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## Technical Memorandum No. 1

### Computing March through November Unimpaired Inflow into Folsom Reservoir

To: Water Forum Successor Effort

From: Tom Gohring and Jonathan Goetz

Reviewed by: Jim McCormack and Buzz Link

Date: May 17, 2007

Subject: Method for Calculating March through November  
Unimpaired Inflow into Folsom Reservoir (UIFR)

#### Introduction

The Water Forum Agreement (WFA) provides for Purveyor Specific Agreements (PSA's) that specify diversion reductions that will take place if the forecasted March through November Unimpaired Inflow into Folsom Reservoir (March-Nov UIFR) is within a certain range. However, the WFA does not provide a clear method for computing March-Nov UIFR. The purpose of this technical memorandum (TM) is to provide a repeatable and unambiguous method for computing and reporting this important index that is consistent with the WFA. This TM also describes the data required to compute the March-Nov UIFR.

#### Background & Intent of Wedge Year Actions

The wedge and driest year actions are part of the WFA and integral to meeting its two co-equal objectives and for ensuring the aquatic habitat of the lower American River (LAR) is protected. The WFA has made the distinction between hydrologic years as a priority as stated in the following excerpt:

*"It is envisioned that American River diversions by purveyors in the region in average and wetter years above H street would increase from the current level of 216,500 acre-feet annually to about 481,000 acre-feet annually by the year 2030.*

*With adequate mitigation, these diversions in average and wetter years can be accomplished while still preserving the fishery, wildlife, recreational and aesthetic values of the lower American River.*

*However, the river is already stressed in drier years. The health of the fishery would degrade if lower American River flows were decreased by these amounts in drier years." (WFA, January 2000, Section 3, II A)*

Several purveyors have PSAs that subject dry-year diversions in excess of their 1995 levels to a cutback based on the hydrologic condition and associated indices and thresholds identified in the WFA.

The March through November Unimpaired Inflow to Folsom Reservoir (March-Nov UIFR) is used as the primary index in the WFA for identifying the current year's hydrologic condition. The intent of using the Mar-Nov UIFR is to provide an index that represents water availability over a broad range of hydrologic conditions. The value of the March-Nov UIFR is the computed volume of water in the American River that would flow past Folsom Dam if no water development projects had been constructed and is based on the amount of snow pack and runoff that has occurred and is projected to occur in the basin at the time the March-Nov UIFR estimate is made. By its very nature, the March-Nov UIFR value does not consider storage in reservoirs upstream of Nimbus Dam.

Past and current reporting practices of the State Department of Water Resources (DWR) have been to report the unimpaired "runoff" in the American River below Folsom Reservoir as part of Bulletin 120. Given this documented practice, the Water Forum has used this reported number as the data by which to determine the March-Nov UIFR and applied it to the hydrologic year definitions made in the WFA as follows:

*"Wet/Ave Years: as it applies to these diverters, years when the projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 acre-feet.*

*Drier Years: as it applies to these diverters, years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 950,000 acre-feet.*

*Driest Years (also known as Conference Years): Years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 acre-feet. Conference years are those years which require diverters and others to meet and confer on how best to meet demands and protect the American River."*

*(WFA, January 2000, Section 3, 1 footnotes from table titled, "1995 AND PROPOSED YEAR 2030 SURFACE WATER DIVERSIONS")*

The definition of what is a drier year, also known as a "wedge" year, is typically a March-Nov UIFR of 950,000 acre-feet (TAF). There are exceptions to this threshold for some purveyors.

### **Data Requirements**

The data required for calculating the March-Nov UIFR is acquired from DWR Bulletin 120 which is released four times a year (February, March, April, and May). Each successive release of Bulletin 120 represents more up-to-date data and provides a higher level of confidence in the forecast for the given water year. Bulletin 120 can be found on the DWR web site at <http://cdec.water.ca.gov/snow/bulletin120>. The published UIFR values are based on data for the first of the month. The forecast is posted on the web by the end of the 6th business day after the first of the month. Hard copies are mailed on about the 6th business day.

The computation of the March-Nov UIFR is based on the “Water Year Unimpaired Runoff” table in Bulletin 120 and the data representing flows in the American River below Folsom Dam. Figure 1 is an excerpt of Bulletin 120 for April 2007 and shows some of the values that are required for computing the March-Nov UIFR. Numbers shown in Bulletin 120, Figure 1, reflect the 50 percent or “median” probability, which is the forecast used for the March-Nov UIFR. Also shown is the 80 percent probability range<sup>1</sup> in the last column of Figure 1.

### **Method for Computing March-Nov UIFR**

The March-Nov UIFR is the sum of unimpaired runoff values for the months of March through November. These values are derived as follows:

The March value of unimpaired runoff is taken directly from Bulletin 120 (see Figure 1) with no modification or adjustments. For February and March issues of Bulletin 120, these values are forecasts. For the April and May issues of Bulletin 120, this value is derived from recorded data.

The April value of unimpaired runoff is taken directly from Bulletin 120 (see Figure 1) with no modification or adjustments. For February, March, and April issues of Bulletin 120, these values are forecasts. For the May issue of Bulletin 120, this value is derived from recorded data.

May, June, and July values of forecasted unimpaired runoff are taken directly from Bulletin 120 (see Figure 1) with no modification or adjustments.

If significant storm activity takes place after the May issuance of Bulletin 120, Water Forum staff will re-compute the March-Nov UIFR using mid-month data updates.

The combined forecast for August and September are taken directly from Bulletin 120 (see “August and September” column in Figure 1) with no modification or adjustments.

Forecasted values for October and November are not reported in Bulletin 120 because they would be part of the following water year. For the purpose of these computations, values of 30 TAF for October and 30 TAF for November have been derived from historical data. These values are consistent with the Water Forum EIR modeling and previous Water Forum computations of UIFR. Although this value could be refined based on analysis of long-term data, such refinement is not proposed at this time because it would not be expected to add appreciable confidence to the forecast of the March-Nov UIFR.

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<sup>1</sup> Runoff probability ranges are statistically derived from historical data. The 80 percent probability range is bounded by the 90 percent exceedance level value and the 10 percent exceedance level. This implies that there is a 10 percent chance that the UIFR will be higher or lower than the range specified and that the actual runoff should fall within the stated limits eight times out of ten. Runoff averages for most streams are based on the period 1956-2005.



Table 1 provides a summary of these values for the April 2007 issue of Bulletin 120.

Table 1. Computation of March – Nov UIFR for 2007  
Given April 2007 Data

Period	Volume of Unimpaired Runoff (TAF)	Data Source
March	285	Bulletin 120
April	250	Bulletin 120
May	235	Bulletin 120
June	90	Bulletin 120
July	15	Bulletin 120
August & September	5	Bulletin 120
October	30	Historical average
November	30	Historical average
March-Nov UIFR	940	Sum of above values

### Water Forum Monthly Runoff Reports

Water Forum staff will release a Water Forum Monthly Runoff Report for each month from February through May. Each Water Forum Monthly Runoff Report will contain the latest computed value of the March-Nov UIFR. Water Forum staff will perform the required calculations and issue the Monthly Runoff Report within a few days after the release of each issue of Bulletin 120.

Water Forum members can expect to receive the Monthly Runoff Report by email around the 8<sup>th</sup> of the month in February, March, April, and May. In addition to the latest value of the March-Nov UIFR, the Water Forum Runoff Reports will include a summary of the associated computation and input data. This information will also be posted on the Water Forum web site ([www.waterforum.org](http://www.waterforum.org)).

### Mid-Month Notices

It is important to note that the value of the March-Nov UIFR is subject to change with each successive month or reporting. Earlier reports have a greater uncertainty. Later reports are more certain because they are based on updated measurements of rainfall, runoff, and snow pack.

Due to changing conditions and ongoing monitoring, DWR releases mid-month data updates of unimpaired flow. If the mid-month values are considerably different from those reported in the most recent Bulletin 120, Water Forum staff will issue a notice to the Water Forum Successor Effort. Such a mid-month notice will not be a re-issuance of the latest Monthly Runoff Report. Rather, the notice will provide a “heads up” to Water

Forum stakeholders that the next issue of the Monthly Runoff Report is likely to differ significantly from the last.

**Water Forum Annual Runoff Report**

Following the May March-Nov UIFR, the Water Forum staff will issue an Annual Runoff Report which will contain a summary of the Monthly Runoff Reports and the final value of the March-Nov UIFR. This value will be the accepted value of the March-Nov UIFR for the given water year. In most years, the final March-Nov UIFR value will be the same as that which was released in the May Runoff Report because the May issue of Bulletin 120 is the last of the given water year.

However, if significant storm activity takes place after the May issuance of Bulletin 120, Water Forum staff will re-compute the March-Nov UIFR using mid-month data updates. If such a post-May value is re-computed, Water Forum staff will issue a Draft Annual Runoff Report and solicit comments from Water Forum stakeholders as to how well it represents the current water year.

Water Forum staff will present the draft Annual Runoff Report and a summary of comments to the Water Forum Successor Effort Coordinating Committee. The final Annual Runoff Report will be issued upon concurrence of the Coordinating Committee.