Draft Strategic Plan Appendix E – Flow Accounting

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 MOU and Term Sheet 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 will also include 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.

The Delta Accounting Procedures are in development and will be included in the next version of Appendix E.

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.

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Friant Draft Quantitative Flow Accounting Procedures

Date Drafted: March 28, 2024

Drafted by: FWA and Reclamation

1 Definitions

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

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 factor is added 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. This 10% uncertainty factor does not mean that Restoration Flows are not fully present — it is only applied to recapture.

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 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

3.1.1 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.

3.1.2 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 protected under Water Code section 1707 through the San Joaquin River and Sacramento-San Joaquin River Delta (Delta), 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 flows, 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), Merced River near Stevinson (MST), Tuolumne River at Tuolumne City (TRT), and Stanislaus River at Koetitz (KOT) minus any recapture that is occurring.

Consistent with the Implementing Agreement, it is understood that in some years there would 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 separate 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.

3.1.2.1 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, 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
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 upstream gauge. All Restoration Flows are sourced from Friant Dam. For portions of the San Joaquin River, a pre-determined loss factor is applied. Between SJB and SDP, a 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.

3.1.2.2 Example of Measuring HR&L Flow Deployment

If the Friant HR&L was implemented in 2018, the HR&L flow deployment would've been measured as 11,477 AF in February through May. The Restoration Year Type was Normal-Dry and the Restoration Allocation totaled 280,258 AF at Gravelly Ford, however, only 159,544 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations spreadsheet accounted for 9,782 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 18,400 AF was recaptured during this period in the lower San Joaquin River and Mendota Pool. With the HR&L, 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 by 9,200 AF, resulting in total HR&L flow deployment of 18,982 AF. These historical flows do not account for latest and upcoming increases in downstream capacity for Restoration Flows, which will increase the HR&L flow deployment.

If the Friant HR&L was implemented in 2020, the HR&L flow deployment would've been measured as 17,286 AF in February through May. The Restoration Year Type was Dry and the Restoration Allocation totaled 202,197 AF at Gravelly Ford, however, only 139,517 AF was released from Friant Dam for Restoration Flows due to downstream capacity constraints. The SJRRP Operations spreadsheet accounted for 22,974 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 4,268 AF was recaptured during this period in the lower San Joaquin River and Mendota Pool. Recapture would've been reduced by 2,134 AF (up to 50% per month), resulting in total HR&L flow deployment of 25,108 AF.

3.1.3 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: March 28, 2024

1 Definitions

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

CVP – Central Valley Project

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

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

SRSC – Sacramento River Settlement Contractors

SWRCB – State Water Resources Control Board

TAF – thousand acre-feet

USBR – United States Bureau of Reclamation

White Papers - 2019 Draft Water Transfers White Paper framework

WY – water year

2 Flow Measures

For HR water sourced from the mainstem Sacramento River system, below are the preliminary quantitative procedures for 1) measuring HR flow deployment; and 2) confirming HR flow contributions were made available or verified based on fallowing and groundwater substitution, consistent with the White Papers.

Sacramento River HR flows will occur in dry, below, 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 HR flows will be during April and May of above normal years, assuming the deployment will not compromise temperature management on the upper Sacramento River. HR flows will be provided on an irrigation schedule during below normal and dry years from Shasta Reservoir. HR flow 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 HR program, as well as the completion of the appropriate environmental documentation.

3 Flow Measure Accounting

SRSC 100 TAF Sacramento River VA Flow Accounting

For the HR flow deployment, the Sacramento River HR Tributary Governance group and SRSC 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.

USBR will verify the SRSC's actions from fallowing and groundwater substitution that make water available for the HR flow are generally consistent with the White Papers.

3.1.1 Reference Flow

Reference Keswick releases are the flows necessary to meet either flood control or water supply including Delta requirements in absence of the HR flows. Reference Keswick releases include the flows needed to meet 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. SWRCB's D1641 Bay-Delta water quality and outflow requirements,
4. 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 basis of the Reference Keswick release. During periods when Reference Keswick releases are changing or forecast to change, e.g. April as diversions increase and tributary flows decrease, 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.

3.1.2 Measuring Sacramento River HR Flow Deployment above Reference Flow

<u>SRSC HR Flow Deployment in Spring Measured as Shasta Reservoir/Sacramento River Release:</u>

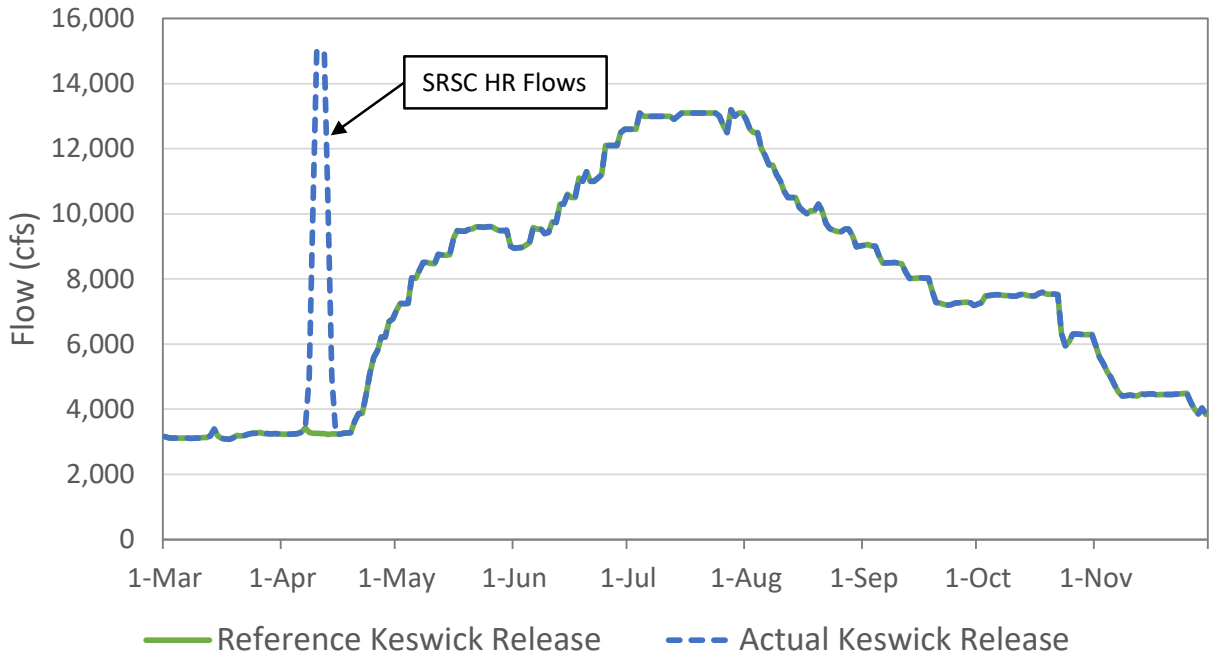
1. As described in the Implementing Agreement, HR governance entities (Sacramento River Governance and Systemwide Governance Committee) will decide on a recommended Spring Action based on the framework in the HR Strategic Plan. An evaluation of Shasta Cold Water Pool will be completed to ensure any spring action does not impact winter-run salmon cold water temperature requirements that align with the applicable Biological Opinions and SWRCB water right requirements.
2. Recommendations by the HR governance entities require approval from at least two of the following agencies: National Marine Fisheries Service, California Department of Fish and Wildlife, and the SWRCB.
3. Weekly HR deployment coordination with USBR biologists, water transfer team, 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.
    a. 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.
    b. Similar meetings will be occurring for the implementation of the Biological Opinions.
4. There are three options for SRSC HR flow deployment in coordination with USBR operations. USBR will track the SRSC HR flows and the Reference flows and will coordinate with USBR/DWR's tracking of the HR deployments to and through the Delta. The following table describes key components for each option.

Deployment Option	Likely Water Year Type	Measurement Location	Reference Flow	SRSC HR Flow Asset
Spring Pulse Release	Above Normal	Keswick	Short-term CVO forecast of Keswick release	$Keswick_{actual}$ > $Keswick_{reference}$ During pulse period
Summer, Fall, or Irrigation Pattern Release	Below Normal	Keswick or Wilkins Slough	Short-term or Seasonal CVO Keswick Release forecast or Wilkins Slough target	$Gage_{actual}$ > $Gage_{reference}$ During specified period
Carryover for Cold-Water	Dry	Keswick	Seasonal CVO forecast of Keswick release	$Keswick_{actual}$ < $Keswick_{reference}$ April to October

Flow gauges to be used for SRSC HR flow accounting are Keswick Reservoir outflow (California Data Exchange Center station KES) and potentially the United States Geological Survey gage 11390500, Sacramento River below Wilkins Slough. The following sections provide additional descriptions of the process and accounting for each deployment option.

a. Spring Pulse Release – likely in Above Normal Years
    i. 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).
    ii. Prior to any pulse flow, the Reference Keswick release for the pulse period will be identified by USBR. The Reference Keswick release will be a short-term forecast of Keswick release for the upcoming two weeks or less.
    iii. USBR will make an additional release from Keswick Dam with associated ramping rates to go above and return to the Reference Keswick release.
    iv. The HR flow will be calculated as the difference between the actual Keswick Release and the Reference Keswick release for the pulse period.
    v. The SRSC will schedule and maintain their diversion rates during the pulse period to ensure the pulse flow moves down the Sacramento River.
    vi. The SRSC will coordinate with USBR and the SWRCB to identify other legal users of water outside the SRSC diversion group and coordinate with those diverters to ensure diversions are not increased during the short-duration pulse period.
    vii. The SRSC will schedule and maintain diversion rates during the irrigation season and those diversions will be reduced by the fallowing and groundwater HR actions. Reduced SRSC diversions may result in reductions to actual Keswick releases during the irrigation season and/or additional water available for USBR to meet CVP demands and obligations. USBR and SRSC will perform the real water verification described in Section 3.1.3, but no additional Sacramento River HR flow accounting will be performed.

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



b. Summer, Fall, or Irrigation Pattern Release – likely in Below Normal Year

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. The following sections describe shorter releases over a few weeks and longer duration releases that may last more than a month.

i. Accounting for releases of a few weeks during the summer or fall will be the same as a Spring Pulse Release wherein USBR will provide a Reference Keswick release and the SRSC HR flow will be measured as the difference between the actual Keswick release and the Reference Keswick release.

ii. Accounting for releases lasting more than a month may be performed at Wilkins Slough. The accounting location will be determined by USBR and SRSC in consultation with CDFW, DWR, and SWRCB based on the requested release timing, duration, and current conditions. Accounting performed at Wilkins Slough is more difficult due to the distance downstream from Keswick and the tributary inflows and diversions that occur between the two locations.

iii. USBR will determine a seasonal flow target for the Sacramento River at Wilkins Slough, e.g. 4,500 cfs, that would be maintained with the Reference Keswick release schedule and Reference SRSC diversions without the fallowing and groundwater HR actions.

iv. The HR flow will be calculated as the difference between the actual Wilkins Slough flow and the Reference Wilkins Slough flow for the period when HR flow assets are scheduled to be deployed. HR flow assets may be scheduled during the entire irrigation season or a portion of the season, but with a duration that exceeds a month.

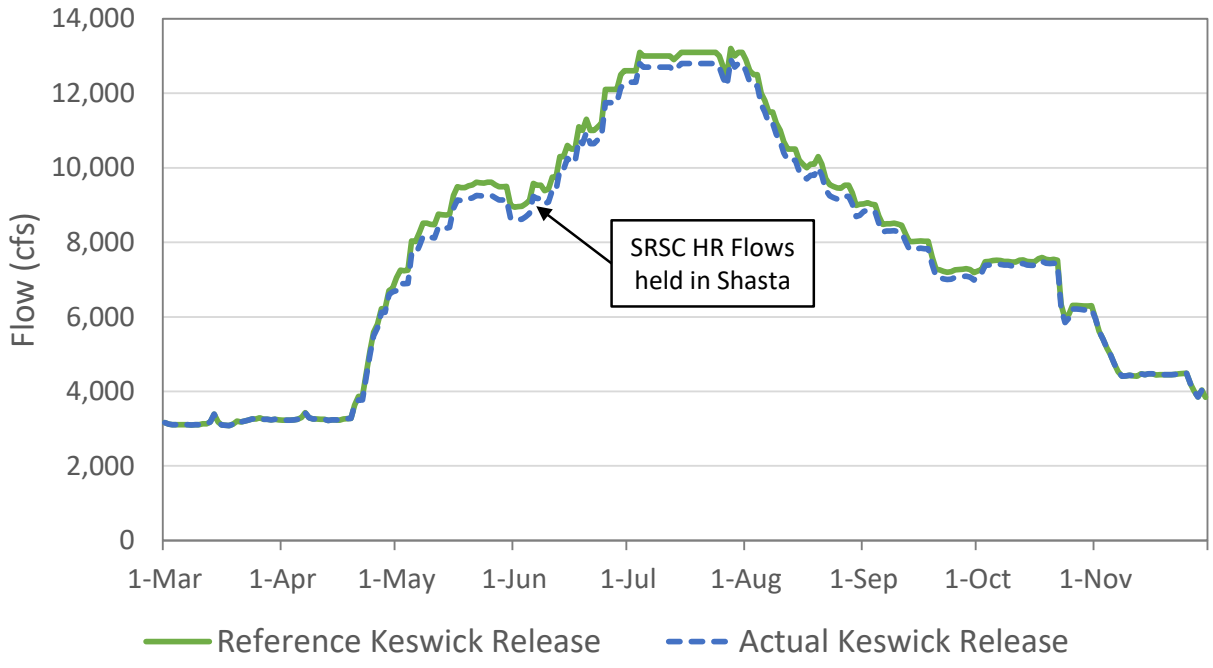
v. The SRSC will schedule and maintain diversion rates during the irrigation season and those diversions will be reduced by the fallowing and groundwater HR actions.

vi. During these year types, Term 91 may be imposed curtailing water right holders with Term 91 in their water right licenses. Most other junior and senior water rights are part of the SRSC diversion group.

1. The SRSC will coordinate with USBR and the SWRCB to identify other legal users of water outside the SRSC diversion group and coordinate with those diverters to ensure diversions are not increased during the release period.

c. Carryover for Cold-Water – likely in Dry Year
   i. SRSC will coordinate with USBR and others to determine if the best use of the SRSC HR flow asset 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.
   ii. Under the Carryover option, the actual Keswick release is expected to be less than the Reference release throughout the April through October period.
   iii. The SRSC will schedule and maintain diversion rates during the irrigation season and those diversions will be reduced by the fallowing and groundwater actions.
   iv. The HR flow asset being held in Shasta Lake will be calculated as the Reference Keswick release minus the actual Keswick release during the April through October period.
   v. During these year types, Term 91 may be imposed curtailing water right holders with Term 91 in their water right licenses. Most other junior and senior water rights are part of the SRSC diversion group.
   vi. SRSC HR flow assets carried over in storage in Shasta Lake will be subject to spill in the winter. HR flow assets not spilled will be available to be deployed on one of the other release patterns 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.



d. SRSC HR flows will be protected for Delta outflow in accordance with the Delta accounting methodologies.

3.1.3 Sacramento River HR Real Water Verification

In general, all real water verification procedures will follow the White Papers which have been prepared by DWR and USBR in coordination with SWRCB.

SRSC HR Flow Contribution Measured using Cropland Fallowing:

1. Up to 100 TAF of HR 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 HR flow contribution is presumed to be based on fallowed rice lands or other annual crops.
3. SRSC will identify the fallowed parcels by March 1st, and will in all likelihood, have a long-term agreement for the fallowed parcels for the duration of the program versus having to identify fields on a year-to-year basis.
4. Consistent with the White Papers, the following steps are needed to verify the SRSC HR contribution from fallowed lands during the typical irrigation season.
    a. Reference cropland planting (without HR) conditions – estimate crop acreages without HR flow.
    b. Verify available water – based on the acreage to volume relationship as mutually agreed. It has been agreed that water made available from riceland idling equates to 3.3 AF per idled acre during the irrigation season, and 1 AF of reduced Fall water use per each idled acre, for a total of 4.3 AF per idled acre.
    c. Reporting – during the typical irrigation period, SRSC will report the fallowing activities to USBR.
    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 20% of recent harvested crop acreage by 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.

SRSC HR Flow Contribution Measured using Groundwater Substitution:

1. SRSC HR 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 HR water made available through groundwater substitution, SRSCs will identify and coordinate with USBR on the following:
    a. The amount of increased pumping to provide HR 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 HR.
    e. Mutually agreed value for the streamflow depletion factor.
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 HR implementation.

Feather Draft Quantitative Flow Accounting Procedures

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 (HR&L) water sourced from Feather River system, below are the preliminary quantitative procedures for 1) measuring HR&L flow deployment; and 2) confirming HR&L flow deployments 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 Water Transfer White Paper (Water Transfer White Paper) framework.

Feather River HR&L flows will occur in dry, below, and above normal years for a total quantity of up to 60 TAF, anticipated to be approximately 50 TAF from FRSA and up to 10 TAF from upstream, of Lake Oroville, reservoir re-operation (e.g., South Feather Water and Power Agency (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 HR&L flows 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.

3 Flow Measure Accounting

60 TAF Feather River HR&L Flow Accounting

For HR&L flow deployment 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 HR&L flow pattern above the necessary releases to meet the SWP's obligation.

To compensate for DWR's Oroville Complex releases for deploying the HR&L flow, 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 HR&L flow contributions from upstream reservoirs associated with reservoir re-operation will typically occur the following summer and early fall months after the HR&L flow 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 HR&L

contribution flow from Ponderosa Dam into Lake Oroville are primarily dependent on the South Feather's reservoir operational criteria.

3.1.1 Reference Flow

Reference releases are the flows necessary to meet either flood control or water supply including Delta requirements absent of HR&L flow. 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:

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

3.1.2 Measuring Feather River HR&L Flow Deployment above Reference Flow

<u>HR&L Flow Deployment in Spring Measured as Oroville Release:</u>

1. Weekly HR&L deployment coordination with DWR biologists, water transfer team, and Feather River HR&L Tributary Governance will start at least one month 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.
2. DWR will deploy the HR&L flows, including HR&L 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 HR&L flow contribution. The repayment of the HR&L deployment will follow the water transfer framework described in the Water Transfer White Paper. During the drier months, HR&L flow could be temporarily stored in Lake Oroville prior to its deployment.
3. HR&L flows 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 HR&L deployment flow and will coordinate with DWR/USBR's Delta tracking of the HR&L deployments.
    a. Demonstrate HR&L deployments.
        i. Prior to any HR&L deployment, an identification of the reference flow will be performed.
        ii. An additional release increase will demonstrate HR&L deployment and will include associated ramping rates above the reference flow.
    b. Demonstrate HR&L deployment flows in accordance with the Delta accounting methodologies [Placeholder to reference Delta accounting].

3.1.3 Feather River 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 were prepared by DWR and USBR in coordination with SWRCB.

<u>HR&L Flow Contribution Measured using Cropland Fallowing:</u>

1. The Feather River HR&L flow contribution from the FRSA is presumed to be based on fallowed rice fields.
2. To account for the HR&L water made available through cropland fallowing, FRSA contractors must provide the following by March 1st.
    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 River HR&L Flow was made available from FRSA fallowed rice fields during the typical irrigation season.
    a. Cropland with planting (without HR&L) conditions – estimate crop acreages without HR&L flow.
    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.

HR&L Flow Contribution Measured using Groundwater Substitution:

1. To account for the HR&L water 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 HR&L flow 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 HR&L 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 of HR&L.
    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 HR&L effects.
    f. A mitigation plan designed to alleviate possible injury to other legal users of water.

HR&L Flow Contribution Measured using Reservoir Re-Operation:

1. HR&L flow 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 additive HR&L flow must be released at a time when the flow can be re-released through Oroville Complex for downstream benefits. To account for the HR&L water made available through reservoir re-operation, South Feather must provide the following by March 1st.

   a. The need to establish an upstream reservoir operations baseline which includes normal operating conditions, normal end-of-season storage, and typical release patterns. Factors such as annual hydrology, agency demand, and instream requirements are needed to develop a variety of hydrologic baseline conditions.
   b. Information needs to be provided to ensure the quantity of HR&L water as the additional storage is released.
   c. 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.

2. Reservoir release, storage data, and gage records downstream of reservoir will be required during the deployment period to verify the HR&L flow.
3. Refill criteria are required to ensure that the refill of vacated space from a HR&L flow release 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

Drafted by: S. Grinnell

1 Definitions

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

"VA Reference Flows” mean (1) the Yuba River flow at the Marysville Gage that would have been present without any YWA VA Component B operations or (2) when determining YWA’s VA Component A deployment, this term refers to the “Baseline Flow” as detailed in the Accord Accounting.

“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 accounted as YWA VA Component A or B flows as compared with the releases that would occur with YWA operations for VA Reference Flows. These reduced releases could result from diversions to storage to fill storage space evacuated as a result of VA 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 as that term is defined in the Accord Accounting, as determined by DWR for Delta conditions export facility operations and operations to back water into storage in Oroville which is made available under the YWA Implementation Agreement.

“**VA Component B**” means water that is made available 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 below 650,000 AF and which are not releases to comply with the Accord required instream flows other water right terms, FERC license requirements and USACOE 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 VA 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 storage in Oroville 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 are not releases to meet Yuba Accord required flows. Both VA Components are to be provided in SVI water year types Above Normal, Below Normal and Dry.

All flows will be accounted as mean daily flow at USGS Gage 11421000 Yuba River near Marysville, as calculated for three flow conditions:

- 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 VA storage releases
- Recorded flows at the gage that includes the VA storage releases.

3 Flow Measure Accounting

3.1.1 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 VA deployment flows. The reason for two sets of Reference flows is to account for the two types (Components A and B) of YWA VA Program flows.

YWA VA Program Component A flows are accounted against the VA 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–

- D-1644 Interim required flows (Water Right Order 2003-0016)
- YRDP Target storage in New Bullards Bar Reservoir for 9/30 of 705TAF
- 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
- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

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

- Yuba Accord Required Flows (SWRCB Water Right Order 2008-0025)
- YRDP 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
- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

3.1.2 Measuring YWA VA Deployment above Reference Flow

VA Component A flows are Accord transfer releases in April, May and June that cannot be backed into storage in Oroville or exported by DWR, VA 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 elevation 1,881.45 ft msl and elevation 1,867.63 ft msl (650,000 acre-ft and 600,000 acre-ft), resulting in an end of September storage to achieve a total of 50,000 acre-ft to contribute to Delta outflow. The YWA VA 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 VA Component A evacuated storage will be tracked and calculated in the Yuba Accord accounting while YWA VA 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 VA 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 VA 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 this VA 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 VA Component A flows compared to Yuba Accord Delivered Transfer Water are,

- YWA VA Component A flows will meet the requirements of Accord Released Transfer Water
- YWA VA Component A flows are Released Transfer Water that occur only in April, May and June
- YWA VA Component A flows can be accounted for in Balanced Conditions, Excess Conditions or under E/I Control
- YWA Component A flows are accounted for on the day the flow occurs and do not include any backing of this water into Oroville storage for later release

Scheduling of VA Component B releases will be based on the information available at the time of release planning 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 VA 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 VA 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 VA Component A through the Accord accounting.

YWA will prepare preliminary operations plans for release of VA water in coordination with DWR, USBR and CDFW and as required, for coordination described in other VA agreements. Prior to April 1, which would be the earliest date that a release of VA water from New Bullards Bar Reservoir storage would occur, 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 of stored water for VA 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.

3.1.3 Real Water Verification

As described above, VA Component A releases meet the requirements for Accord Released Transfer Water (as determined by DWR, with concurrence by USBR, and 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. VA Component B will also meet the requirements of Released Transfer Water. Verification will be done through submission to DWR and USBR of the Accord Accounting spreadsheets and supporting documentation which will be augmented to include VA flow tracking and accounting.

All YWA VA Program flow deployment will comply with the accounting requirements for “Released Transfer Water”. 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) New Bullards Bar Reservoir storage values; and (2) Mean Daily Flows calculated (for baseline determination) and measured at the USGS Gage 11421000 Yuba River near Marysville.

For the Reference flow condition (baseline in Accord Accounting terms) determination of New Bullards Bar Reservoir storage, the historic end of September storage of 705 TAF, which was 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 VA Reference Flow for YWA VA Component A deployment. The second

control point for determining the VA Reference Flow for YWA VA Component A is the Mean Daily Flow at the USGS Gage 11421000 Yuba River near Marysville, calculated under VA Reference Flow conditions (baseline in Accord Accounting) with YWA operations to comply with SWRCB Decision 1644 Interim flow requirements. YWA VA Component A deployment flows are the flows that result from YWA's operations to reach a New Bullards Bar Reservoir storage level of 650TAF and operation to comply with Yuba Accord required flows, resulting in flows above the VA Reference Flow.

The same two control points that are used to determine the VA Reference Flow for YWA VA Component A deployment are used to determine the VA Reference Flow for YWA VA Component B deployment except with two different conditions. Instead of an end of September target of 705TAF used for the Yuba Accord Accounting baseline, an end of September target of 650TAF is used as this is the Yuba Accord targeted storage to produce Accord transfer flows. YWA VA Component B deployment will be determined as the amount of storage evacuated below 650TAF if, without the YWA VA Component B deployment storage would have been at this storage level, or within the storage range of 650TAF to 600TAF. The second, differing condition (compared to the Reference for YWA VA Component A flows) is a different VA Reference Flow at the Marysville Gage. For the VA Reference Flow determination of YWA VA Component B deployment, the calculated flow will be the resulting flow with YWA operating to comply with SWRCB Order 2008-0025 which is the order implementing the Yuba Accord required instream flows.

For additional technical information, see Appendix 2 ("Yuba River Flow Accounting") of the Implementing Agreement for Healthy Rivers and Landscpaes Program in the Yuba River

American Draft Quantitative Flow Accounting Procedures

American River flow accounting forthcoming by April 5, 2024.

Mokelumne Draft Quantitative Flow Accounting Procedures

[[[Note: EBMUD recently received comments from DWR, CDFW, and the SWRCB on this flow accounting document. EBMUD has not yet addressed certain of those comments due to time constraints. We will continue to engage with these agencies to address their comments.]]]

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.

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

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.

Flow Measure Accounting

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.

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 entering the Joint Settlement Agreement (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/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.

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. The HRL flow accounting includes this water within the Existing Flow Requirements.

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 historical monthly average observed losses, by JSA year type. The HRL flow accounting includes this water within the Existing Flow Requirements.

1.4 Water Right Permit 10478 Term 20: MMRP Fish-1

Mitigation Measure Fish-1, 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.

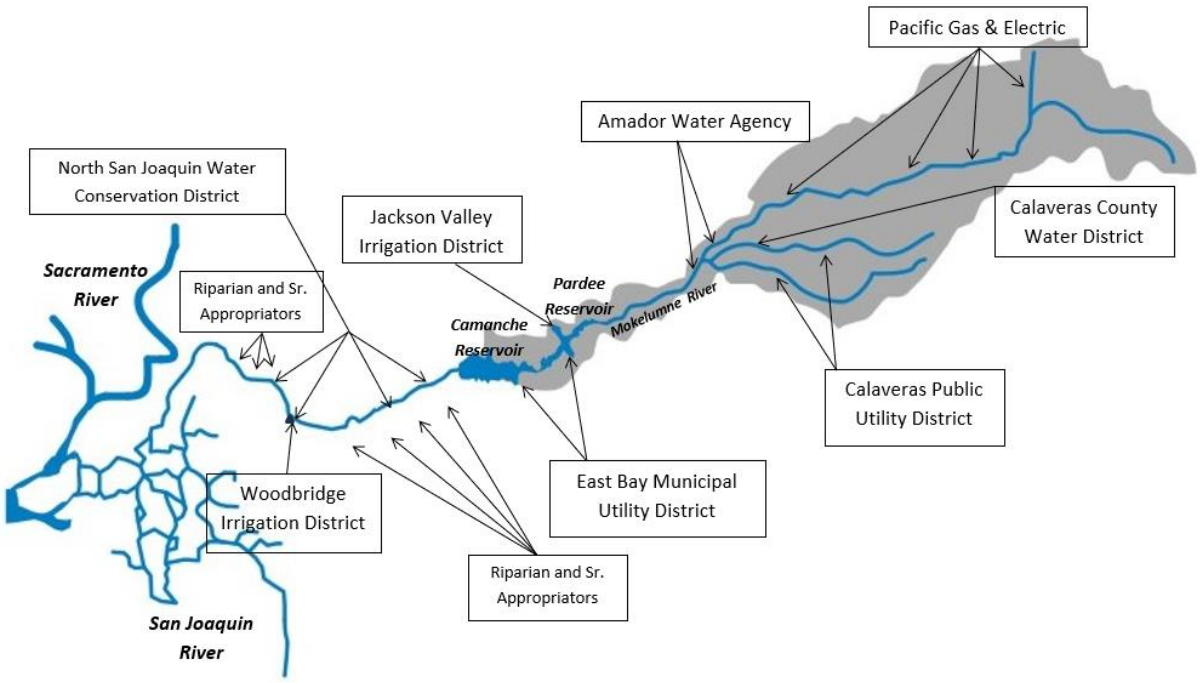


Figure 1. Mokelumne River Diverters

2. 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.

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 and the HRL Flow Contribution, in accordance with the applicable JSA Year Type (respecting Existing Flow Requirements) and Mokelumne HRL Year Type (respecting the HRL Flow Contribution). 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). Since the HRL Flow Contribution includes a Spring block of water in the March through May timeframe, 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. Therefore, the PCC may approve two or more alternative schedules that can be implemented based on changing conditions. For example, the PCC could meet in February and develop schedules for both "Dry" and "Normal and Above" HRL Year Types, provided that the total HRL Flow Contribution released in March through May will be no less than the required Spring release for the Mokelumne HRL Year Type that is determined in April. The PCC may also decide to make changes in response to evolving conditions or to shift flows to the October time period for fall attraction pulses within the Flexible Range of Block Releases from Camanche Dam specified in Appendix 1, Tables 1 through 4.

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 fish mitigation water, 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. 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 examples to demonstrate how the tables work in practice. The first example shows a year where the Mokelumne is in compliance with its HRL Flow Commitments.

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

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Example 1: Table 1

Year	Month	[1] JSA Year Type	[2] Minimum Release from Camanche Dam	[3] Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)	[4] Flow Below Woodbridge Dam	[5] Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams	[6] Scheduled WID Diversion	[7] Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights	[8] Other Release Requirements: Water Right Permit 10478 Term 20 (MMRP Fish-1)	[9]	[10] Existing Flow Requirements (Appx. 1, § I.A.2)	[11] Mok. River HRL Flow Contribution: Mokelumne HRL Year Type (Appx. 1, Table 6)	[12] HRL Flow Contribution (Appx. 1, § I.A.3)	[13]	[14] Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	[15] Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)
			JSA/D1641	JSA/D1641	JSA/D1641	*Estimated DATA	*Scheduled / Planned DATA	Apr-Sep: =max([2] + [3] or [3] + [4] + [5] + [6]) Oct-Mar: = [2] + [3]			= [7] + [9]				= [10] + [13]	DATA
			(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(AF)	(CFS)	(CFS)		(AF)	(CFS)	(CFS)	(CFS)
	January	Normal	325		100	10.99	0.00	325.00			325.00				325.00	1445.00
	February	Normal	325		100	42.76	0.21	325.00			325.00				325.00	600.30
	March	Normal	325		100	64.88	0.00	325.00			325.00	Normal	3375.72	54.90	379.90	2017.00
	April	Normal	325	200	150	81.44	20.30	525.00			525.00	Normal	19470.04	327.20	852.20	3158.00
	May	Normal	325	100	300	24.89	97.23	522.12			522.12	Normal	16355.94	266.00	788.12	2243.00
	June	Normal	325		300	89.04	117.83	506.88			506.88				506.88	1923.00
	July	Normal	100		25	-14.45	175.16	185.71			185.71				185.71	2187.00
	August	Normal	100		25	66.35	184.94	276.29			276.29				276.29	1073.00
	September	Normal	100		25	82.58	158.20	265.78			265.78				265.78	736.20
	October	Normal	325		100	22.46	99.39	325.00			325.00	Normal	5798.37	94.30	419.30	1235.00
	November	Normal	325		100	26.80	1.73	325.00			325.00				325.00	583.00
	December	Normal	325		100	63.33	0.00	325.00			325.00				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		Mokelumne River HRL Flow Contribution		Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	
		Volume (AF)	Flow (cfs)	Volume (AF)	Flow (cfs)	Volume (AF)	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	11,419	185.71
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 is in compliance for that year.

Example 1: Table 3

COMPLIANCE DETERMINATION	Measured	HRL Releases	Total Required Releases	Compliance?
March-May	449,852	39201.7	122,528	YES
October	75,937	5798.366	25,782	YES
Annual	1,061,712	45000.06	300,050	YES

	HRL Flow Flexibility Range	Actual Percentage
Spring Block	70-90%	87%
Fall Block	10-30%	13%

The second example shows a year where the Mokelumne is not in compliance.

Example 2: Table 1

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Year	Month	JSA/D-1641 Release Requirements							Other Release Requirements			Mok. River HRL Flow Contribution				
		JSA Year Type	Minimum Release from Camanche Dam	Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)	Flow Below Woodbridge Dam	Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams	Scheduled WID Diversion	Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights	Water Right Permit 10478 Term 20 (MMRP Fish-1)		Existing Flow Requirements (Appx. 1, § I.A.2)	Mokelumne HRL Year Type (Appx. 1, Table 6)	HRL Flow Contribution (Appx. 1, § I.A.3)		Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)
			JSA/D1641	JSA/D1641	JSA/D1641	*Estimated DATA	*Scheduled / Planned DATA	Apr-Sep: =max([2] + [3] or [3] + [4] + [5] + [6]) Oct-Mar: = [2] + [3]			= [7] + [9]				= [10] + [13]	DATA
			(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(AF)	(CFS)	(CFS)		(AF)	(CFS)	(CFS)	(CFS)
	January	Below Normal	250		100	43.28041	4.947754	250			250				250	342.2
	February	Below Normal	250		100	50.25459	0.642857	250			250				250	270.1
	March	Below Normal	250		100	56.16078	52.15667	250			250	Dry	1500.319	24.4	274.4	269.4
	April	Dry	220		150	73.33626	68.96374	292.3			292.3	Dry	3373.934	56.7	349	315.1
	May	Dry	220		150	90.22476	126.8347	367.0595			367.0595	Dry	2625.559	42.7	409.7595	384.9
	June	Dry	100		20	93.68855	135.019	248.7075			248.7075				248.7075	270.9
	July	Dry	100		20	97.26073	172.7456	290.0063			290.0063				290.0063	313.2
	August	Dry	100		20	98.28579	149.3511	267.6369			267.6369				267.6369	285
	September	Dry	100		20	87.66678	148.0931	255.7598			255.7598				255.7598	275.4
	October	Below Normal	250		100	57.62335	60.80888	250			250	Dry	2502.582	40.7	290.7	325.2
	November	Below Normal	250		100	48.71202	4.238635	250			250				250	265.9
	December	Below Normal	250		100	58.30082	3.760541	250			250				250	255.2

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 not 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	Measured	HRL Releases	Total Required Releases	Compliance?
March-May	58,981	7499.812	62,834	NO
October	19,996	2502.582	17,874	YES
Annual	215,822	10002.39	204,519	YES

	HRL Flow Flexibility Range	Actual Percentage
Spring Block	70-90%	75%
Fall Block	10-30%	25%

Putah Draft Quantitative Flow Accounting Procedures

Date Drafted: 3/28/2024

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 Yolo County Flood Control and Water Conservation District (Yolo Flood) 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.

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 Yolo Flood, distinct from the Accord and Putah Creek VA Flows.

3 Flow Measure Accounting

3.1.1 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)

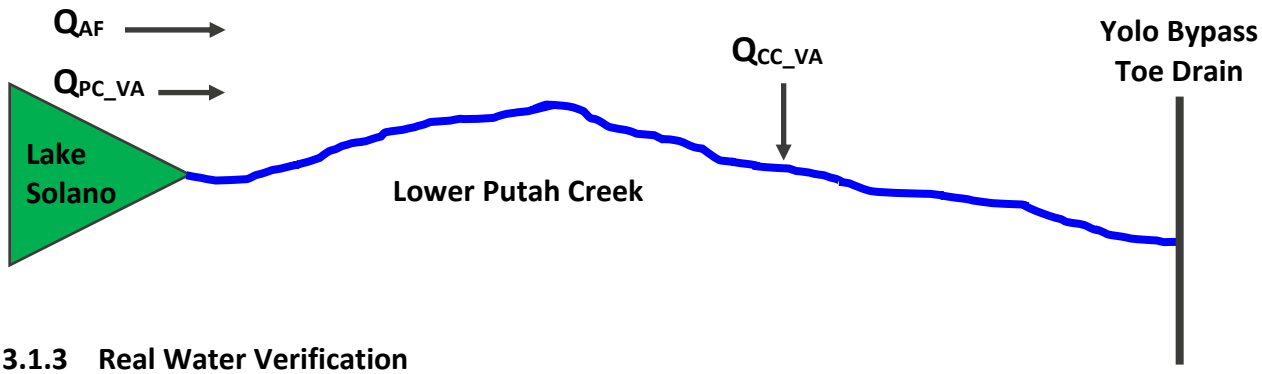
Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	15	25	25	25	16	26	46	33	33	33	26	15
I-80	2	2	2	2	2	2	2	2	2	2	2	2

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

3.1.2 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, Yolo Flood 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 Yolo Flood. However, SCWA and Yolo Flood 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



3.1.3 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 Yolo Flood, but in close coordination with SCWA.

Delta Exports Draft Quantitative Flow Accounting Procedures

1. Definitions

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

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

HR&L –Agreements to Support Healthy Rivers and Landscapes.

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.

COA – Agreement Between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and State Water Project, executed in 1986 and addended in 2018.

In-Basin Use – Legal uses of water in the Sacramento Basin, including the water required for Delta requirements as specified in D-1641 (per the 2018 COA addendum) and 2019 BiOps.

Storage Withdrawals for In-Basin Use – The total SWP/CVP storage withdrawals (as defined in COA) that exceed total exports.

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.

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

2. Flow Measures

A memorandum of understanding (MOU) dated March 29, 2022, outlined the export contribution volumes the SWP and CVP (Projects) would provide to enhance Delta outflow under the Export HR&L. These volumes are dependent on the Sacramento Valley Water Year Index and are summarized as follows:

C	D	BN	AN	W
0 TAF	125 TAF	125 TAF	175 TAF	0 TAF

The primary window for the Export HR&L 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 HR&L action through reductions in exports based on the 90% exceedance hydrology in March and 75% exceedance hydrology in April. The action 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.

3. Flow Measure Accounting

3.1.1 Reference Operation

Since Delta inflow should increase in response to additional flows on the tributaries pursuant to Implementation Agreements upstream, the Projects must track the additional Delta inflow to ensure that exports do not divert any of the additional HR&L flow. This accounting methodology is fully described in the Delta Accounting Procedures Document. A short summary is described below to provide the context for the Reference Operation upon which the Export HR&L contribution will be additive.

Tributary HR&L Deployment plans will be used to develop regulatory offsets that reflect the incremental flow and water quality differences that would occur with additional HR&L inflows. These offsets will be used during real-time Project operations to demonstrate that HR&L flows are not exported. The resulting export operation, including regulatory offsets, would become the reference operation from which the Export HR&L 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 HR&L 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 US Army Corps of Engineers permit, that 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 HR&L contributions.
    a. A default OMRI of –5,000 cfs will be used, unless a prescriptive action (a Condition of Approval in the LTO ITP, or a conservation measure in the LTO BiOps, that is a predetermined action based on measured data, such as salvage-based actions) requires an OMRI less negative than –5,000 cfs.
    b. The species protections under 2019 BiOp will be the point of reference [placeholder for detailed description per MOU Term Sheet Section 4.1].
    c. Any Export reductions for species not covered by the 2019 BiOps would be counted toward meeting the Export HR&L action.
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. Determination of Unstored water for Export under the Coordinated Operations Agreement (COA).
    a. Stored Project water will not be used for meeting the Export HR&L when in balanced conditions. To prevent this HR&L action from using stored Project water to meet obligations, no cuts to exports will be made for an Export HR&L action when the Projects are making storage withdrawals for In-Basin Use (as defined in COA).

3.1.2 Measuring HR&L Flow Deployment above Reference Operation

Flows for the Export HR&L 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[1].

3.1.3 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.

The Delta Accounting Procedures section provides a methodology for developing operational 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.

[1] Maintenance and/or repair of facilities will be allowed during the export HR&L action without affecting the determination of Reference Flow.

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

2.1.1 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.

2.1.2 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.

2.1.3 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.

2.1.4 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

3.1.1 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

3.1.2 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.

3.1.3 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.

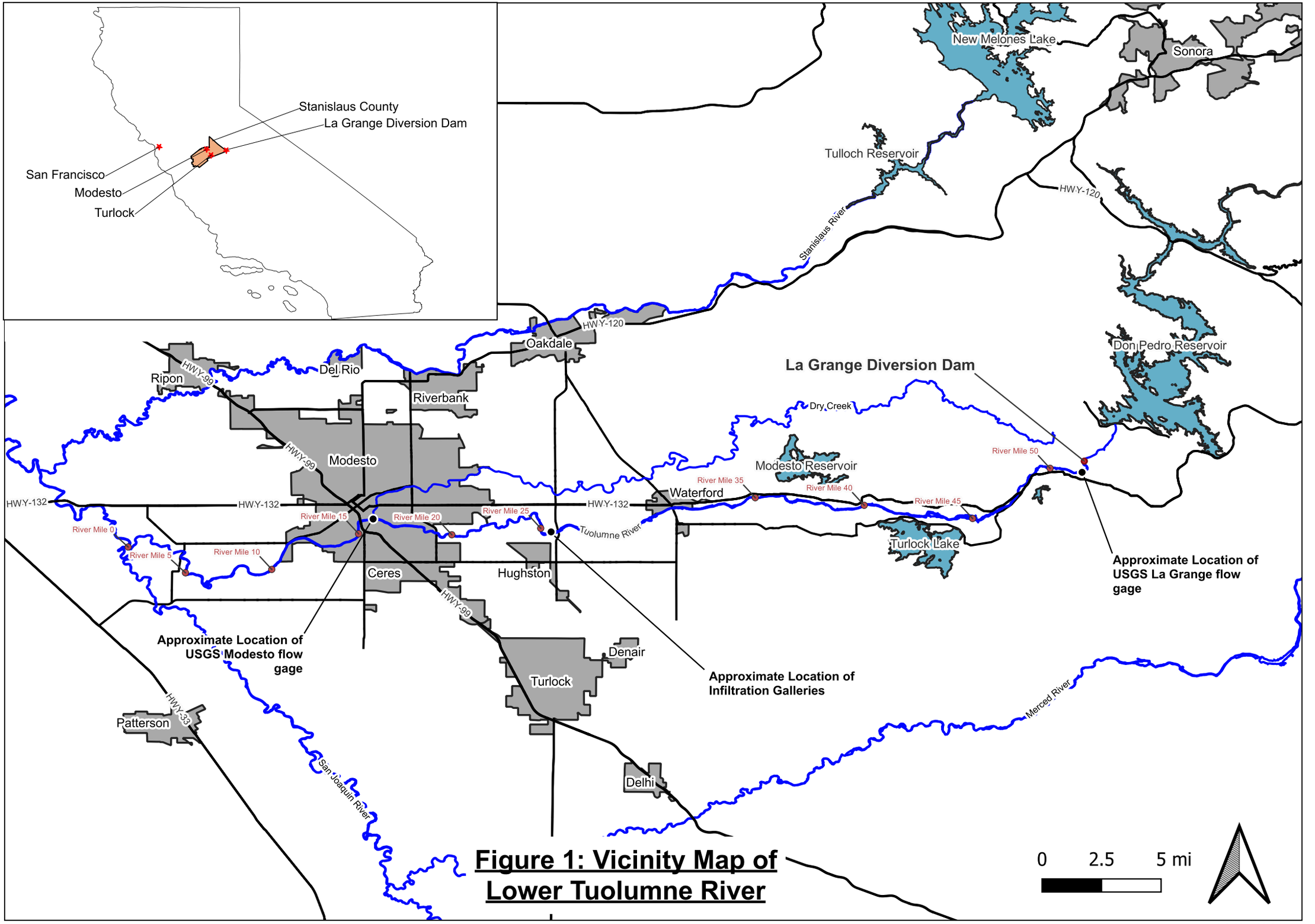


Figure 1: Vicinity Map of Lower Tuolumne River

03/27/2024

Table A – Tuolumne River VA Volume Summary

Critical Year Type [1]

Fall Run Chinook Salmon Life Stage [2]	*O. mykiss* Life Stage [2]	Period	Volume Summary of 1996 FERC Order Amending the License for the Don Pedro Project, Excluding Interpolation Water [3a,3b]	Volume of Tuolumne VA Flow Measures [4]		Volume Summary of Implementing Schedule for Tuolumne VA [4]
			Total Minimum Flow Requirement at La Grange Base Flow + Pulse Flows (AF)	Tuolumne VA Flows: Increase in Minimum Instream Flow Requirement from 1995 FERC License (AF)	Flexible Ranges of Tuolumne VA Flows [5] (Percent of VA Flow Measure Volume)	Estimated Minimum Net Flow Past Infiltration Galleries Base Flow + Pulse Flows - Infiltration Gallery Diversions (AF)
Fry Rearing	Adult Habitat	1/1-2/28	17,554	86,559 (17,039) [6]	0%	20,479
Juvenile Rearing	Spawning	3/1-3/31	9,223		60% to 100%	67,818 (22,298) [7]
		4/1-4/15	4,463			5,950
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	30,193			46,901 (22,901) [8]
		5/1-5/15				
	Juvenile Rearing	5/16-5/31	4,760		0% to 40%	7,141
		6/1-6/30	2,975			7,438 (7,438) [9]
		Jan-Jun Totals:	69,168	86,559 (17,039) [6]		155,727 (86,207) [6]

Table B – Tuolumne River VA Volume Summary

Dry Year Type [1]

Fall Run Chinook Salmon Life Stage [2]	*O. mykiss* Life Stage [2]	Period	Volume Summary of 1996 FERC Order Amending the License for the Don Pedro Project, Excluding Interpolation Water [3a,3b]	Volume of Tuolumne VA Flow Measures [4]		Volume Summary of Implementing Schedule for Tuolumne VA [4]
			Total Minimum Flow Requirement at La Grange Base Flow + Pulse Flows (AF)	Tuolumne VA Flows: Increase in Minimum Instream Flow Requirement from 1995 FERC License (AF)	Flexible Ranges of Tuolumne VA Flows [5] (Percent of VA Flow Measure Volume)	Estimated Minimum Net Flow Past Infiltration Galleries Base Flow + Pulse Flows - Infiltration Gallery Diversions (AF)
Fry Rearing	Adult Habitat	1/1-2/28	19,309	139,720 (39,604) [6]	0%	23,405
Juvenile Rearing	Spawning	3/1-3/31	10,146		60% to 100%	93,951 (23,835) [7]
		4/1-4/15	4,909			6,694
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	46,308			89,876 (59,876) [8]
		5/1-5/15				
	Juvenile Rearing	5/16-5/31	5,236		0% to 40%	8,727
		6/1-6/30	4,463			7,438 (7,438) [9]
		Jan-Jun Totals:	90,371	139,720 (39,604) [6]		230,091 (129,975) [6]

Table C – Tuolumne River VA Volume Summary

Below Normal Year Type [1]

Fall Run Chinook Salmon Life Stage [2]	*O. mykiss* Life Stage [2]	Period	Volume Summary of 1996 FERC Order Amending the License for the Don Pedro Project, Excluding Interpolation Water [3a,3b]	Volume of Tuolumne VA Flow Measures [4]		Volume Summary of Implementing Schedule for Tuolumne VA [4]
			Total Minimum Flow Requirement at La Grange Base Flow + Pulse Flows (AF)	Tuolumne VA Flows: Increase in Minimum Instream Flow Requirement from 1995 FERC License (AF)	Flexible Ranges of Tuolumne VA Flows [5] (Percent of VA Flow Measure Volume)	Estimated Minimum Net Flow Past Infiltration Galleries Base Flow + Pulse Flows - Infiltration Gallery Diversions (AF)
Fry Rearing	Adult Habitat	1/1-2/28	27,793	127,368 (97,616) [6]	0%	26,330
Juvenile Rearing	Spawning	3/1-3/31	14,603		60% to 100%	114,545 (84,793) [7]
		4/1-4/15	7,066			7,438
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	89,087			116,364
		5/1-5/15				
	Juvenile Rearing	5/16-5/31	7,537		0% to 40%	9,521
		6/1-6/30	9,670			8,926 (8,926) [9]
		Jan-Jun Totals:	155,756	127,368 (97,616) [6]		283,124 (253,372) [6]

Table D – Tuolumne River VA Volume Summary

Above Normal Year Type [1]

Fall Run Chinook Salmon Life Stage [2]	*O. mykiss* Life Stage [2]	Period	Volume Summary of 1996 FERC Order Amending the License for the Don Pedro Project, Excluding Interpolation Water [3a,3b]	Volume of Tuolumne VA Flow Measures [4]		Volume Summary of Implementing Schedule for Tuolumne VA [4]
			Total Minimum Flow Requirement at La Grange Base Flow + Pulse Flows (AF)	Tuolumne VA Flows: Increase in Minimum Instream Flow Requirement from 1995 FERC License (AF)	Flexible Ranges of Tuolumne VA Flows [5] (Percent of VA Flow Measure Volume)	Estimated Minimum Net Flow Past Infiltration Galleries Base Flow + Pulse Flows - Infiltration Gallery Diversions (AF)
Fry Rearing	Adult Habitat	1/1-2/28	35,107	138,515	0%	26,330
Juvenile Rearing	Spawning	3/1-3/31	18,446		60% to 100%	114,545
		4/1-4/15	8,926			7,438
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	107,733			166,364
		5/1-5/15				
	Juvenile Rearing	5/16-5/31	9,521		0% to 40%	9,521
		6/1-6/30	14,876			8,926 (8,926) [9]
		Jan-Jun Totals:	194,609	138,515		333,124

Table E – Tuolumne River VA Volume Summary

Wet Year Type [1]

Fall Run Chinook Salmon Life Stage [2]	*O. mykiss* Life Stage [2]	Period	Volume Summary of 1996 FERC Order Amending the License for the Don Pedro Project, Excluding Interpolation Water [3a,3b]	Volume of Tuolumne VA Flow Measures [4]		Volume Summary of Implementing Schedule for Tuolumne VA [4]
			Total Minimum Flow Requirement at La Grange Base Flow + Pulse Flows (AF)	Tuolumne VA Flows: Increase in Minimum Instream Flow Requirement from 1995 FERC License (AF)	Flexible Ranges of Tuolumne VA Flows [5] (Percent of VA Flow Measure Volume)	Estimated Minimum Net Flow Past Infiltration Galleries Base Flow + Pulse Flows - Infiltration Gallery Diversions (AF)
Fry Rearing	Adult Habitat	1/1-2/28	35,107	138,515	0%	26,330
Juvenile Rearing	Spawning	3/1-3/31	18,446		60% to 100%	114,545
		4/1-4/15	8,926			7,438
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	107,733			166,364
		5/1-5/15				
	Juvenile Rearing	5/16-5/31	9,521		0% to 40%	9,521
		6/1-6/30	14,876			8,926 (8,926) [9]
		Jan-Jun Totals:	194,609	138,515		333,124

Table F – Tuolumne River VA Implementing Schedule, Base Flows

Implementing Schedule for Tuolumne VA [4] Instream Flow Requirement at La Grange Base Flows (CFS)								
Fall Run Chinook Salmon Life Stage [2]	***O. mykiss* Life Stage [2]**	**Period**	**Water Year Type [1]**					
			Critical		**Dry**		**Below Normal, Above Normal, and Wet**	
			Instream Flow Requirement at La Grange [10]	**Expected Infiltration Gallery Diversions [11]**	**Instream Flow Requirement at La Grange [10]**	**Expected Infiltration Gallery Diversions [11]**	**Instream Flow Requirement at La Grange [10]**	**Expected Infiltration Gallery Diversions [11]**
Fry Rearing	Adult Habitat	1/1-2/28	175	0	200	0	225	0
Juvenile Rearing	Spawning	3/1-3/31	200	0	225	0	250	0
		4/1-4/15	200	0	225	0	250	0
Rearing and Outmigration	Incubation/Fry Rearing	4/16-4/30	200	0	250	0	275	0
		5/1-5/15	200	0	250	0	275	0
	Juvenile Rearing	5/16-5/31	225	0	275	0	300	0
		6/1-6/30	200 (125) [11]	75	200 (125) [11]	75	200 (150) [11]	50

Table G – Tuolumne River VA Implementing Schedule, Pulse Flows

Implementing Schedule Including Tuolumne VA [4] Instream Flow Requirement at La Grange Pulse Flows [12, 13, 14] (AF)								
Period	Water Year Type [1]							
	Critical	Successive Critical	Dry	Successive Dry	Below Normal	Successive Below Normal	Above Normal	Wet
1/1-2/28	0	0	0	0	0	0	0	0
3/1-3/31	55,521	10,000 [7]	80,116	10,000 [7]	99,174	69,421 [7]	99,174	99,174
4/1-4/15	0	0	0	0	0	0	0	0
4/16-4/30	35,000	11,000 [8]	75,000	45,000 [8]	100,000	100,000	150,000	150,000
5/1-5/15								
5/16-5/31	0	0	0	0	0	0	0	0
6/1-6/30	0	0	0	0	0	0	0	0

Notes for Tables A through G:

1. The Tuolumne VA implementing schedule uses the San Joaquin Index Water Year Types as defined in D1641.
2. The timing of life stages is approximate and may depend on hydrologic cues or other factors that vary from year to year.
3a. The 1996 FERC Order Amending the License for the Don Pedro Project has 10 water year type classifications as set by the 1995 Settlement Agreement that have been converted to the 5 SJI Water Year Type classifications by averaging minimum flow requirements. A crosswalk for year type classifications is provided below:

1995 Settlement Agreement Water Year Type	Crosswalk to D1641 SJI Water Year Type
CRITICAL WATER YEAR AND BELOW	Critical
MEDIAN CRITICAL WATER YEAR	
INTERMEDIATE C-D WATER YEAR	
MEDIAN DRY	Dry
INTERMEDIATE D-BN	
MEDIAN BELOW NORMAL	Below Normal
INTERMEDIATE BN-AN	
MEDIAN ABOVE NORMAL	Above Normal
INTERMEDIATE AN-W	
MEDIAN WET/ MAXIMUM	Wet

3b. The minimum instream flow requirements shown in this column exclude interpolation water. Interpolation water requirements are described in the 1996 FERC Order amending the license for the Don Pedro Project. The volume of interpolation water that is required varies from year to year and is not always required. If it is required in a given year, the interpolation water is typically applied in October.
4. The Tuolumne VA implementing schedule occurs from January through June. The effective FERC license for the Don Pedro and La Grange hydroelectric projects will determine July through December flow requirements.
5. The flexibility in the Tuolumne VA can be achieved through adjusting the timing of the two spring pulse flows. Such adjustments will be made to increase benefits to salmonids in the lower Tuolumne River based on the timing of hydrologic conditions and results of salmonid monitoring.
6. The increase from 1995 minimum instream flows shown in parentheses occurs when dry-year relief is applied to the Tuolumne VA implementation schedule. See the description of dry-year relief in notes 7 and 8 below.
7. The March (floodplain) pulse volume is reduced in Dry or Critical water year types that follow a Dry or Critical water year type; such years are referred to here as successive Dry and successive Critical water year types, respectively. The March pulse volume is also reduced as shown in Below Normal years that follow a Dry or Critical water year type; these years are referred to as successive Below Normal water year types. Below Normal years that follow a successive Below Normal water year are also considered successive Below Normal years and have a reduced March pulse volume as shown.

As described here, the March pulse flows contain a "dry-year relief" plan. Specifically, in a successive Dry or Critical year, the floodplain pulse is set at the dry-year relief level for that year and any following successive Dry or Critical years. In any Below Normal year occurring in a sequence of Critical and/or Dry years, the floodplain pulse flow will be set to the dry-year relief level for Below Normal years. Any Below Normal year occurring within a sequence of Dry and/or Critical years does not interrupt the dry-year relief sequence. For example, in the water year type sequence of C, D, BN, C, D, the first and second Dry and second Critical years in the sequence would be considered successive Dry or Critical years and would have dry-year relief applied because a Below Normal year does not interrupt the dry-year relief sequence. In this example, there would also be dry-year relief in the Below Normal year. Similarly, in a water year type sequence of C, BN, D, there would be dry-year relief in the Below Normal year and in the Dry year.

In a 3rd successive Below Normal year, the Districts, San Francisco and CDFW shall meet and confer to see what if any water is available for a March floodplain pulse. For example, in a sequence of W, BN, BN, BN water years, the meet-and-confer would occur in the third BN water year.

For purposes of determining dry year relief, a sequence cannot start with a Below Normal year (excluding sequential Below Normal years as set-forth above). For example, in a water year type sequence of BN, C, D, there would be no dry-year relief in the Below Normal year or in the Critical year, but dry-year relief would be applied in the Dry year.

8. The April-May (outmigration) pulse volume is reduced as shown in Dry years that follow a Dry or Critical water year, and also in Critical years that follow a Dry or Critical water year. These years are referred to here as Successive Dry Years and Successive Critical Years, respectively.

Similar to the March pulse flows, the April-May pulse flows include the provision for "dry-year relief". In successive occurrences of Dry and/or Critical water years, the spring outmigration pulse flows are as shown above. Examples of this dry-year relief are enumerated below.

Example 1: If there were a sequence of six water years of type C, D, C, D, C, D, the second and third Critical years and each of the three Dry years would be considered successive Dry or Critical years and would have dry-year relief applied to the April-May pulse.

Example 2: If there were a sequence of four water years of type C, C, D, D, the second Critical year and each of the two Dry years would be considered successive Dry or Critical years and would have dry-year relief applied to the April-May pulse.

Example 3: If there were a sequence of six years of type C, D, BN, C, D, C, both Dry years and the third Critical year would be considered successive Dry or Critical years and would have dry-year relief applied to the April-May pulse.

9. Values in parentheses are interim minimum instream flows that will be released at La Grange Diversion Dam until both infiltration galleries are operational. Both infiltration galleries are expected to be constructed and operating by year 6 of the VA implementation.
10. Base flows and pulse flows will be measured at the USGS La Grange stream gage below La Grange Diversion Dam.
11. Diversions at the infiltration galleries will be measured by flow meters in the galleries. Flow in the Tuolumne River downstream of the infiltration galleries will be calculated by subtracting the flow

measured in the infiltration galleries from the flow measured at the La Grange stream gage. The values in parentheses are examples of calculated values of flow downstream of the infiltration galleries.

12. Base flows and pulse flows will be measured at the USGS La Grange stream gage below La Grange Diversion Dam.

13. The default timing of pulse flows will be to start the March pulse in mid-March, and to start the April-May pulse in mid-April. The Tuolumne VA includes flexibility to adjust the start timing of these pulses to optimize benefits to salmonids in the lower Tuolumne River.

14. Pulse volumes are inclusive of any required ramping in the FERC license for the Don Pedro and La Grange Hydroelectric Projects.