SAN JOAQUIN RIVER RESTORATION PROGRAM

Bureau of Reclamation
2800 Cottage Way, MP-170
Sacramento, California 95825

Provisional 2016 Restoration Allocation

January 29, 2016

The State of California has experienced four years of below average precipitation and, while water supply conditions are significantly improving for 2016, water storage and runoff remain low at this point in the season. Considering the low water storage in Millerton Lake and uncertainty in Delta pumping for meeting statutory, legal, and contractual requirements; the volume of Restoration Flows available for February is 9,445 acre-feet, as measured at Gravelly Ford.

Forecast Unimpaired Runoff

Information for forecasting the unimpaired runoff primarily includes:

- The Bureau of Reclamation (Reclamation), Friant Division estimate of unimpaired runoff into Millerton Lake to support the water supply allocation[1];
- The Department of Water Resources (DWR) Water Supply Index forecast latest update on January 1, 2016 (published on January 11, 2016) for Water Year 2016 San Joaquin River inflow to Millerton Lake Unimpaired Flow[2], and/or the most current DWR Bulletin 120 Report[3]; and
- The National Weather Service (NWS) Ensemble Streamflow Prediction (ES-P) Water Supply Forecast (Water Year 2016) for the San Joaquin River at Millerton Lake[4] (published daily).

Table 1 shows the 2016 San Joaquin River Water Year forecast at Millerton Lake, while Figure 1a and Figure 1b plot the forecast over time. The water year accumulated runoff at Friant Dam as of January 25th is 106 thousand acre-feet (TAF). This is 53% of average for this date in contrast to the 50th percentile runoff forecast which is 97% of average. This discrepancy is likely indicative of either an antecedent soil moisture deficit, a high proportion of precipitation bound in snowpack as opposed to rainfall runoff, or a combination of those factors. Accumulated runoff is not anticipated to match the forecast until the bulk of snowmelt occurs. Until that time, reservoir levels will be well below normal despite the near-normal snowpack.

DWR is expected to complete another snow survey and release its February 1 Bulletin 120 runoff forecast around February 8, 2016. Reclamation will analyze this data, other forecast information, and CVP hydrologic and operational factors. Reclamation anticipates completing this analysis and issuing a revised Restoration Allocation shortly thereafter. Flow limitations may be lifted at that time, or possibly further restrictions applied to comply with senior obligations.

Table 1 — San Joaquin River Water Year Actuals and Forecast at Millerton Lake.

Forecast Source	90%	75%	50%	10%
Accumulated "Full Natural" Runoff, January 25, 2016 [1]	108 TAF			
DWR, January 1, 2016[2]	740 TAF	1030 TAF	1350 TAF	2430 TAF
NWS, January 25, 2016 (Daily Value[4])	1260 TAF	1420 TAF	1790 TAF	2850 TAF
NWS, January 25, 2016 (7-day Smoothed Value[5])	1177 TAF	1321 TAF	1709 TAF	2822 TAF

[1] http://www.usbr.gov/mp/cvo/vungvari/milfln.pdf

[2] http://cdec.water.ca.gov/cgi-progs/iodir/WSI.2016

[3] http://cdec.water.ca.gov/cgi-progs/iodir?s=b120

[4] http://www.cnrfc.noaa.gov/water_resources_update.php?stn_id=FRAC1&stn_id2=FRAC1&product=WaterYear

[5] The NWS smoothed data uses a 7-day weighted moving average, where the most recent day (n) is given greater weight than each previous forecast day (n-1, 2, 3, etc.); this reduces noise stemming from ESP model input. The following formula us used: $((Forecast_n * 1) + (Forecast_{n-1} * 0.857) + (Forecast_{n-2} * 0.714) + (Forecast_{n-3} * 0.571) + (Forecast_{n-4} * 0.429) + (Forecast_{n-5} * 0.286) + (Forecast_{n-6} * 0.143)) / 4$

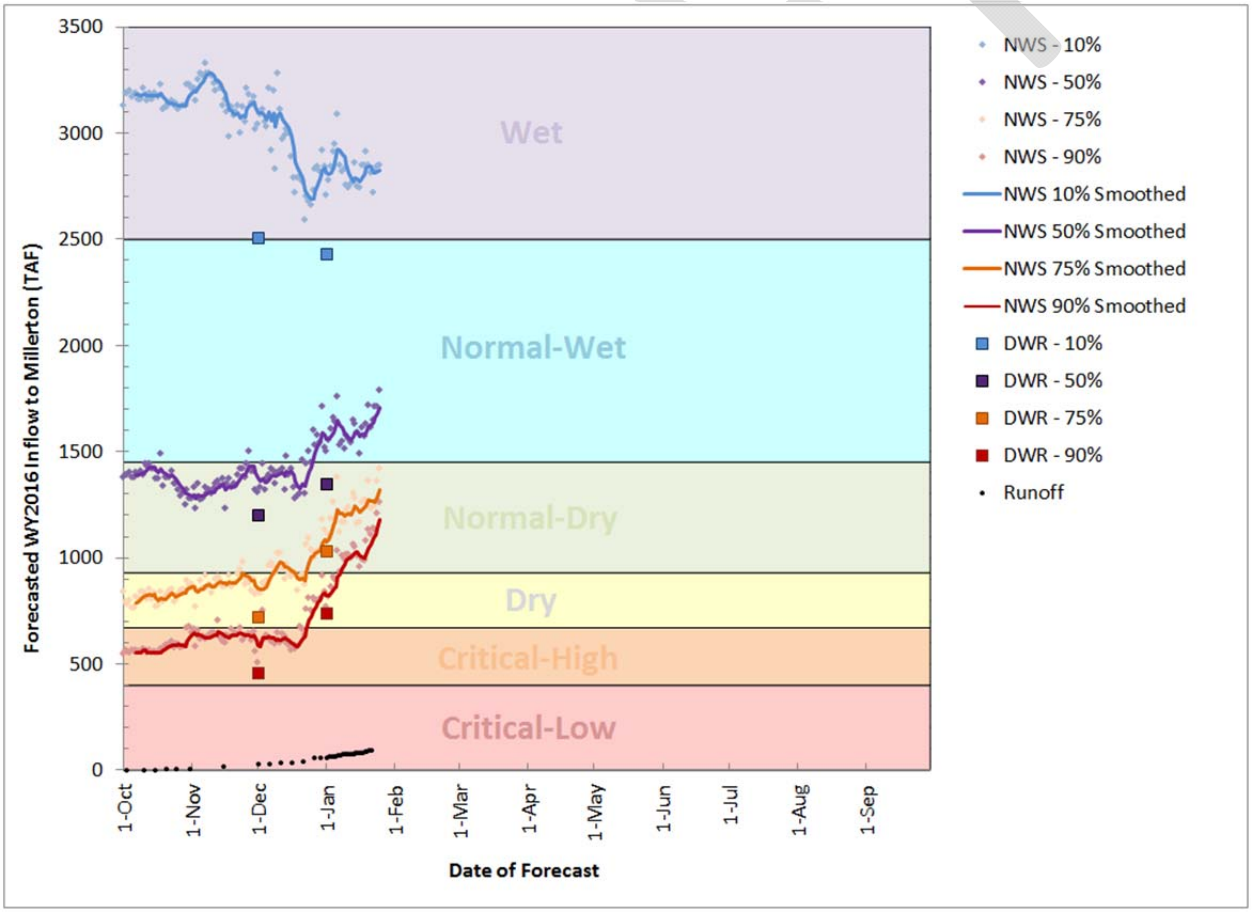

Figure 1a – Plot of Water Year 2016 forecasts, including both NWS Ensemble Streamflow Prediction Forecast and DWR Forecast

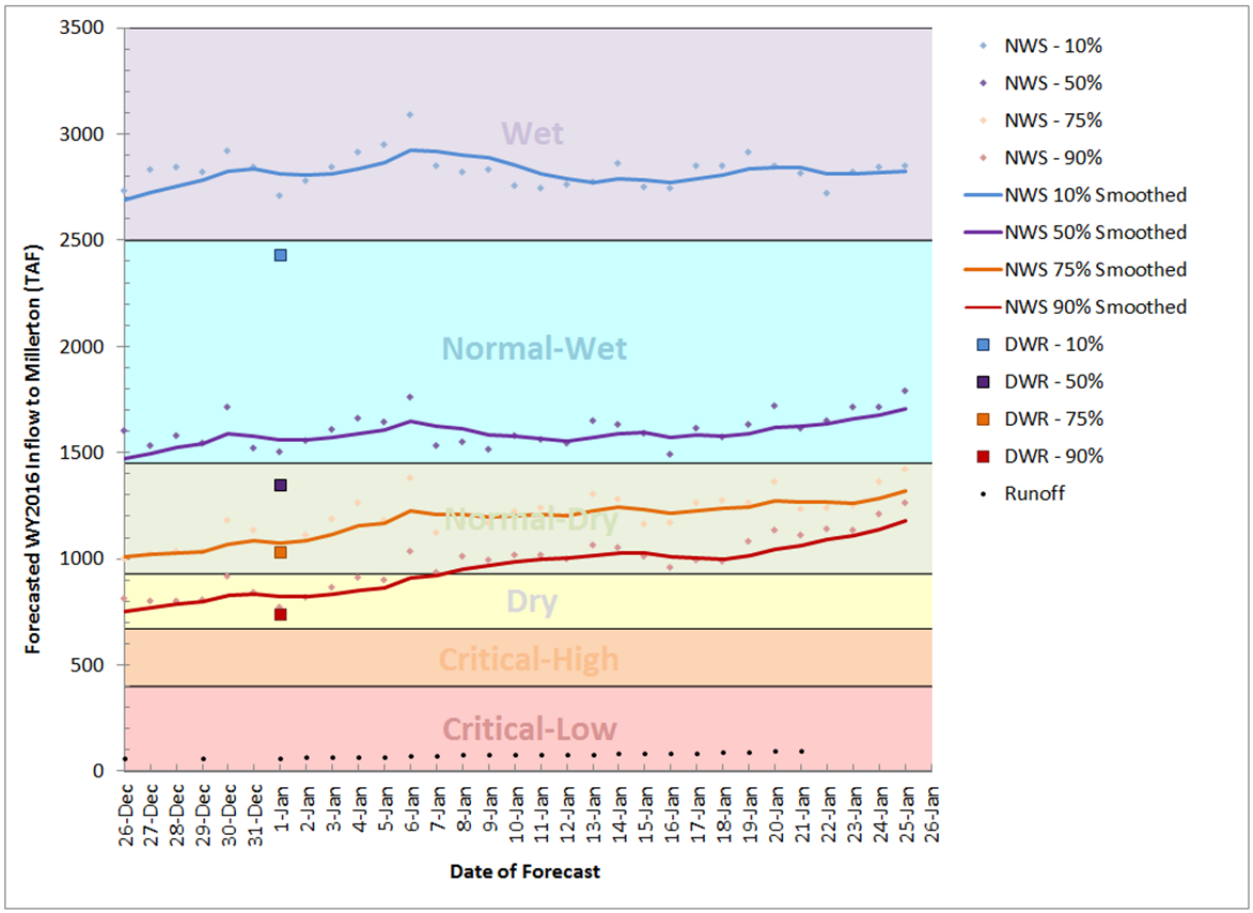

Figure 2b. Detail plot of most recent forecasts

Contractual Obligation Considerations

Consistent with Section 10004(j) of the San Joaquin River Restoration Settlement Act, the Settlement and the Settlement Act do not modify the rights and obligations of the United States under the Purchase Contract between Miller and Lux and the United States (Purchase Contract) and the Second Amended Exchange Contact between the United States, Department of the Interior, Bureau of Reclamation and Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company (Exchange Contract). Reclamation's obligations in the Purchase Contract and Exchange Contract remain unchanged. As a result, if a situation were to occur where the Restoration Flows conflicted with Reclamation making necessary deliveries under the Purchase Contract and Exchange Contract, Reclamation would make water available to meet the contractual requirements and/or refrain from making releases under the Settlement.

In determining whether to release Restoration Flows, Reclamation considers its ability to meet senior obligations in the Purchase Contract and Exchange Contract. Reclamation currently has concerns regarding meeting Purchase Contract and Exchange Contract requirements from the Delta based on San Luis Reservoir storage and Delta pumping uncertainties. As of mid-January, Reclamation has not yet begun pumping for 2016 supplies and is still supplying water for 2015 transfers. Additionally, based on the initial inflow projections to Shasta Reservoir, the Exchange

Contract would provide for 840,000 acre-feet to be made available to the Exchange Contractors. If inflow projections stay below 4.0 million acre-feet, the Exchange Contract would provide for 650,000 acre-feet to be made available. The January 1 DWR 90th percentile forecast is 3.18 million acre-feet, while the January 25 NWS forecast is 5.0 million acre-feet for Shasta Lake unimpaired inflow. A full 840 TAF supply for the Exchange Contract is thus likely. Water availability and regulatory factors could result in substantial differences in the CVP water supply available south of the Delta, and therefore substantially affect Reclamation's ability to provide the water to be made available under the Exchange Contract from north of Delta sources. The potential result of a shortfall in deliveries for the Exchange Contract from north of Delta supplies could be fulfilling the remainder of the contract with Millerton Lake supplies.

Based on information available to date and the high level of uncertainty in key forecast factors, Reclamation is not certain it can provide the water to be made available under the Exchange Contract without a delivery from Friant Dam (Millerton Lake). Considering the potential for constrained through-Delta pumping capacity for 2016 supplies and the low reservoir storage amounts as compared to previous years[1], it is prudent to exercise caution and initially limit Restoration Flows early in the season.

Operational Constraints

At this time, channel capacity and seepage constraints prevent any flows below Sack Dam. Upon completion of additional flowage easements and one seepage easement, approximately 300 cfs will be allowable past Sack Dam, which is anticipated later this spring. Reclamation will complete a Flow Bench Evaluation prior to any increases below Sack Dam to verify the allowed flow increase. Once flows are allowed, an initial 50 cfs will be allowed to pass below Sack Dam while monitoring groundwater levels for two weeks. Only after groundwater levels have stabilized below thresholds, Reclamation will perform another Flow Bench Evaluation to evaluate an increase to 150 cfs, if the Restoration Administrator requests such an increase. After two weeks at 150 cfs and groundwater stabilization, Reclamation will evaluate an increase to 300 cfs. After two weeks at 300 cfs and groundwater stabilization, Reclamation will complete another Flow Bench Evaluation to evaluate whether any additional increase can be made while maintaining groundwater levels below thresholds. These incremental releases allow groundwater levels in monitoring wells to respond to 6 inch changes in water surface elevation in the river and avoid potential groundwater seepage impacts. Future Restoration Allocations will provide updates to seepage limitations.

In addition, the 2016 Restoration Year Channel Capacity Report identifies a maximum flow in Reach 2B of 1,120 cfs. This results in a maximum release from Friant Dam between 1,360 cfs and 1,490 cfs depending on the time of year. Reclamation will coordinate with the Restoration Administrator through the weekly Flow Scheduling Subgroup conference calls and on an as-needed basis to update these constraints.

[1] Reservoir information is available at: http://www.usbr.gov/mp/cvo/

Summary

This provisional allocation addresses the potential risk of inadequate water to meet senior obligations, allow more runoff to materialize in Millerton Lake, and still provide water to implement the Restoration Goal and protect juvenile fall-run Chinook salmon anticipated to hatch in the coming month. The Restoration Administrator is requested to submit a recommendation by February 4 for an initial release of 9,445 acre-feet starting as early as February 8.

Reclamation is actively evaluating hydrologic conditions and will update this provisional allocation as soon as practical, but no later than February 20, 2016.