San Joaquin River Restoration Program
Restoration Administrator

January 31, 2012

Ms. Alicia Forsythe
Program Manager
San Joaquin River Restoration Program
Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

Subject: Transmittal of the 2012 Restoration Administrator Interim Flow Program Recommendations

Dear Ali:

I am forwarding my recommendations for the 2012 Interim Flow Program for your consideration and action pursuant to the terms of the Stipulation of Settlement for the San Joaquin River Restoration Program (SJRRP) and the Draft Restoration Flow Guidelines (RFG).

My recommendations respond to the February 1 Allocation and Default Flow Schedule submitted to me by your staff that are based on a declaration for a Critical High Water Year. I am providing a recommended schedule for release of Interim Flow from Friant Dam for the period commencing March 1, 2012, through February 28, 2013. In addition to recommending a specific flow schedule, my recommendations address monitoring, modeling and experimental actions that I believe should be conducted as part of the 2012 Interim Flow Program.

The attached recommendations have been prepared following extensive consultation with my Technical Advisory Committee and SJRRP Implementing Staff. Paragraph 15 of the Settlement requires the RA to consult with the TAC prior to finalizing these recommendations. My consultation efforts included discussions during the November and December 2011 TAC meetings relating to alternative strategies for managing flows during 2012, including a range of illustrative Interim Flow hydrographs for different Water Year types, preliminary modeling and monitoring measures and objectives and the availability of instrumentation and staff resources for the coming year. I also conducted conference calls with various TAC members and agency staff during this time to better understand the range and feasibility of potential implementation approaches. The TAC includes member representatives from the California Department of Fish and Game (CDFG) and Department of Water Resources (DWR), and liaison representatives from the three federal liaison agencies. Members of the Fish Management Work Group (FMWG) also were consulted directly and through the agency representatives attending the TAC meetings prior to finalizing my recommendations.

I believe that my Interim Flow Program recommendations for 2012 are based on the best information available at this time and I look forward to your early review, concurrence and/or

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comment on the recommendations in accordance with the terms of the Settlement and Draft Restoration Flow Guidelines.

I look forward to working together during 2012 and the continuing progress toward achieving the goals of the SJRRP Settlement. After reviewing the attached recommendations, please let me know if you have questions or concerns that you would like to address.

Respectfully submitted,

Rod Meade
Restoration Administrator
San Joaquin River Restoration Program

Attachment: 2012 Restoration Administrator Interim Flow Program Recommendations

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2012 RA INTERIM FLOW PROGRAM RECOMMENDATIONS:

INTRODUCTION AND PURPOSE

The San Joaquin River Restoration Program Restoration Administrator (RA) is required under the Stipulation of Settlement in *NRDC* v. *Rodgers* (CIV-S- 88-1658-LKK/GGH) (the Settlement) to develop recommendations for "implementation of a program of Interim Flows in order to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture and reuse". Interim Flows are defined by the Settlement as those flow releases from Friant Dam that began October 1, 2009, and end when the Restoration Flows commence (no later than January 1, 2014). The Draft Restoration Flow Guidelines (RFG, December 2011 version) require Reclamation to transmit an Allocation and Default Flow Schedule (Allocation) to me by January 20 each year. Based on my receipt of the Allocation from Reclamation, the RFG requires me to prepare and transmit Interim Flow recommendations to the Secretary of the Interior by January 31 each year for the Water Year that begins on March 1 of the same year.

Recommendation Goals and Objectives

The purpose of the Interim Flows Program is to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture and reuse to inform and improve implementation of the Settlement in order to achieve the two primary goals of the Settlement (Paragraph 2) as set forth below:

1) *Restoration Goal*: The Parties agree that a goal of this Settlement is to restore and maintain fish populations in good condition in the mainstem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish.
2) *Water Management Goal*: The Parties also agree that a goal of this Settlement is to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in this Settlement.

Developing an effective restoration program for salmon and other fish in the San Joaquin River requires that a number of uncertainties and potentially limiting factors affecting salmon and other fish within the river be identified and addressed. Paragraph 15 of the Settlement, as noted above, requires the RA to ". . . develop and recommend to the Secretary implementation of a program of Interim Flows in order to collect relevant data concerning temperatures, fish needs, seepage losses, recirculation, recapture and reuse." My Interim Flow Program recommendations are based on consultation with the Technical Advisory Committee (TAC) and Implementing Agency staff. These recommendations reflect an interdisciplinary approach collecting such data that includes consideration and experimentation focused on fish biology, hydrology, geomorphology, terrestrial biology, water project operations, engineering, geohydrology, water quality, and recirculation, recapture and reuse. These recommendations are intended to inform and improve future SJRRP implementation actions by:

- Reducing scientific uncertainties;
- Providing information needed to enable real-time flow management;

- Identifying refinements to the existing flow and water quality monitoring program;
- Providing information to inform decisions on fish migration pathways (e.g., Reach 4B versus Eastside Bypass) and design of physical facilities (e.g., headgates, channel modifications) to better achieve flow routing and fish migration objectives;
- Providing information that will shape and refine the seasonal instream flow releases (hydrographs) under inter- and intra-annual variation in hydrology, including the decision process necessary to accommodate hydrologic and forecasting uncertainties;
- Providing field-based information to calibrate, validate, and/or improve predictive models for guiding future recommendations and management;
- Providing information that will assist planning and decisions regarding potential mechanisms for recirculation, recapture, and reuse;
- Identifying additional information needed prior to reintroduction of salmon into the river;
- Providing baseline information on channel conditions upon which future changes can be documented; and
- Establishing a foundation for future management decisions and program refinements as part of long-term adaptive management for the river consistent with the terms of the Settlement.

Paragraph 15 of the Settlement requires the RA to consult with the TAC prior to finalizing these recommendations. My consultation efforts included discussions during the November and December 2011 TAC meetings relating to alternative strategies for managing flows during 2012, including a range of illustrative Interim Flow hydrographs for different Water Year types, preliminary modeling and monitoring measures and objectives and the availability of instrumentation and staff resources for the coming year. I also conducted conference calls with various TAC members and agency staff during this time to better understand the range and feasibility of potential implementation approaches. Because the TAC includes member representatives from the California Department of Fish and Game (CDFG) and Department of Water Resources (DWR), and liaison representatives from the three federal liaison agencies, and because members of the Fish Management Work Group (FMWG) also were consulted directly by me and through the agency representatives attending the TAC meetings prior to finalizing my recommendations, I believe that my Interim Flow Program recommendations for 2012 are based on the best information available at this time.

The Interim Flow recommendations contained in this document address the information needs and purposes identified above with an emphasis on achieving the following objectives:

- Identifying processes needed to refine annual Interim Flow and Restoration Flow releases,
- Identifying short-term monitoring, modeling, and studies needed to address specific areas of uncertainty in implementing required actions of the Settlement, including refinement of Interim and Restoration Flows,
- Identifying baseline monitoring needed to document and refine specified management objectives,
- Assessing the ecological and hydrologic responses to the Interim Flow releases, and
- Preparing for the potential need to amend my initial recommendations to reflect changes in the amount of inflow to Millerton Reservoir that could result in a change in the Allocation by the Bureau of Reclamation for the 2012 Water Year.

Requirements that Must Be Addressed During Preparation of Interim Flow Program Recommendations

Recommendations for implementing the Interim Flow Program for a given year must be prepared in a manner that is consistent with substantive provisions of the:

- Most recent Reclamation Allocation transmitted to the RA,
- Controlling provisions contained in the body of the Settlement,
- Restoration flow allocations identified in Exhibit B of the Settlement,
- Most recent flow conveyance capacity constraints along the mainstem of the San Joaquin River identified by Reclamation,
- San Joaquin River Restoration Settlement Act (SJRRSA) affecting Interim Flows, and
- State Water Resources Control Board (SWRCB) permit guiding releases of restoration flows from Friant Dam from October 1, 2011 through September 30, 2012.

In addition, Interim Flow recommendations must be prepared in accordance with the process and timing provisions contained in the latest version of the Draft RFG and the provisions of Reclamation's March 2010 letter to me relating to implementation of Interim Flows. All of the documents and sources referenced as part of this discussion of Interim Flow guidance are available on the SJRRP web site for those desiring specific information.

RA INTERIM FLOW PROGRAM RECOMMENDATIONS FOR 2012

As required by the Draft RFG, the 2012 Interim Flow Program accounts for the total Water Year volume (March 1, 2012 through February 28, 2013) as determined by Reclamation and set forth in the Default Flow Schedule (Table 1 for a Critical High Water Year).

Flow Period	Releases from Friant Dam (cfs)	Flows Targets at Gravelly Ford (cfs)	SJRRP Flows at Gravelly Ford (cfs)	Release Volume from Friant Dam for the SJRRP (af)
Mar 1 - Mar 15	500	375	370	11,008
Mar 16 - Mar 31	1,500	1,375	1,370	43,478
Apr 1 - Apr 15	200	55	50	1,488
Apr 16 - Apr 30	200	55	50	1,488
May 1 - Jun 30	215	30	25	3,025
Jul 1 - Aug 31	255	30	25	3,074
Sept 1 - Sept 30	260	55	50	2,975
Oct 1 - Oct 31	160	5	0	0
Nov 1 - Nov 6	400	275	270	3,213
Nov 7 - Nov 10	120	5	0	0
Nov 11 - Dec 31	120	5	0	0
Jan 1 - Feb 28	110	15	10	1,170
Totals (af):	**187,785**	**74,539**	**70,919**	**70,919**

TABLE 1. Reclamation Default Flow Schedule for Critical High year

My recommendation provides specific timing and release rates for Interim Flow releases from Friant Dam (see Table 2). My recommendations also address, based on consultation with affected Implementing Agencies, the modeling and monitoring measures recommended to be implemented during the 2012 Water Year, taking into consideration the availability of needed instrumentation and Implementing Agency staffing capabilities.

In response to the February 1 Allocation provided to me by Reclamation on January 29, 2012, my recommendations focus first on Critical High Year conditions and constraints. However, the Department of Water Resources (DWR) will conduct another snow survey on February 1 and at regular intervals between now and early June. As meteorology and snow conditions changes during the course of the Spring, Reclamation will continue to evaluate changes in potential runoff to Millerton Reservoir and, as appropriate, issue additional Water Year Forecasts. In addition, if I determine that I need an updated Allocation prior to the time Reclamation proposes to prepare an Allocation update, I can request that the Allocation be updated by Reclamation.

Whenever I receive an amended Allocation from Reclamation, I will update my Interim Flow recommendations and transmit a revised Interim Flow Program Recommendations to Reclamation within two weeks of receipt of their modified Allocation.

RA Strategy for Implementing the 2012 Interim Flow Program

The strategy recommended to implement 2012 Interim Flow releases and related water management, including modeling and monitoring measures, reflects the likelihood that 2012 will be a drier water year. Accordingly, after extensive consultations with the TAC and agency staff cited earlier in this report, I am submitting recommendations that reflect the following considerations:

- Multiple conveyance capacity constraints will continue to limit releases from Friant Dam both above the Mendota Pool and below Sack Dam, thus exacerbating the limits imposed by what is expected to be a drier water year (Note: the initial Restoration Flow Allocation from Reclamation is based on Critical High Water Year);
- During drier years, the focus of management and monitoring will shift to site-specific predation (*e.g.*, near the gravel pits) and overall survival of hatchery produced juvenile fall-run Chinook salmon from below Friant Dam;
- Fall-run juvenile Chinook salmon should be released below Friant Dam to using a combination of PIT tags and acoustic tags;
- Flow benches implemented concurrent with the PIT tag experiment should occur in late March when water temperatures are beginning to warm, with provision for paired benches (ascending and descending limbs of the hydrograph) to assess the same flow rates under different meteorological conditions if water is available;
- Flow benches implemented concurrent with the Acoustic tag experiment should be timed for late April and early May so that juveniles have time to grow large enough to carry the acoustic tags;
- There may be insufficient water to conduct both PIT tag and acoustic tag experiments; therefore, if flow volume becomes limiting, the April/May releases should be prioritized to enable both acoustic tag and PIT tag experiments;

- Trap and haul measures involving juvenile fall-run Chinook salmon would provide much-needed data on future fish survival prospects and the logistics of conducting a trap and haul operation for juvenile salmon;
- Flow benches should be a minimum of seven days long to enable fish to fully traverse the site-specific experimental areas.
- Respond to the Reclamation request (p. 5, February 1 Allocation) to add a 500 cfs bench prior to releasing peak Interim Flows to monitor groundwater seepage conditions.

RA Interim Flow Program Recommendations

Based on the February 1, 2012, Allocation provided by Reclamation, my recommended Interim Flow release schedule from Friant Dam for the Critical High Year is discussed below. Reclamation's Allocation forecast is based on a 90 percent probability that there would be at least 640 thousand acre feet (TAF) of unimpaired runoff into Millerton Reservoir during the 2012 Water Year. This forecast results in a declaration that 2012 will be classified as a Critical High Year based on the provisions of Exhibit B of the Settlement and the Draft RFG if precipitation/runoff conditions do not change significantly during the course of the 2012 Water Year. A Critical High Water Year is a year (March 1, 2012 through February 28, 2013) where the Millerton Reservoir receives between 400 TAF and up to a maximum of 670 TAF of unimpaired runoff from upstream sources in the San Joaquin River watershed. My recommendation is based on using all of the capped Critical High Water Year allocation for Interim Flow releases.

The current Reclamation Allocation of 640 TAF of unimpaired runoff is very close to the maximum Critical High Year volume of 670 TAF unimpaired runoff; therefore, following the scheduled February snow survey by DWR, there is a distinct possibility that Reclamation may need to revise and transmit an updated Allocation to me in early to mid-February.

Unless the forecast is amended by Reclamation, I am obligated to limit the amount (volume) of Interim Flow releases to a maximum of 70,919 acre feet during the 2012 Water Year in accordance with the Settlement Exhibit hydrograph for a Critical High Year. However, pursuant to Settlement Exhibit B, I also am able to recommend releases from Friant Dam during "flexible flow" periods at rates and on a schedule that differs from the Exhibit B hydrograph as long as I do not exceed the total allocated volume (70,919 acre feet). I can elect to recommend implementing the "flexible flow" provisions of the Settlement to extend Interim Flow releases beyond April 30 to as late as May 28, or commence Interim Flow releases as early as February 1.

For the projected Critical High Water Year, my Spring Interim Flow recommendations are discussed below and also presented in Table 2 (RA Recommended Friant Dam Interim Flow Releases), Figure 1 (RA Recommended Friant Dam Annual Interim Flow Hydrograph) and Figure 2 (RA Recommended Friant Dam Spring Interim Flow Hydrograph). I do not have authority to make recommendations that affect Riparian Flow releases from Friant Dam. Accordingly, all of the following Friant Dam release recommendations assume that the Riparian Releases used in Reclamation's Default Flow Schedule are incorporated without change for the entire Water Year. In addition, I assume that the actual Friant releases will be sufficient to meet actual riparian demands and in accordance with the then current Reclamation method for achieving target flows at Gravelly Ford.

Spring Flow Recommendations (March 1 through May 28).-- I am recommending that a "flexible flow" schedule be implemented during the Spring of 2012 to enable Interim Flow releases to continue from

March 1 through May 28, 2012 (Table 1 and Figure 2). I recommend the following Friant Dam release rates and timing:

- Initiate 350 cubic feet per second (cfs) releases from Friant Dam on March 1 and continue the 350 cfs releases from Friant Dam through March 31 (including Interim Flow daily releases of 220 cfs at Gravelly Ford);
- Increase Friant Dam releases to 500 cfs on April 1 and maintain the 500 cfs releases from Friant Dam through April 13 (including Interim Flow daily releases of 350 cfs at Gravelly Ford);
- Increase Friant Dam releases to 1,040 cfs on April 14 and maintain the 1,040 cfs releases through April 23 (including Interim Flow daily releases of 890 cfs at Gravelly Ford);
- Decrease Friant Dam releases to 700 cfs on April 24 and maintain the 700 cfs releases through April 30 (including Interim Flow daily releases of 550 cfs at Gravelly Ford);
- Decrease Friant Dam releases to 500 cfs on May 1 and maintain the 500 cfs releases through May 7 (including Interim Flow daily releases of 310 cfs at Gravelly Ford); and
- Decrease Friant Dam releases to 350 cfs on May 8 and maintain the 350 cfs releases until May 28, 2012 (including Interim Flow daily releases of 160 cfs at Gravelly Ford).

Begin Date	End Date	Recommended Friant Dam Release (cfs)	Exhibit B Riparian Release (cfs)	Gravelly Ford Flow Target (cfs)	Gravelly Ford Flow Allocation (cfs)	Estimated Flows Entering Mendota Pool (cfs)
3/1/12	3/31/12	350	130	225	220	145
4/1/12	4/13/12	500	150	355	350	265
4/14/12	4/23/12	1040	150	895	890	788
4/24/12	4/30/12	700	150	555	550	455
5/1/12	5/7/12	500	190	315	310	225
5/8/12	5/28/12	350	190	165	160	85
5/29/12	6/30/12	215	190	30	25	0
7/1/12	8/31/12	255	230	30	25	0
9/1/12	9/30/12	260	210	55	50	0
10/1/12	10/31/12	160	160	5	0	0
11/1/12	11/6/12	400	130	275	270	195
11/7/12	12/31/12	120	120	5	0	0
1/1/13	2/28/13	110	100	15	10	0
	Totals (af):	**187,745**	**116,866**	**74,499**	**70,879**	**46,680**

TABLE 2: RA Interim Flow Release Recommendations for Critical High Water Year

***Note: When beginning dates fall on weekends or holidays the begin date may be shifted to the closest weekday to maintain normal work hours for Reclamation staff. In such cases, volume calculations will need to be adjusted.**

As of May 28, the volume of released Interim Flows released from Friant Dam will total approximately 57,460 acre feet (Our spreadsheet computes 58,810 thru May 28, which excludes the 5 cfs). The

remaining unused balance of for Interim Flows will be about 12,109 acre feet for the remainder of the Water Year if the February 1 Restoration Allocation remains unchanged.

Summer Base Flows (May 20 through October 31).-- During the Summer Base Flow period, Riparian Releases range from 190 cfs to 230 cfs. Interim Flow releases from Friant Dam range from 30 cfs to 55 cfs for a Critical High year during this time period. Therefore, my Interim Flow release recommendations address only the Interim Flow release portion of the identified Base Flow releases. Recommended daily Interim Flow releases range from 30 cfs to 55 cfs of the total releases during this period. Daily Riparian releases would range from 160 cfs to 230 cfs (see Table 1).

For the Summer Base Flow period my recommended Interim Flow releases from Friant Dam

- Decrease Interim Flow daily releases of 25 cfs as part of the daily Friant Dam releases of 215 cfs starting May 29 and continuing through June 30;
- Maintain Interim Flow daily releases of 25 cfs as part of Friant Dam daily releases of 255 cfs starting July 1 and continuing through August 31;
- Increase Interim Flow daily releases to 50 cfs as part of the daily Friant Dam releases of 260 cfs September 1 and continuing through September 30; and
- Decrease Interim Flow daily releases of 0 cfs as part of daily Friant Dam releases of 160 cfs staring October 1 and continuing through October 31.

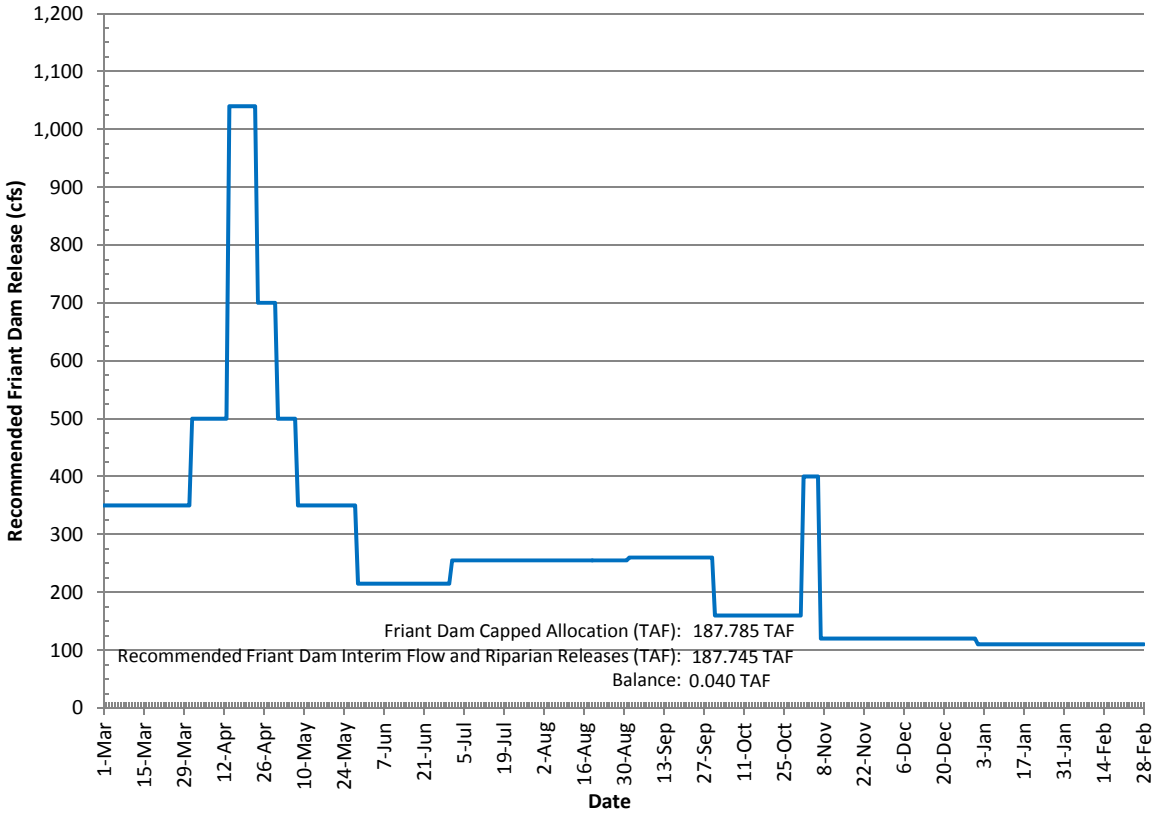

FIGURE 1: RA Recommended Annual Interim Flow Schedule for Critical High Water Year

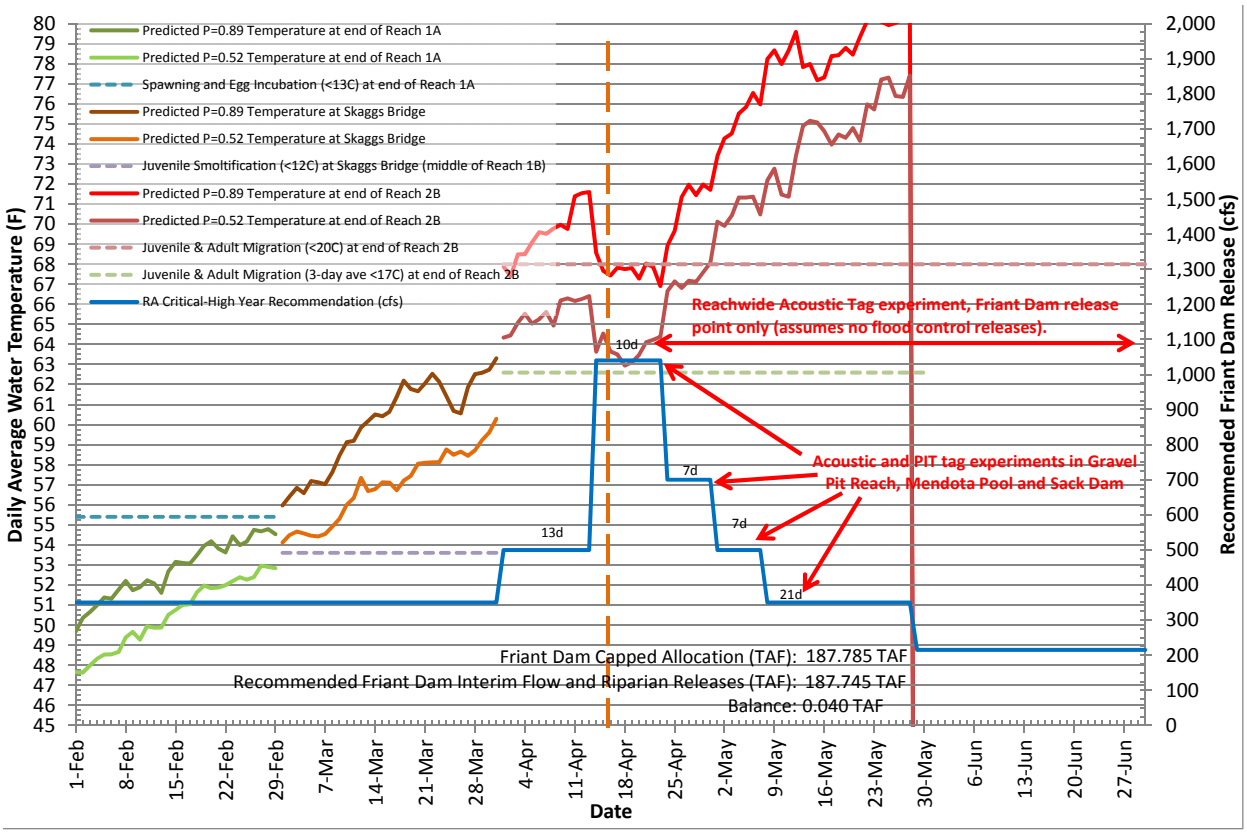

FIGURE 2: RA Recommended Spring Interim Flow Schedule for Critical High Water Year

As of October 31, the Summer Base Flow (including spawning and incubation flows) releases will include about 7,686 acre feet (May 29 through Oct 31) of Interim Flow releases, increasing the total volume of Interim Flows released from Friant Dam to about 66,496 acre feet. The remaining balance of unused Interim Flows will be reduced to about 4,400 acre feet on November 1 if the February 1 Restoration Allocation remains unchanged.

Fall Pulse Flow Recommendations (November 1 through November 6):-- I recommend that the Friant Dam releases be increased to 400 cfs starting on November 1 and continuing at 400 cfs through November 6 (see Table 1 and Figure 2). The Fall Pulse releases from Friant Dam would include 275 cfs of Interim Flow releases.

The Fall Pulse Flow releases from Friant Dam will include about 3,200 acre feet of Interim Flow releases, increasing the total released Interim Flows to about 69,700 acre feet resulting in a remaining unused Interim Flow Allocation of about 1,200 acre feet.

Winter Base Flows (November 7, 2012 through February 28, 2013).-- During the Winter Base Flow period, Riparian Releases range from 110 cfs to 120 cfs. Interim Flow releases from Friant Dam range from 0 cfs to 10 cfs during this time period.

I recommend the following Interim Flow releases during the Winter Base Flow period (see Table 1 and Figure 2):

- Decrease Interim Flow releases to 0 cfs starting November 7 and continue the 0 cfs Interim Flow releases through December 31, 2012 as part of the 120 cfs daily Riparian releases from Friant Dam; and
- Increase the Interim Flow releases to 10 cfs January 1, 2013, and continue the 10 cfs Interim Flow releases through February 28 as part of the 110 cfs Riparian releases from Friant Dam.

The Winter Base Flow releases from Friant Dam will include about 1,170 acre feet of Interim Flow releases, thus reducing the total remaining unused Interim Flow Allocation to about 40 acre feet. Thus, my recommended Interim Flow release recommendations can be achieved within the total volume of Interim Flow water provided for under the February 1 Allocation and Default Flow Schedule.

Recommendation Concerning Downstream Extent of Interim Flows.-- Significant constraints on conveyance capacities have been identified in Reach 2B and below Sack Dam in Reach 4A. While I acknowledge these constraints, I recommend that Reclamation continue to evaluate flow conditions, inspect seepage conditions, and evaluate shallow groundwater data so that the 2012 Interim Flow releases could continue to be routed downstream past Mendota Dam and Sack Dam, and through the Eastside and Mariposa bypasses, into the downstream half of Reach 4B and past the confluence with the Merced River if Reclamation determines that Interim Flows can be conveyed consistent with the terms of the Settlement and SJRRSA.

The ability to provide for continuous flows would provide important information for future implementation of the SJRRP. Flow losses are expected to be greatest in Reach 2A. Flow accretions and losses are also expected in downstream reaches, and there is even less data available to estimate the location and magnitude of those possible accretions and losses. While these accretions and losses in downstream reaches are expected to occur on a much smaller scale than in Reach 2A, there is substantial need to gain a better quantitative understanding of the location and scale of those accretions and losses.

Recommendation Related to Downstream Flow Capacities.-- SJRRP staff continue to investigate conveyance capacities in Reaches 2, 3, and 4 and potential seepage impacts of mainstem flows on agricultural lands adjacent to these reaches. At this time, based on the February 1 Allocation provided by Reclamation, a conveyance capacity constraint of 810 cfs appears to exist at the top of Reach 2B and information needed to enable specific Interim Flow recommendations below Mendota Pool continues to be compiled and evaluated. I expect that evolving information on seepage impacts will continue to constrain releases downstream of Mendota Pool and Sack Dam in 2012.

The Reach 2A and Reach 2B conveyance capacity limitations are based on LiDAR-based elevation comparisons and hydraulic model predictions of water surface elevations. To evaluate these potential capacity limitations, I recommend that DWR conduct field inspections during Interim Flow releases, and continue to investigate and refine conveyance capacity calculations for these downstream reaches in an effort to determine whether the existing conveyance capacity constraints are appropriate. To date, the Program has been accepting remote sensing data (LiDAR) and a 1-D hydraulic model as the best available information. I recommend that DWR provide monthly updates at TAC meetings starting in March and continuing through June to address field conditions observed in comparison to the LiDAR/1-D modeling data.

RA Monitoring Recommendations for the Critical High Year

If precipitation and runoff conditions do not change significantly during the course of the year, the available Interim Flows will impose limits on the scope of monitoring and experimentation tasks that can be accomplished during the Critical High Water Year. With this constraint in mind, and assuming that flood control releases do not occur during April and May, I recommend the following experimentation and monitoring actions:

- Continue ongoing temperature and water quality monitoring in all reaches;
- Continue to monitor seepage from the mainstem of the San Joaquin River to adjacent lands, particularly in Reach 2 and Reach 4A;
- Continue monitoring levee integrity in areas subject to seepage and erosive impacts related to changing mainstem flows;
- Obtain the largest feasible population of suitable fall-run Chinook salmon juveniles from the Feather River Fish Hatchery or other suitable donor source as determined by USFWS, NMFS and CDFG, and transfer the juveniles to the CDFG San Joaquin Fish Hatchery;
- Install available PIT tag and acoustic tag transmitters on the fall-run juveniles, with the timing of installing the acoustic tags dependent on size of the juveniles;
- Obtain permission where necessary to install acoustic receivers and PIT tag arrays in the locations identified in the following locations
    - Upstream and downstream of the Gravel Pits in Reach 1A (see Figure 3);
    - Upstream and downstream of the Chowchilla Bifurcation Structure in Reach 2A and Reach 2B (see Figure 4);
    - Within the Mendota Pool at selected locations (see Figure 5); and
    - Upstream and downstream of Sack Dam (see Figure 6)
- Release the fall-run juveniles with PIT tags during late March, and release of juveniles with both PIT tags and acoustic tags during late April and early May to monitor progress in downstream movement and survival of the juveniles;
- Conduct site-specific survival experiments using the acoustic receivers and PIT tag arrays installed at the selected locations (see Figures 3, 4, 5 and 6);
- If there are sufficient PIT tags and/or acoustic tags, install in predators (largemouth and smallmouth bass) in the gravel pit reach (Figure 3), and use mobile acoustic tag receivers and/or PIT tag arrays to document predator (bass) and prey (fall-run Chinook salmon juveniles) movement and habitat use as flows and water temperatures change during the spring release period; and
- Conduct trap and haul experiments with a portion of the released juvenile Chinook salmon population to test the response of juveniles, and gather additional information on the logistics and potential success of trap and haul measures if conditions necessitate such actions in the future.

With respect to installation of acoustic receivers, it would be desirable to have additional acoustic tag detectors in those gravel pits that appear to have the highest likelihood of predation. Completion of the recommended experimentation and monitoring measures during a Critical High Water Year (or Dry Water Year, if unimpaired runoff conditions change) would be especially useful to fishery agencies.

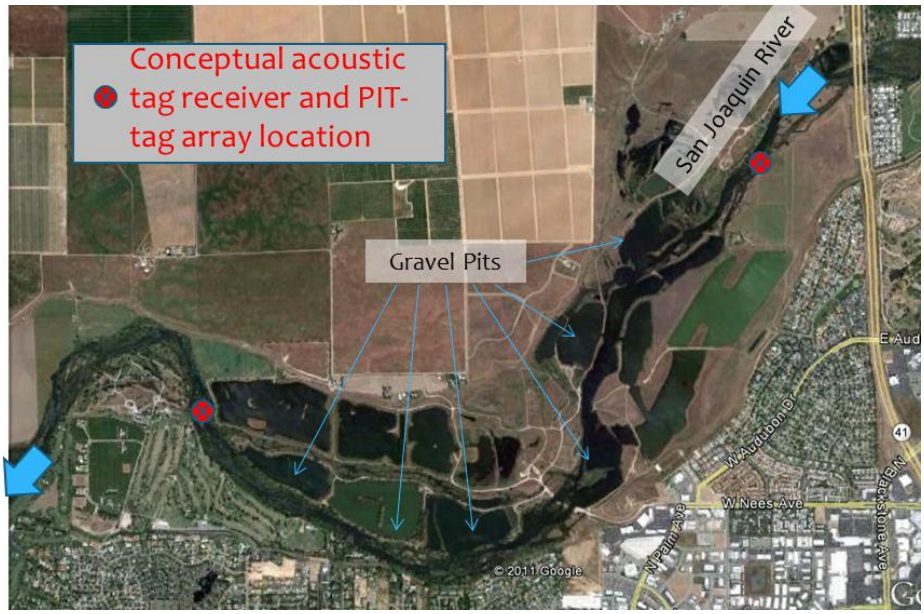

FIGURE 3: Conceptual placement of acoustic tag receivers to detect fish passage into and out of the gravel pit reach.

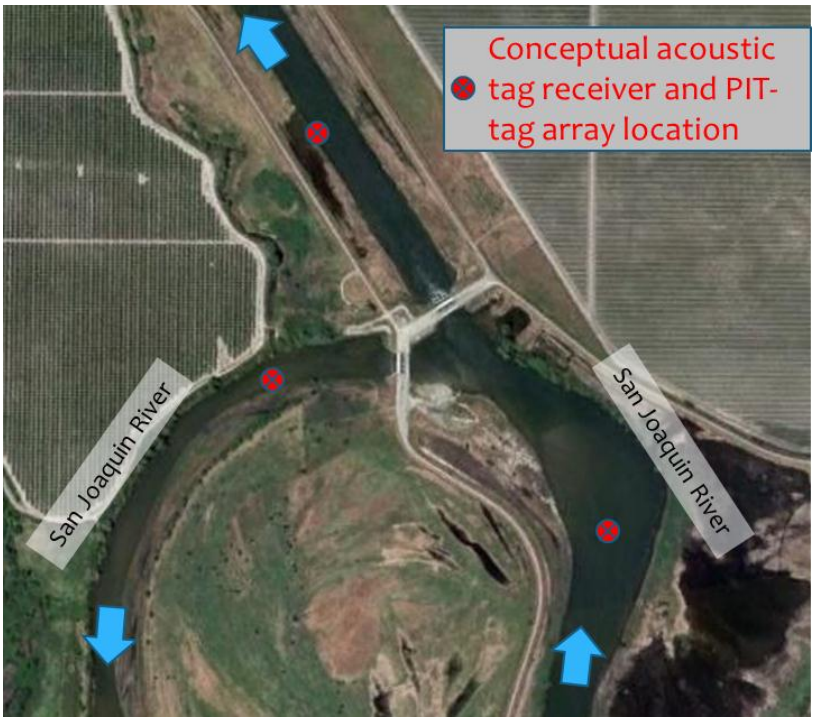

FIGURE 4: Conceptual placement of acoustic tag receivers to detect fish passage through the Chowchilla Bifurcation Structure.

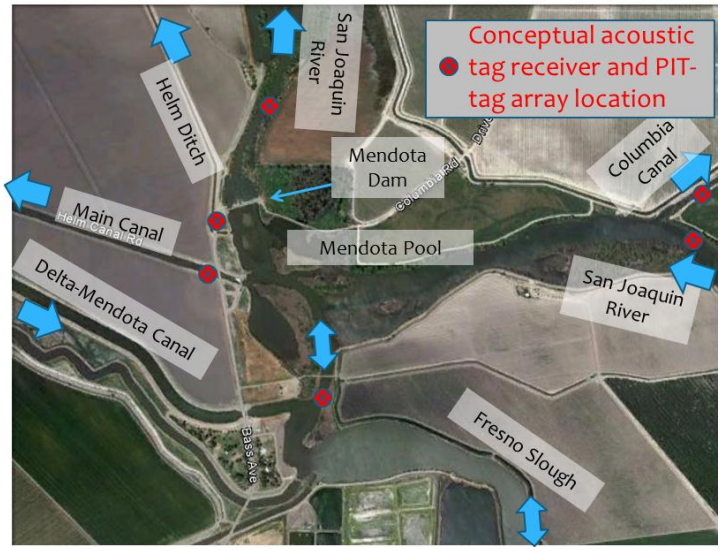

FIGURE 5: Conceptual placement of acoustic tag receivers to detect fish passage into and out of Mendota Pool.

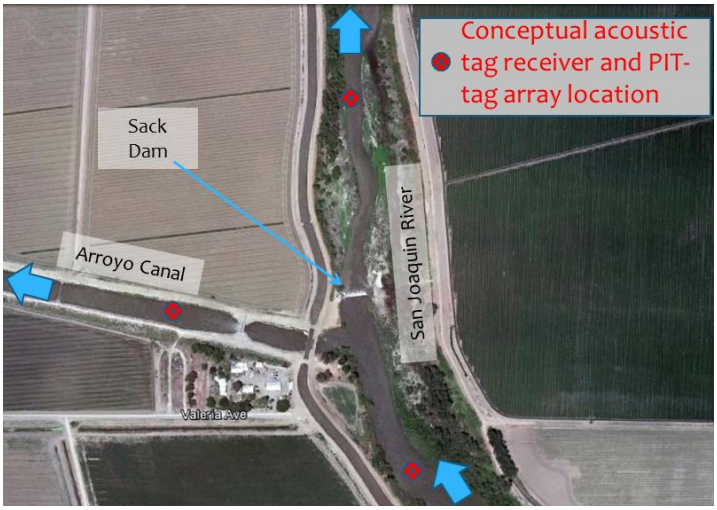

FIGURE 6: Conceptual placement of acoustic tag receivers to detect fish passage through Sack Dam.

Preliminary Recommendations In the Event of Increased Unimpaired Runoff Forecasts

If the snow surveys and updated forecast data indicate an increase in projected precipitation and runoff and I receive an updated Reclamation Allocation based on a Dry Water Year, I will update my Interim Flow Program recommendation to reflect the latest Allocation that I receive. In view of the water forecast information available at this early point in the Water Year, conditions are likely to continue to be drier than normal, although there is a decent prospect for a "Normal" Water Year if the storm track changes in the latter portion of February and continues to provide for storms through March and early April. Accordingly, I am including illustrative recommendations that address the prospect of a future Reclamation Dry Year Allocation. In the event that precipitation and runoff conditions increase

sufficiently to generate even wetter Water Year allocations, I will address those conditions and the resulting Reclamation Allocation as it arises.

Prospective Interim Flow Program Recommendations Based on a Dry Year Allocation

For discussion purposes, I am providing illustrative RA recommendations for two different Dry Water Year scenarios with the understanding that at this point these are only hypothetical and would be subject to revision as specific precipitation and runoff data and forecasts become available. The two Dry Water Year scenarios are:

- a Low-Point Dry Year Allocation with a Reclamation runoff forecast and Restoration Allocation of at least 670 TAF unimpaired runoff; and
- a Mid-Point Dry Year Allocation with a Reclamation runoff forecast and Restoration Allocation of at least 800 TAC unimpaired runoff.

Illustrative RA Interim Flow Recommendations for a Low-Point Dry Year (670 TAF).-- If I receive an updated Reclamation Allocation based on at least 670 TAF unimpaired runoff, I will amend my current Interim Flow Program recommendations to reflect those conditions. For discussion purposes, I am including an Illustrative Interim Flow hydrograph (Figure 7) and an Interim Flow Release Schedule (Table 3) that represent potential RA recommendations based on a 670 TAF Allocation that included a 272 TAF total Riparian/Interim Flow Allocation from Reclamation.

The Restoration Allocation (excluding riparian releases and the 5 cfs Gravelly Ford flow) would increase to about 155 TAF when compared to the 70,919 acre feet Restoration Allocation provided for by the current Critical High Year Allocation. The illustrative hydrograph in Figure 7 indicates that a 670 TAF Dry Year would lead to significant changes in the hydrograph and Table 3 also indicates significant changes in the release schedule that I could recommend.

Two notable changes in the recommended hydrograph are apparent by looking at Figure 7. First, the Summer Base Flow Interim Flows would increase from between 25 and 50 cfs in my current recommendation to, on average, about 100 cfs. Second, the 400 cfs Fall Pulse Flow recommended currently would increase to 700 cfs in the Low-Point Dry Year.

All of the Restoration Allocation would be used under the illustrative Low-Point Dry Year hydrograph and flow schedule included in this illustration.

Illustrative RA Interim Flow Recommendations for a Mid-Point Dry Year (800 TAF).-- If precipitation and runoff conditions improve sufficiently to support a Dry Year declaration based on 800 TAF unimpaired runoff (Mid-Point Dry Year), the total Riparian/Interim Flow Restoration Allocation would be 301 TAF, increasing the Interim Flow Allocation at Gravelly Ford from about 155 TAF to about 184 TAF. The primary changes in the hydrograph profile under these conditions could include: 1) adding a second, fourteen (14) day release of 1040 cfs in May to the 1040 cfs pulse in April that already is included in both the Critical High and Low-Point Dry Year hydrographs; and 2) the Summer Base Flow releases would increase to a consistent 350 cfs from late May through October 31.

All of the Restoration Allocation would be used under the illustrative Mid-Point Dry Year hydrograph and flow schedule included in this illustration.

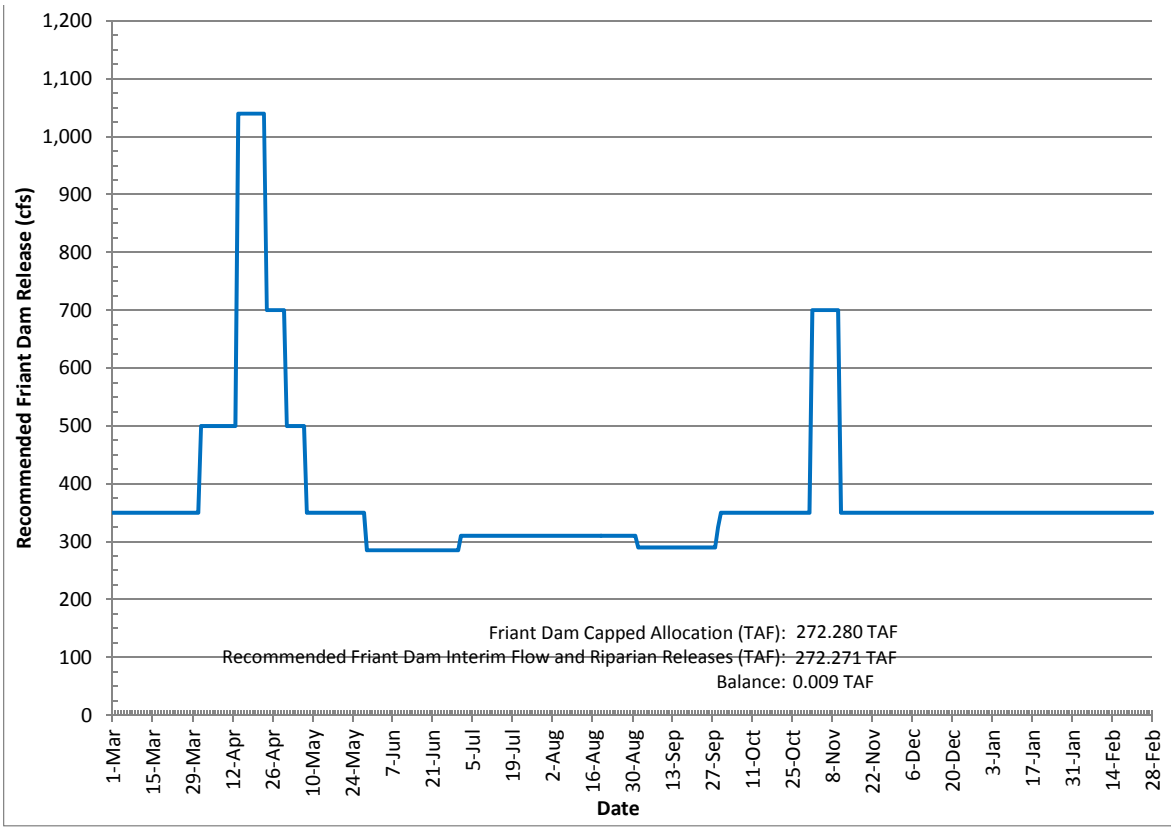

FIGURE 7: Illustrative RA Interim Flow hydrograph for a Low-Point Dry water year (runoff>670 TAF, Riparian/Interim Flow Allocation=272.28 TAF).

Begin Date	End Date	Recommended Friant Dam Release (cfs)	Exhibit B Riparian Release (cfs)	Gravelly Ford Flow Target (cfs)	Gravelly Ford Flow Allocation (cfs)	Estimated Flows Entering Mendota Pool (cfs)
3/1/12	3/31/12	350	130	225	220	145
4/1/12	4/13/12	500	150	355	350	265
4/14/12	4/23/12	1040	150	895	890	788
4/24/12	4/30/12	700	150	555	550	455
5/1/12	5/7/12	500	190	315	310	225
5/8/12	5/28/12	350	190	165	160	85
5/29/12	5/31/12	285	190	100	95	20
6/1/12	6/30/12	285	190	100	95	20
7/1/12	8/31/12	310	230	85	80	5
9/1/12	9/28/12	290	210	85	80	5
9/29/12	9/29/12	325	210	120	115	40
9/30/12	9/30/12	350	210	145	140	65
10/1/12	10/31/12	350	160	195	190	115
11/1/12	11/10/12	700	130	575	570	475
11/11/12	12/31/12	350	120	235	230	155
1/1/13	2/28/13	350	100	255	250	175
	Totals (af):	**272,271**	**116,945**	**158,945**	**155,326**	**99,421**

TABLE 3: Illustrative RA Interim Flow Release Schedule for Low-Point Dry Water Year (670 TAF).

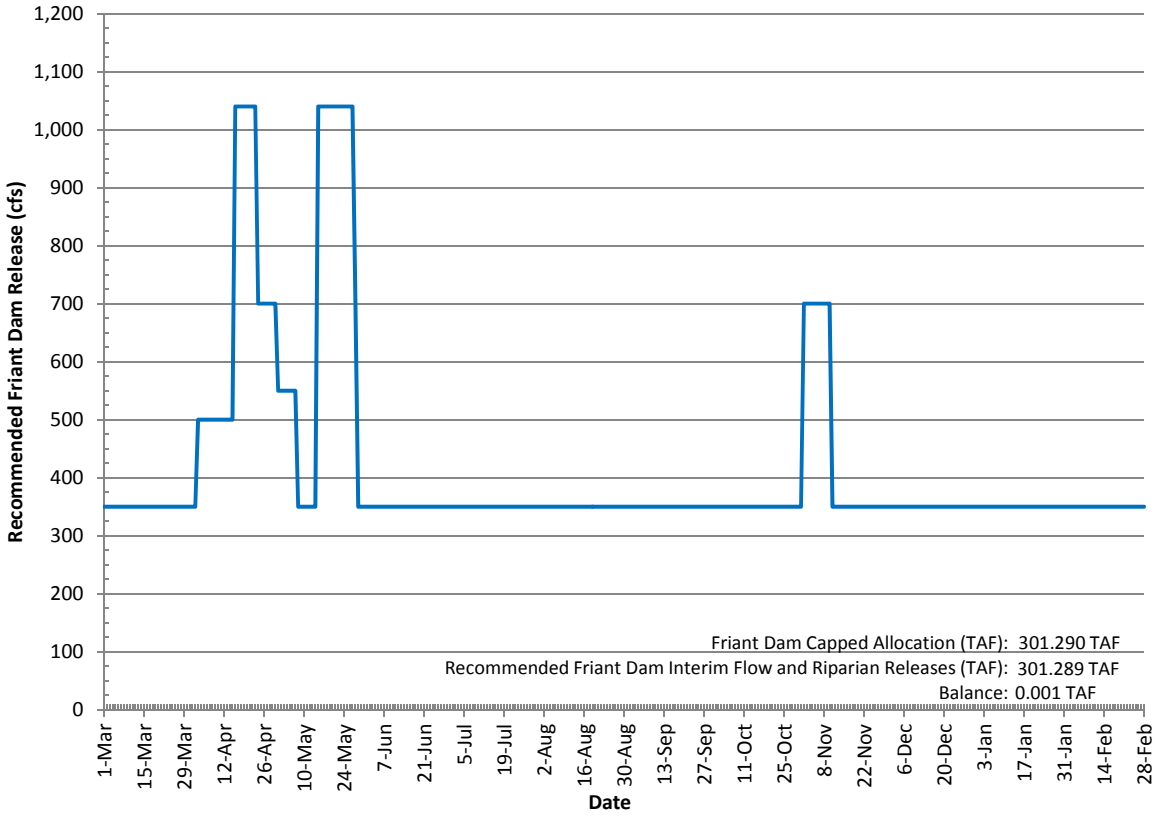

FIGURE 8: Illustrative RA Hydrograph for Mid-Point Dry Water Year (runoff=800 TAF, Riparian/Interim Flow Allocation=301.29 TAF).

Begin Date	End Date	Recommended Friant Dam Release (cfs)	Exhibit B Riparian Release (cfs)	Gravelly Ford Flow Target (cfs)	Gravelly Ford Flow Allocation (cfs)	Estimated Flows Entering Mendota Pool (cfs)
3/1/12	3/31/12	350	130	225	220	145
4/1/12	4/2/12	350	150	205	200	125
4/3/12	4/15/12	500	150	355	350	265
4/16/12	4/23/12	1040	150	895	890	788
4/24/12	4/30/12	700	150	555	550	455
5/1/12	5/7/12	550	190	365	360	275
5/8/12	5/14/12	350	190	165	160	85
5/15/12	5/27/12	1040	190	855	850	751
5/28/12	5/28/12	710	190	525	520	425
5/29/12	6/30/12	350	190	165	160	85
7/1/12	8/31/12	350	230	125	120	45
9/1/12	9/30/12	350	210	145	140	65
10/1/12	10/31/12	350	160	195	190	115
11/1/12	11/10/12	700	130	575	570	475
11/11/12	12/31/12	350	120	235	230	155
1/1/13	2/28/13	350	100	255	250	175
	Totals (af):	**301,289**	**116,945**	**187,964**	**184,344**	**127,899**

TABLE 4: Illustrative RA Interim Flow Release Schedule for a Mid-Point Dry Water Year (800 TAF)