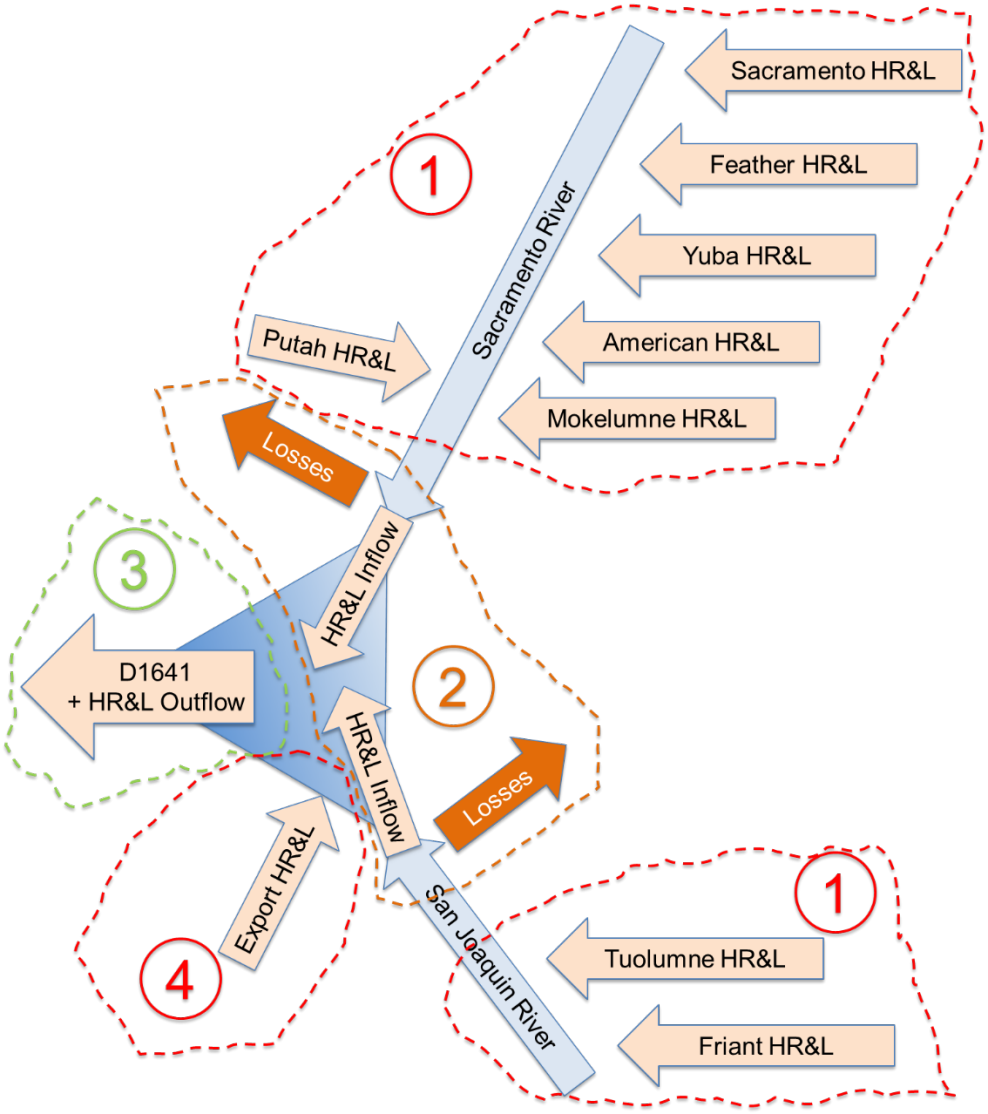


Figure 1: Four primary components of HR&L Accounting

This document primarily focuses on the second of these components and presents an operational method that will account for how water made available under the HRLP agreements contributes toward a greater outflow.

Most of the tributary contributions are measured at a downstream control point within the individual tributaries. The accounting methodology in this document requires several assumptions or methods/tools (e.g., groundwater depletions or other losses, any diversions between the downstream end of the tributary and the Delta inflow location, travel time/hydrologic routing, potential diversions in the Delta, salinity offsets etc.). If the actual conditions differ from the assumptions stated in this document, it may result in less Delta inflow and/or outflow and can have direct impact on the Project water supplies. Therefore, additional efforts are necessary to ensure the impact to the Project supplies is avoided.

This methodology makes simplifying assumptions in a complex system, however through implementation and gathering of additional data, adjustments may be warranted.

As part of the accounting, the HRLP program will coordinate with Water Board to develop a method for any additional surface water and groundwater monitoring to account for water lost to the environment, to be differentiated from water unlawfully diverted. The accounting methodology is developed to provide additional outflow of pre-determined quantities above that provided in the 2019 biological opinions baseline, which includes operations to the State Water Board D-1641 standards. As such, HRLP flows will not be included in the accounting of flow necessary to meet D-1641, or in the determination of D-1641 compliance locations that are variable based on flow or X2 location (i.e., winter-spring X2). Similarly, to protect HRLP flows from increased diversions, the HRLP flow will not be included in the calculations to determine available flow or water quality for Delta diversions (i.e., X2 requirements in the Contra Costa Water District (CCWD)-specific BiOps regarding CCWD's diversions or OMR requirements in the LTO BiOps at the Projects' south Delta).

For the Projects, day-to-day operational decisions must be made quickly, and often with limited or incomplete information. Most days, the planned operation of the Projects is settled before 9:00 a.m. Due to the complications of coordinating the enhanced flows associated with HRLP along the tributaries in real-time, the Projects are proposing a more aggregate method of accounting for these flows in real-time that would approximately meet the intended flows. This aggregate real-time method would then be followed up with a more detailed post-season accounting to "true up" and balance any unmet obligations.

The accounting methodology being proposed is based around developing a set of adjustments or "offsets" to each operational criteria that could control Project operations while the HRLP flows are being deployed during balanced Delta conditions. The Projects would then operate to each relevant operational criteria and its adjustment. A breakdown of the key steps in this framework follows.

1 Develop Projected Flow Schedule

At the beginning of the HRLP season, an initial forecast of HRLP tributary flows would be provided to the Projects from the tributary operators. The forecast should consist of a time-step aggregated average flow volumes, adjusted for losses to the Delta from each tributary operator. Tributary project operators would finalize a schedule prior to initiating the flow action and be obligated to adhere to this schedule and would immediately notify the Projects of any unavoidable deviations from the flow schedule. The flow projections would then be aggregated into Sacramento and San Joaquin River components.

2 Apply Losses and Travel Time Adjustments to Flow

The assumed time lag and losses for daily scheduled HRLP tributary flows entering the Delta are tabulated below. These assumptions will be updated as needed through periodic review and based on monitoring information.

Table 1: Tributary flow measure assumptions for Delta outflow

Contribution	**Downstream Control Point**	**Travel Time to Delta Outflow**	**Losses from Control Point to Delta Outflow**	**Flows Included in Regulatory Offsets**
Sacramento River	Keswick	5 days	0%	Yes
Feather River	Oroville Complex	3 days	0%	Yes

Contribution	Downstream Control Point	Travel Time to Delta Outflow	Losses from Control Point to Delta Outflow	Flows Included in Regulatory Offsets
Yuba River	Marysville Gauge	2 days	0%	Yes
American River	Nimbus	1 day	0%	Yes
Mokelumne River	Camanche Dam	1 day	0%	No
Putah Creek	Putah Diversion Dam	2 days	0%	No
Friant	Vernalis	1 day	0% (losses to Vernalis are part of recapture accounting)	Yes
Tuolumne River	La Grange	2 days	10%	Yes
CVP/SWP Exports	CCF/Jones PP	0 day	0%	No
Water Purchases	Varies	Varies	0% for Sacramento 10% for San Joaquin	Yes

Most tributary flow measures will be included in the development of regulatory offsets, where the Projects demonstrate that those flows are not benefiting the Projects (the following steps 3 to 6), however other flows measures (noted in Table 1) follow an alternative accounting approach. These alternative approaches are described in the Contributions with Alternative Approaches section below.

3 Develop Adjustments to Operational Objectives (Operational Regulatory Offsets)

Regulatory offsets would then be calculated based on this tributary flow schedule for the coming season. These offsets would be designed for the Projects to operate above the requirements in D-1641 and the BiOps by the incremental volume contributed by the enhanced HRLP flows (offset). These regulatory offsets, representing additional flows from HRLP contributions would result in operations that are more restrictive than the requirements under D-1641 and the BiOps. Project operators would use these operational offsets in addition to other project objectives in real-time operations. This would in turn give Project operators a defensible and transparent set of criteria to base their operations on while waiting for complete information to become available. Examples of how these enhanced operations for key criteria that would apply during deployment follows:

1. **D-1641 Agricultural Water Quality Standards**
    a. **Overview:** D-1641 contains several Agricultural Water Quality standards that apply April 1-August 15. The most likely to control Project operations are standards at Jersey Point on the San Joaquin River and Emmaton on the Sacramento River.
    b. **Operational Offset:** These standards could be adjusted to require a fresher water quality. The incremental improvement to quality would be based on the improvement to quality

associated with the addition of the enhanced HRLP Flows. DSM2 or other models could be used to determine this improvement to quality equivalent to an increment of flow.

c. **Example:** In a dry year, the Jersey point standard is 1670 mS/cm on a 14-day average. If 1000 cfs of enhanced HRLP flow were released in this month, DSM2 could be run to determine the incremental improvement to EC associated with this flow. For example, if this 1000 cfs flow is shown to offer an improvement of 350 mS/cm, this could be subtracted from the D-1641 standard and Project operators would meet a standard of 1320 mS/cm on a 14-day average.

2. Habitat Protection Outflow D-1641 Requirements (X2 Requirements):

a. **Overview:** The habitat protection outflow (X2) standard in D-1641 requires X2 be maintained at Port Chicago, Chipps Island or Collinsville. It can be maintained through either meeting an outflow requirement on a 3-day average basis (29,200 cfs, 11,400 cfs and 7,100 cfs for Port Chicago, Chipps and Collinsville respectively) or by meeting a water quality of 2,640 uohms/cm on either a daily or 14-day average basis.

b. **Operational Offset:** An offset could be determined to make adjustments to both the flow and EC requirements in X2. Flow criteria would be adjusted upward, while EC would be adjusted to a fresher criterion to account for the additional HRLP flows in the system.

c. **Example:** Each compliance location would be adjusted (Ex: for a 1000 cfs volume of enhanced HRLP flow and an equivalent EC offset of 300 mS/cm at Port Chicago and 250 mS/cm at Chipps could be met with 30,200 cfs outflow or an EC of 2340 mS/cm, Chipps could be met with 12,400 cfs or 2390 mS/cm, etc).

3. Percent of Inflow Diverted (EI Requirement):

a. Overview: D-1641 contains requirements for the ratio of how much of the total inflow into the Delta can be diverted by the Projects at their export facilities.

b. **Offset:** Because the Projects have some level of control over both the export and the inflow component of this requirement, it is not possible to directly calculate an offset from the anticipated HRLP flow contributions. Rather, the real-time compliance with this requirement would be based on reducing the calculated amount of Delta Inflows by the time-step averaged anticipated HRLP flows, before running the EI calculation.

c. **Example:** Total Delta inflow is at 10,000 cfs, which includes an enhanced HRLP flow of 1,000 cfs deployed per the pre-season flow schedule. Compliance with the EI requirement would be based on reduced inflow of 10,000-1,000 cfs or 9,000 cfs.

4. Old and Middle River Index Requirements.

a. **Overview:** A major operational target present in the Biological Opinions is the Old and Middle River flow index. This is an index approximating the aggregate flow in the Old and Middle Rivers in the central Delta. The index is a regression of the form:

i. **OMR** = *A****SJR** + *B****EXP**+*C*

ii. Where **OMR** is the Old and Middle River flow index, **SJR** Is the San Joaquin River flow at Vernalis, **EXP** is the combined Project Exports, and *A*, *B* and *C* are regression parameters.

b. **Operational Offset:** To determine an adjusted OMR target for the enhanced HRLP flow, the OMR required under the BiOp can be adjusted by adding the A term multiplied by the enhanced HRLP flow on the SJR tributaries. This can be demonstrated algebraically.

c. **Example:** if the BiOps require an OMR of -5000 cfs, and Grant Line Canal Barrier is not installed, the *A* coefficient is .471. If there is 500 cfs of enhanced HRLP tributary flow from the SJR tribs, the HRLP enhanced OMR requirement would be equal to -5000 + .471* 500 cfs or -4765 cfs.

4 SWP/CVP Operate to Regulations plus Offsets

After developing regulatory offsets based on anticipated additional HRLP inflows, the Projects demonstrate that the HRLP inflows are not exported by showing that existing regulations, plus the regulatory offsets, are being met. As long as the Projects have demonstrated that the flows are not being exported using the methods outlined above, the additional HRLP inflows will be deemed to result in Delta outflow.

The Projects will confirm that existing regulations would have been met without the HRLP flows in the system with a retrospective daily accounting.

5 Develop Retrospective Daily Accounting

After the daily volumes from each tributary operator are provided to the Projects, a more detailed accounting of obligations will take place. Though the exact timing of when this accounting will take place is yet to be determined, a rough draft of this could begin once the data is made available, then refined as more information becomes available until a final post season accounting is finalized. Each tributary operator will provide daily flows on a frequency as needed to support implementation. For this daily accounting, the aggregate daily HRLP flow for the Sacramento and San Joaquin Rivers would be deducted from the respective Delta inflow gages (Freeport and Vernalis for the Sacramento and San Joaquin respectively as well as any Eastside Streams components) for purposes of determining regulatory compliance. Then a hypothetical daily operation would be developed based on these adjusted flows (i.e., the actual Delta inflow less the HRLP contributions), where the Projects are operating to the un-adjusted standards and obligations, which will be used as a basis for demonstrating the daily HRLP outflow contribution.

Unlike the operational offsets, for the retrospective daily accounting, the adjustments will be made to the actual flow conditions, rather than to the operational targets. This is necessary to ensure the original intent of the HRLPs are met, while also giving Project operators a basis to operate to while waiting for complete information.

An example of how this adjustment would be approached follows:.

For a particular day, the HRLP flows can be aggregated as follows:

- Sacramento Component: 5000 cfs
- San Joaquin Component: 500 cfs

The flow volumes at Freeport and Vernalis would be reduced by these values such that the total flow for each side is recalculated without these components. A hypothetical set of reservoir releases and Project exports would then be calculated to see if compliance with the existing operational standards in D-1641 and the BiOps is met.

6 Reconcile Differences

While steps will be taken to ensure that the deployment of the HRLP water is passed through the Delta, some level of temporal mismatch is unavoidable. As a result of real-time conditions during implementation and reasons beyond control of the HRLP parties (such as summer energy emergencies where CalISO requests immediate hydropower releases), there may be discrepancies between the proposed added HRLP flow schedule and actual added HRLP flows that may not be apparent beforehand. These would ultimately lead to discrepancies in the flow accounting. Two key types of discrepancies can arise and are described as follows:

6.1 Scheduled HRLP Inflows to the Delta versus Actual HRLP Inflows

This type of discrepancy can be corrected as the season progresses. Once enough information becomes available, the daily accounting can be initiated, and a summation of the actual HRLP flows contributed can be calculated and compared to those in the flow schedule provided by the tributaries. Any discrepancy can be applied to the next month's operational offsets, by adjusting the proposed HRLP flow in the tributary flow schedule by this discrepancy. For example, if March numbers are finalized and a 20 TAF overshot discrepancy in the pre-season flow schedule compared to the obligation is calculated, this would be deducted from the flow schedule for the months of April and May, and the operational offsets would then be recalculated with this updated HRLP flow. Note that a downward adjustment would apply up to the point where the adjusted HRLP flow contribution is zero so as not to operate below existing standards. This may result in deficits that are not resolved but would be moved to the subsequent months.

6.2 Discrepancies due to HRLP party contribution mismatch and real-water determination

Some components of the HRLP flows will not be fully understood until after complete deployment and the end of the HRLP season. This applies mainly to water that will need to be verified through the real-water determination process. This type of reconciliation will require coordination between the Projects and the HRLP tributary parties. A reconciliation process has not yet been developed for all tributaries and will be developed following the April 24-26 SWB workshop.

Additional Considerations for D-1641 X2 Requirements

A couple of other considerations arise with this methodology. Due to the additional flows in the system associated with the HRLP, there is potential to trigger the Port Chicago X2 requirement when it would not have been triggered absent the additional HRLP flows. In the event this triggers only but for the additional HRLP flows, the requirement should not apply. Conversely, HRLP flow contributions should not be used when calculating the applicable carryover X2 days from one month into the next.

Project Reference Operation Overview

The SWP and CVP manage Project reservoirs (Shasta, Oroville, and Folsom) for developing water supply for later beneficial uses, while also being managed to ensure regulatory requirements are being met. In doing so, the control point may shift throughout the season depending on hydrology and regulatory requirements. These reservoirs generally have three categories of control 1) minimum in-stream flow requirement, 2) flood control requirements, and 3) downstream needs, including the Delta requirements and supporting exports.

As described in the individual tributary accounting documents for these Project reservoirs, during periods of minimum in-stream flow requirements and flood control, additional HRL flows will be demonstrated and verified in the tributary.

However, for conditions where the Project reservoirs are being operated to meet Delta requirements and exports the control becomes the Delta requirements for flow or water quality. During periods when offsets are applied to demonstrate additional HRL flows go as Delta outflow, the regulatory requirements plus the offsets, become the control point for the Project reservoir. With adding the HRL flows facilitated by the Project reservoirs to the offsets, the Projects are able to demonstrate additional flows from Project reservoirs by demonstrating that the regulatory requirements plus the offsets, including those for Project reservoirs, are met.

Overview of Balanced and Excess conditions under COA

As mentioned previously in this document, conditions in the Delta generally fall into one of two conditions, balanced and excess. These conditions depend on whether the system is being actively managed to meet in-basin use obligations and Project Exports or if the total water in the system is greater than what the Projects are able to make use of and thus export. Exact definitions of balanced and excess conditions follow, per the original 1986 agreement between the United States of America and the Department of Water Resources of the State of California for Coordinated operation of the Central Valley Project and State Water Project.

Balanced Delta Conditions: Periods when it is agreed by the Projects that releases from upstream reservoirs plus unregulated flow (approximately) equals the water supply needed to meet Sacramento Valley in-basin uses plus Project exports.

Excess Delta Conditions: Periods when it is agreed by the Projects that releases from upstream reservoirs plus unregulated flow exceed the water supply needed to meet Sacramento Valley in-basin uses plus Project exports.

While these conditions can be defined by these statements above as a binary, the reality of Delta conditions can take on many conditions that fall somewhere between the two. For example, in late spring there may be times when OMR is controlling exports, but water quality at the D1641 stations at JER and EMM are in a transitional zone, where they don't quite control operations, however operators understand that may change with even the slightest increase in exports. To give another example, there may be times where the X2 requirements are being met through outflow that is in excess of the requirements, however the extended weather outlook is exceedingly dry, and Project operators anticipate shifting to relying on the 14-day water quality to meet the requirement in a couple of weeks. Under these circumstances, Project operators may decide not to ramp up exports to get the outflow exactly at that which is required under X2 in the short term to maximize the benefit of the longer-term Water quality in meeting the same X2 requirement.

As a result of the type of complex Delta conditions described above that fall somewhere between balanced and excess, there can be no simple mathematical formulation for the determination of balanced and excess conditions. It is for this reason that this determination is left to the agreement of the Projects.

With the HRLP, the Projects will continue to make determinations of balanced and excess conditions, however when HRLP flows are in the system, this assessment and determination will recognize the additional requirements associated with the regulatory offsets.

Contributions with Alternative Approaches

Mokelumne River and Putah Creek flow measures

Currently, two tributary proposals will not be incorporated into the offset for Delta Outflow accounting. These are the Mokelumne River and Putah Creek. The flow contributions from these tributaries will not be incorporated into the accounting methodology described in this document and will not be incorporated into the offset calculations or protected from Project exports.

While not directly incorporated into the accounting methodology, the flows from these proposals may still contribute to enhanced Delta outflow, provided they come at times when the Delta is in excess conditions. As described in the previous section, under excess conditions, reservoir releases and unregulated flow are greater than water supply needed to meet in-basin use and Project exports. Thus, under these circumstances, the Projects would not be able to export the additional water made available from these proposals as there is already more water in the system than the Projects are able to utilize.

CVP/SWP Export flow measure

As described in the Export HRL Accounting, the reference operation from which the Export HRL flow is measured includes offsets associated with those tributaries identified in Table 1. The methodology described within this document demonstrates that the HRL flows from contributing tributaries are now exported and provides the basis for measuring the Export HRL flow measure. For this reason, the Export HRL flow measure would not be added into the regulatory offset.

To demonstrate that the Export HRL flow measure was additive, the Export HRL measure would be included in the Retrospective Daily Accounting (Step 5 above). This would demonstrate that export levels could have been at the calculated reference levels while meeting existing Delta requirements and would demonstrate that actual export levels were less and resulted in additional outflow.

Contributions through Water Purchases

Purchase of water for HRL program will follow the Transfer White Paper protocols for demonstration of new water and similar Flow Measure criteria listed in each source's Flow Accounting documents. Purchased water will be included in the regulatory offsets, adjusted for any losses and travel time associated with the source of the water being purchased.