Yuba County Water Agency
Temporary Urgency Change Petition
Attachment B

Yuba River Development Project 2014 Drought Planning

January 24, 2014
By Stephen Grinnell, P.E.

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1 INTRODUCTION AND BACKGROUND

Drought conditions in 2014 are a continuation from the extremely dry conditions of 2013, the driest calendar year of record for the Yuba River Watershed. The historic dry conditions are compelling the need to take extraordinary measures to manage very limited water supplies. For the Yuba River Development Project (YRDP) and the lower Yuba River, in 2014 the water supply for all beneficial uses is likely to be mostly derived from stored water in New Bullards Bar Reservoir that was carried over from 2013. 2014 Runoff could account for as little as 25% of the water supply to the lower Yuba River this year.

The Yuba County Water Agency (YCWA) is seeking temporary changes to its Federal Energy Regulatory Committee (FERC) license and State Water Resources Control Board (SWRCB) water right permit terms, as well as concurrence from the Yuba Accord Fisheries Agreement signatories, to more effectively manage the very limited water supply that is likely to result from the current and ongoing dry conditions. YCWA is seeking the following actions;

1. **FERC: Temporary deviation from adherence to November 22, 2005 FERC Order Amending Article 33(d) Footnote 3B Item v.** This license provision requires lower Yuba River flows at the Smartsville Gage not to be reduced to less than 65 percent of the maximum five-day average flow that has occurred from November to March 31. The provision currently requiring a minimum release of 673 cfs. YCWA requests that FERC authorize a reduction to a minimum required flow of 500 cfs for February 1 through March 31, 2014. YCWA requests that this 500-cfs requirement be for a 5-day running average of the average daily streamflows, with instantaneous flows never less than 90 percent of the specified requirement. (This 5-day running average term is consistent with Term 1.b. on page 56 of the SWRCB's Corrected Order WR 2008-0014.)
2. **SWRCB: Temporarily change YCWA water right permits 15026, 15027 and 15030 (Applications 5632, 15204 and 15574).** Term 3 on pages 178-179 of the SWRCB's Revised Decision 1644 amended these YCWA water right permits to add this term, which requires that lower Yuba River flows at the Smartsville Gage not to be reduced to less than 65 percent of the maximum flow that has occurred from November to March 31. This term is currently requiring a minimum release of 683 cfs. YCWA requests that the SWRCB authorize a reduction to a minimum required flow of 500 cfs for February 1 through March 31, 2014.
3. **FERC: Temporary deviation from adherence to FERC License 2246 Article 33(d).** This provision requires releases from Englebright Dam sufficient to maintain flows in the lower Yuba River at the Smartsville Gage at a minimum of 600 cfs from January 16 to March 31. YCWA requests that FERC amend this provision to authorize a temporary

reduction in these required minimum flows to 500 cfs for February 1 through March 31, 2014. YCWA requests that this 500-cfs requirement be for a 5-day running average of the average daily streamflows, with instantaneous flows never less than 90 percent of the specified requirement. (This 5-day running average term is consistent with Term 1.b. on page 56 of the SWRCB's Corrected Order WR 2008-0014.)

4. **SWRCB: Temporarily change YCWA water right permits 15026, 15027 and 15030 (Applications 5632, 15204 and 15574).** Term 1 on pages 56-58 of the SWRCB's Corrected Order WR 2008-0014 requires YCWA to maintain the Lower Yuba River Fisheries Agreement minimum instream flows, which are specified in Exhibit 1 to that order, unless Conference Year conditions are present. Conference Year conditions are present when the North Yuba Index, which is defined in Exhibit 4 of the Fisheries Agreement, has a value of less than 500 TAF. Because Exhibit 4 specifies that the 50% exceedance forecasts in DWR's Bulletin 120 will be used to calculate this index, the values of this index that are calculated with the February, March and April values of this index may be greater than 500 TAF, even though this year's critically dry conditions probably will result in the May value of this index being less than 500 TAF. YCWA requests that the SWRCB temporarily amend YCWA's water right permits to provide that the required minimum instream flows between the date of the SWRCB action and May 15, 2014 will be those for Conference Years. On and after May 15, 2014, the May Bulletin 120 will be used to determine the North Yuba Index and the appropriate minimum flow schedules.
5. **SWRCB: Temporarily changes YCWA water right permits 15026, 15027 and 15030 (Applications 5632, 15204 and 15574).** Under paragraph 1.d on page 57 of Corrected Order WR 2008-0014, the required minimum instream flows for Conference Years are those specified in the 1965 agreement between YCWA and the California Department of Fish and Game, and these include a minimum flow requirement of 600 cfs at the Smartsville Gage. YCWA requests that the SWRCB temporarily reduce this requirement to 500 cfs for February 1 through March 31, 2014. YCWA also requests that the SWRCB increase the required minimum instream flow at the Smartsville Gage for April 1 to April 30, 2014 from none to 500 cfs and increase the required minimum instream flow at Marysville Gage for February 1 through March 31, 2014 from 245 cfs to 350 cfs.

In addition to these requested regulatory actions, YCWA also is seeking agreement from the California Department of Fish and Wildlife, South Yuba Citizens League, Trout Unlimited, Friends of the River and The Bay Institute to make the following temporary amendments to the Lower Yuba River Fisheries Agreement:

A. **Temporary Amendments to Section 5.4.3** to allow the deviations from the flow reduction requirements in the Nov. 22, 2005 FERC Order that are described in item 1 above.
B. **Temporary Amendments to Sections 5.1.1 and 5.1.5** to change the required lower Yuba River minimum flow requirements to the requirements that are specified in items 2 and 5 above.

These requested actions and temporary amendments are requested so that YCWA may operate the YRDP in a manner that will conserve water stored in New Bullards Bar Reservoir and produce a protective flow pattern for fish in the Lower Yuba River for the spring that can be achieved with such limited water supplies. At this time, it is too early to tell what, if any, additional actions can

be taken in the summer and fall to improve fishery habitat conditions, so these requested actions and amendments are only for requirements through May 15, 2014.

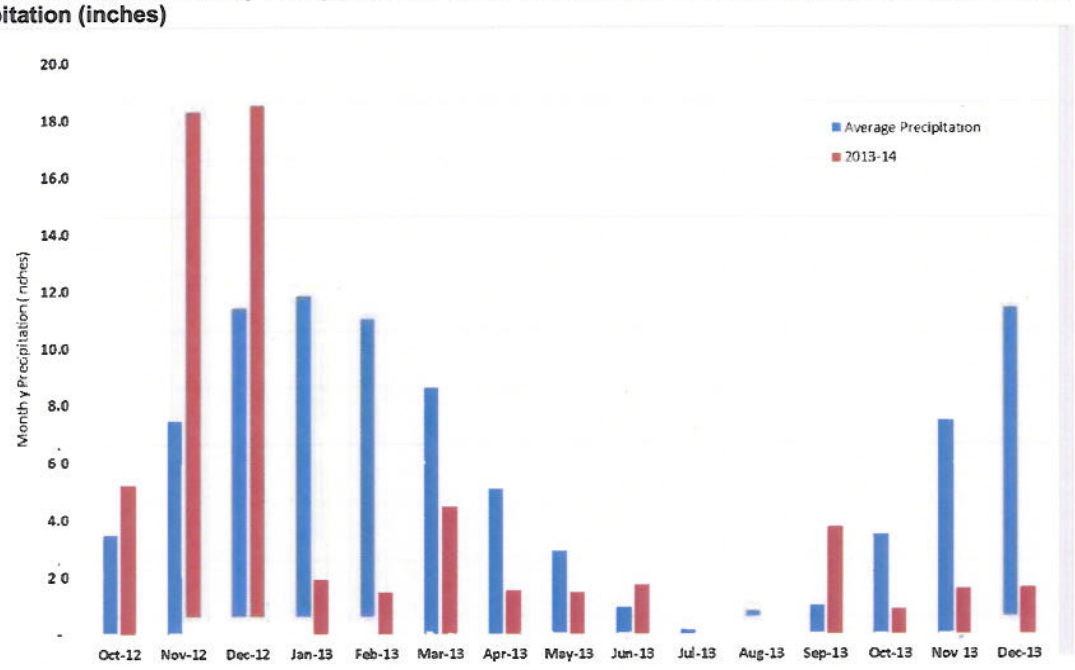
YCWA is forecasting that 2014 will be a Conference Year. However, for reasons described later in this report, the Yuba Accord methodology for determination of the North Yuba Index may not result in a Conference Year designation until April or May, which will be after opportunities to conserve water during February, March and April. This potential delay in transitioning to a Conference Year could lead to even more severe water supply conditions for the remainder of the water year. For this reason, YCWA is for seeking the requested actions now. Under the most severe conditions anticipated, without any action, Conference Year flows would eventually be needed, unwanted flow changes in the spring would likely occur, and storage in New Bullards Bar Reservoir would reach minimum pool by August.

1.1 Climate and Hydrology

The 2013 water year started as one of the wettest October through December periods on record. Then, in January conditions turned dry and conditions have stayed dry since that time. For the 12½ month period of January 1, 2013 through January 15, 2014, conditions have been drier than during any other time in the 100 year history of recorded precipitation in the Yuba Watershed. **Figure 1** is a graph of monthly precipitation recorded at the Downieville weather station for the period October 2012 to December 2013. The historical average monthly precipitation for this gage is also show. The anomalous precipitation amount for September 2013 for the Downieville station of over 3 inches was not observed at other nearby stations. For other areas of the watershed, the September total precipitation was about half of that seen at Downieville.

The conditions shown in the graph, where the wettest first three months of the water year are followed by a very dry remainder of the water year, had occurred previously in 1996/97 (although it was not as dry in the late winter and spring of 1996/97) when flooding occurred in December and early January and then a very dry spring occurred, but in that year the storms of 1997 left a significant snowpack. In 2013, by late spring the snowpack was very small and the final DWR Bulletin 120 update in May listed the April to July unimpaired flow of the Yuba River at Smartsville at 35% of average. The primary reason for the limited snowpack was that the early precipitation of October 2012 to December 2012 was mostly warm rains that did not produce snow in the upper watershed, and instead produced high storm runoff that was bypassed through New Bullards Bar Reservoir to maintain the required flood reservation pool.

Figure 1: Downieville Monthly Precipitation for Water Year 2013 to 2014 and Historical Average Monthly Precipitation (inches)

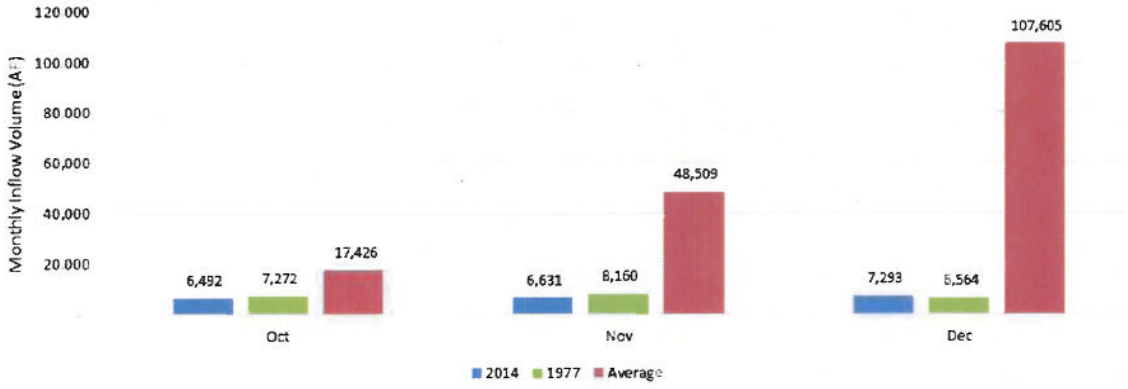


While 2013 turned very dry after the first three months of the water year (October-December 2012), the inflow to New Bullards Bar Reservoir in those first three months established the instream flows of the Lower Yuba River that apply during wetter year types. The Yuba Accord flow schedules for required flows at Smartsville and Marysville are triggered using the North Yuba Index, which is a combination of "active" storage in New Bullards Bar Reservoir (storage above the FERC minimum pool) at the end of the previous water year plus the inflow to New Bullards Bar for the current water year. Although the October-December 2012 inflow to New Bullards Bar Reservoir added to the 2013 index value, most of this inflow was immediately released to maintain the required flood reservation pool and thus did not contribute to stored water that could be used later in the year. The final North Yuba Index for 2013 was 1,155 TAF, which resulted in a Schedule 2 year, the second highest flow schedule of the Yuba Accord. Today, YRDP operations still must comply with the Schedule 2 flow requirements. The first opportunity for the index, and thus the flow schedules, to change will be with the first Bulletin 120 (B-120) of the 2014 water year, which is the February 1 B-120, and which will be released about February 11th. New Bullards Bar Reservoir storage at the end the 2013 water year on September 30, 2013 was 549,730 acre-ft, about 100,000 acre-ft lower than the normal target storage for this date. Storage on January 15, 2014 was 418,512 acre-ft, the lowest storage for this date since 1985.

Inflow to New Bullards Bar reservoir for the 2014 water year to January 15th has been the driest (lowest volume) of record. From October 1, 2013 to January 15, 2014, the total inflow volume has been 22.6 TAF. The average inflow rate has been about 100 cfs while during the same time period the minimum instream flow requirement at the Smartsville Gage has been 700 cfs. This flow requirement has been met with releases from New Bullards Bar Reservoir of approximately 550 to 600 cfs, with the remainder coming from flows from the Middle and South Yuba River into Englebright Reservoir. Weather models are forecasting continued dry weather, with a high pressure ridge that is causing all storms to track to the north, missing the Northern Sierra Nevada range, and this weather pattern is expected to continue into the foreseeable future. **Figure 2** is a

plot of the recorded New Bullards Bar Reservoir monthly inflow volumes for 2014, 1977, and the historical averages for the first three months of the water year.

Figure 2: Historical New Bullards Bar Reservoir Monthly Inflow Volume for 2014, 1977 and long term average



1.2 Yuba River Development Project Operations

Since April 2013, the YRDP has been operated to meet required Schedule 2 flows. Releases have been sufficient to maintain lower Yuba River flows at the Smartsville Gage at rates that were just above the minimum required flow during this time, with the exception of the June through August period, when groundwater substitution transfer flows were added to the required flows to complete the transfer. This type of transfer does not result in a reduction in New Bullards Bar Reservoir storage when compared to storage at the end of the water year without a groundwater substitution transfer. From mid-January to April 2013, the YRDP operated to comply with flow reduction limits in YCWA's water-right permits and FERC license, which required a minimum release of 1,300 cfs during that time, 600 cfs higher than the Schedule 2 required flow for that period.

1.2.1 Irrigation Diversion Curtailments to Date

With New Bullards Bar Reservoir storage 100,000 acre-ft lower than the normal target amount for the end of September, and as dry conditions persisted into early December, YCWA worked with its eight Member Units to implement a curtailment of irrigation diversions as of December 18th. In the week prior to the 18th, irrigation diversions, which during this time of year are for a combination of pasture and permanent crop maintenance, rice stubble decomposition and water fowl habitat, were averaging about 350 cfs. Starting on December 18th, diversions were curtailed to a maximum of 200 cfs, a 42% reduction. Because the Schedule 2 required flows have a deferential between the requirement at Smartsville and the requirement at Marysville of 200 cfs, and because diversions occur between these two compliance points, irrigation diversions have been limited to the difference between the two requirements so that irrigation deliveries do not require any additional storage releases from New Bullards Bar Reservoir. This practice is continuing through the winter.

1.2.2 Current Operations for Flow Requirements

For the week of January 20th, YRDP operations are continuing to release water to comply with the Schedule 2 flow requirement at the Smartsville Gage of 700 cfs and at the Marysville Gage of 500 cfs and flows are about 15 cfs higher than these requirements to ensure that no violations occur.

In mid-November, the combination of the Marysville requirement plus irrigation diversions at Daguerre Point Dam resulted in a maximum 5 day average flow of 1,035 cfs and a maximum one day average flow of 1,050 cfs. YCWA's FERC license includes a term that limits flow reductions

to 65% of the maximum five day average flow that has occurred from November 1 to March 31, excluding storm flows, resulting in a minimum release from Englebright Dam of 673 cfs (65% of 1,035 cfs) until March 31st when this requirement ends.

A similar term is included in YCWA's water right permits as a result of the SWRCB's Revised Decision 1644. However, this requirement is a limit of 65% of the maximum daily average flow. The maximum one day average flow was 1,050 cfs, resulting in a minimum required flow of 683 cfs until March 31st under the water right permit term. These flow reduction requirements are important because when the February 1 Bulletin 120 is released (about February 11th), it is likely that a Schedule 5 or 6 year will result, and, absent the flow reduction requirements, the required flow at the Smartsville Gage will be 550 cfs for either of these schedules. The required FERC license minimum flow at the Smartsville Gage for January 15th until March 31st is 600 cfs, and this requirement would govern if the flow reduction criteria were not in effect. However, if the flow reduction criteria were to remain in effect, then flows at the Smartsville Gage would have to be maintained above 683 cfs until after March 31, even with the lower minimum instream flow requirements in the FERC license and SWRCB water right permit flow schedules.

2 FORECASTED WATER SUPPLY AND CONDITIONS

2.1 Snowpack

As of the third week of January, more than 50% of the normal snowpack development period is over. The peak snowpack typically occurs around April 1st, with the three months of greatest accumulation being December, January and February. As of the third week of January of this year, there is essentially no snowpack. This is the lowest snowpack on record for this date. In 1977, the driest year of record for the Yuba watershed, the three snow survey locations in the watershed averaged 6.5 inches of water. In addition to the lack of snow, the watershed soil condition this year is very dry due to the lack of rainfall, so any future precipitation will first have to hydrate the soil profile before any significant runoff can occur. Also, forecasts show little potential for added snowpack development well into February.

2.2 Available Runoff Forecast Information

One of the primary sources of data for forecasted runoff in the Yuba watershed is the National Weather Service's California Nevada River Forecast Center (CNRFC). The CNRFC produces an Ensemble Streamflow Prediction (ESP) that uses short range weather forecasts and medium range weather models to produce climate conditions (precipitation, temperature, etc.) for the next 16 days, which are then coalesced with historical meteorology from 58 historical years to produce an estimate of meteorological conditions from the present date out 365 days. This climate data is utilized in an operations model that includes the watershed snow and soil conditions to produce a probabilistic runoff forecast. This information, because it includes historical meteorology after about the first two weeks of simulation, does not include the effects of the persistent high pressure ridge that is currently in place and therefore is seen as over predicting runoff probability. Even

with this method, the probabilities are greater than 1 in 4 that, without significant action, New Bullards Bar Reservoir will be drawn down to, or well below, the minimum pool storage of 234,000 acre-ft.

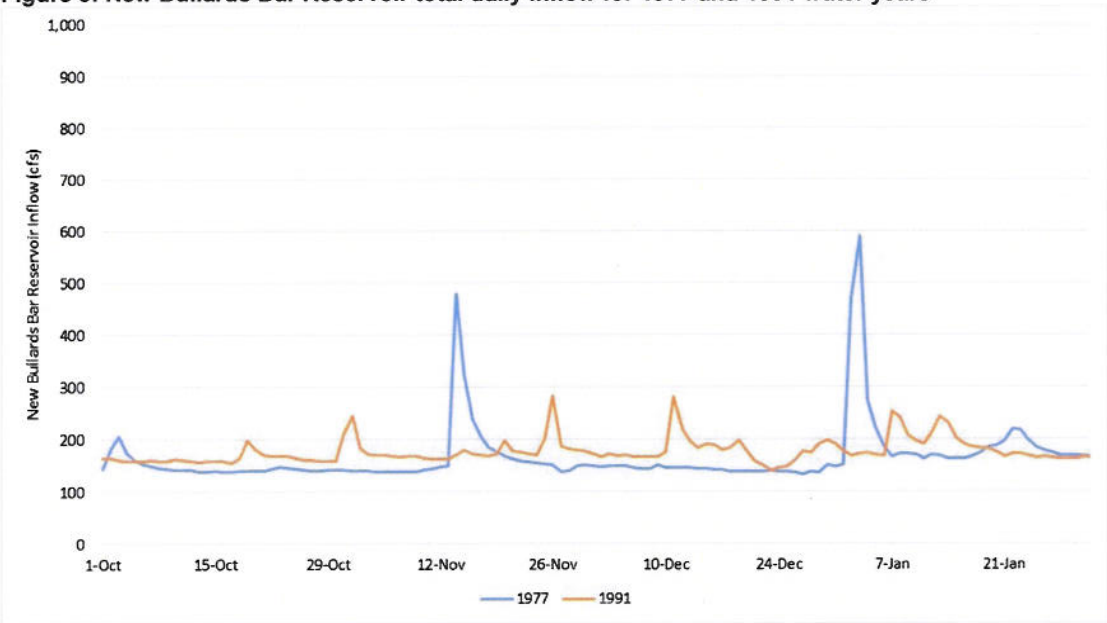
2.3 Probable Lowest YRDP Inflow Condition

In addition to examining the CNRFC forecast, analysis has been done to identify the likely lowest inflow volume to the YRDP that could be expected to occur for the remainder of 2014. Because the ESP forecasts shift drier and drier as each day of the normally wet season passes, and weather models forecast further into the water year, resulting in less predicted runoff and inflow to New Bullards Bar Reservoir, these forecasts are a moving target for planning purposes. At present, with the very persistent high pressure ridge, and weather models continuing to predict that the current conditions will continue, a reasonable planning assumption is that minimal precipitation will occur for the remaining months of the normally wet season. Even if several inches of rainfall occur during each remaining month of this season, a "no rain" estimate of runoff still will be valid, because, with the current soil conditions, it would take several inches of precipitation to sufficiently moisten the soil profile to produce any meaningful increased runoff in the watershed. A demonstration of the dryness of the watershed occurred during a small rainstorm on January 11 and 12th 2014. Rainfall totals for the two days in and around the North Yuba River watershed ranged from 0.2 to 0.7 inches. Typically, a rough rule of thumb for this time of year, with a normal snowpack is that one inch of precipitation will produce up to or more than 10,000 acre-ft of inflow to New Bullards Bar Reservoir. However, this small storm in mid-January produced less than 150 acre-ft of inflow into the reservoir.

2.3.1 The No Rain Hydrology

The development of a "no rain", or, more correctly, a minimal rain scenario, was done to prepare an estimate of a hydrologic condition that reflects the lowest likely runoff in the lower Yuba River watershed that could occur in 2014, and to use this hydrology for modeling and analysis of the resulting conditions that would occur in the lower Yuba River. The development of this hydrology consisted of examining historical base flows in the North, Middle and South Yuba Rivers, with primary focus on inflow to New Bullards Bar Reservoir. The reference water years examined included 1976, 1977 and 1991 from October through February and 1976 and 1977 from August through September. Based on this examination, a "No Rain" hydrology base flow was developed for modeling simulations by using the October 1, 1976 through January 31, 1977 inflows to the YRDP and scaling these flows to equal the total inflow volume recorded for the same period of the 2014 water year. For the February 1 to August 1 period, a straight line reduction was used so that local inflows uniformly transition from the February 1, 1977 amounts to the August 1, 1977 amounts. This calculation was done for the major modeling inflow points of the YRDP water balance/operations model that is currently being used in the FERC relicensing in order to model the system. **Figure 3** is a plot of the October through January period for 1977 and 1991 that was used to assess base flow conditions. This information is from synthesized hydrology developed for the YRDP FERC relicensing.

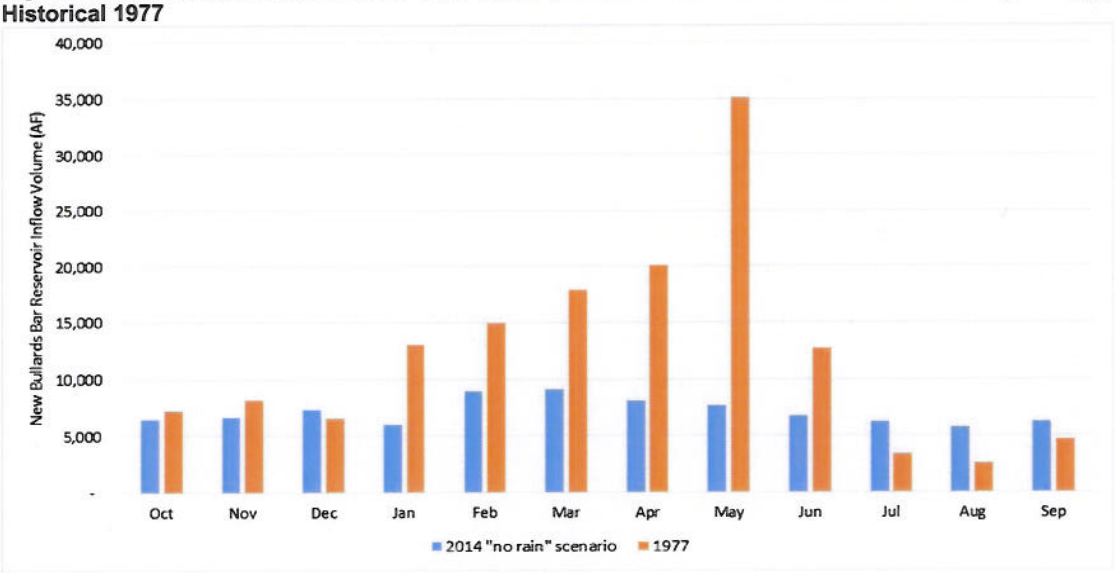
Figure 3: New Bullards Bar Reservoir total daily inflow for 1977 and 1991 water years



As see in the plot, in water year 1977, although minor increases in inflow occurred, after each increase the inflow receded immediately to the flow level that was occurring before the increase. For the 2014 water year, this pattern is expected to continue and is the basis for the modeled scenarios.

Results of the analysis and development of the No Rain hydrology are shown in **Figure 4** as a graph of New Bullards Bar Reservoir monthly inflow volumes for the 2014 water year, with October through December as actual inflow and January through September from the analysis. The actual inflow for 1977 is also shown.

Figure 4: New Bullards Bar Reservoir Total Monthly Inflow Volume for the 2014 "No Rain" Hydrology, and Historical 1977



The comparison of the no rain hydrology and the 1977 historical inflow, along with comparison of the current conditions with the 1977 conditions, reveals several important conclusions. First,

the CNRFC is currently forecasting New Bullards Bar Reservoir inflow at under the 1977 monthly volumes for the 90% forecast, and this forecast is continuing to trend lower as each day passes. In 1977, the Downieville station precipitation in the months of January, February and March was just under four inches for each of these months, and totaled just under six inches in May. The May precipitation for 1977 is almost twice the average for May. Currently this January is on track to total less than one inch of precipitation for the month and above average precipitation is not likely in any month in 2014. Lastly, in 1977 the snowpack that existed in January of more than six inches of snow water equivalent together with the monthly precipitation from February through May provided some amount of increased direct runoff and snowmelt runoff for the spring. Currently there is no indication that this type of precipitation or snowmelt can relied upon in 2014.

2.4 North Yuba Index and Conference Year

As described previously, the Yuba Accord flow schedules for required flows at Smartsville and Marysville are determined using the North Yuba Index (NYI), which is the sum of the "active" storage in New Bullards Bar Reservoir at the end of the previous water year plus the inflow to New Bullards Bar for the current water year. Active storage is defined in the index as the previous water year's September 30th storage minus a minimum pool value of 234,000 acre-ft. For the 2014 water year NYI calculation, the September 30, 2013 storage was 549,730 acre-ft, resulting in an active storage of 315.7 thousand acre-ft (TAF). The index is defined in TAF units. For the No Rain hydrology the inflow to New Bullards Bar is estimated at 94.7 TAF, resulting in an NYI value of 410 TAF. The threshold value for a Conference Year is 500 TAF. Therefore, the No Rain hydrology would be a Conference Year. Even using the CNRFC ESP forecasted inflow at the 90% level, the index would still be substantially below the Conference Year threshold of 500 TAF.

3 RESULTING CONDITIONS OF THE NO RAIN HYDROLOGY IF NO ACTION IS TAKEN

3.1 Modeled Conference Year with the No Rain Hydrology

The concept of the Conference Year embodied in the Yuba Accord is to have all years with available water supply, which was defined as the amount of available water in New Bullards Bar Reservoir plus inflow for the current water year, which is exactly what the NYI equals, that were drier than the 1% occurrence of available water (a 1 in 100 year drought) to have a relatively low regulatory minimum instream flow requirements to which additional flows could be added based on additional available water supply. The process to allocate any additional water is to be accomplished through the River Management Team, the group set up in the Yuba Accord Fisheries Agreement to study and help manage the Lower Yuba River. The Conference Year also includes a limit of 250 TAF for lower Yuba River irrigation diversions.

Modeling of the No Rain hydrology results in conditions that are well below the conditions expected for the threshold for a Conference Year, as envisioned in the Yuba Accord. It is estimated that operating the YRDP strictly to the Conference Year flow requirements, and with the imposition of a restriction on irrigation deliveries of more than twice the amounts of the shortages required by the Accord Fisheries Agreement, will result in New Bullards Bar Reservoir reaching

its minimum pool of 234 TAF in the middle of August. It is further estimated that operating solely to the required flows from October 15, 2014 on, with no additional releases for irrigation supply, will result in the storage in New Bullards Bar Reservoir being drawn down to 179 TAF by December 1, 2014.

Given the onerous results of the No Rain Scenario, actions must be taken now to conserve as much water as possible as soon as possible.

3.2 Resulting Flows of the No Action Scenario

Modeling of the No Rain hydrology if no action is taken (referred to here as the "No Action Scenario") shows that flows in the lower Yuba River at the Marysville Gage will be at the required Conference Year level flows from April until the early winter. Under the No Action Scenario, February and March required minimum flows in the river at the Smartsville Gage will not depend upon the Bulletin 120 forecasts that will be released in February and March, because, without any action, the required minimum flows at Smartsville will remain at about 700 cfs for these months because of the flow reduction restrictions in YCWA's FERC license and water-right permits. Even if these requirements are relaxed, without any further actions the required flows in February and March still will be 600 cfs under the FERC license and 550 cfs under YCWA's water-right permits (the requirements for Schedule 5 and 6 years), so the 600 cfs FERC license requirement would control.

Figure 5 shows the modeled flows at the Smartsville Gage for the No Action Scenario with no regulatory changes and the assumption that B-120 will result in Schedule 5 or 6 requirements in February and March and then Conference Year requirements in April. Given the process preparation of the B-120 forecasts, there also is the possibility that a Conference Year would not result from the April forecast. The B-120 is similar to the ESP forecasts in that it assumes average conditions going forward. This tends to make the forecasted runoff in drier years higher than what actually is likely to occur.

Figure 5: Yuba River Required and Resulting Flows at Smartsville for the No Action Scenario

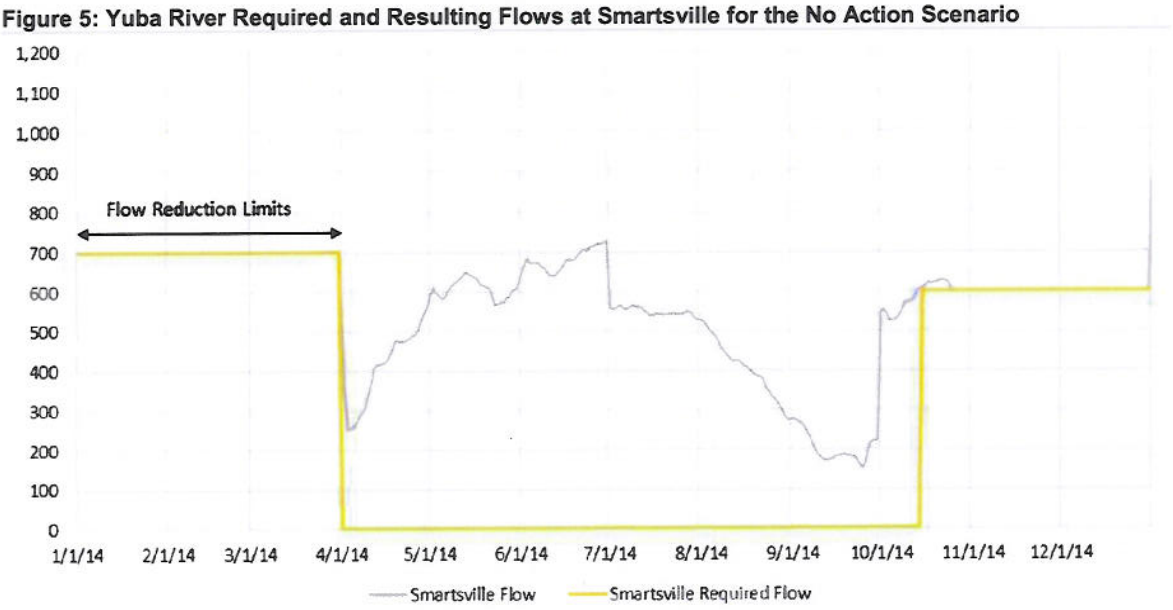
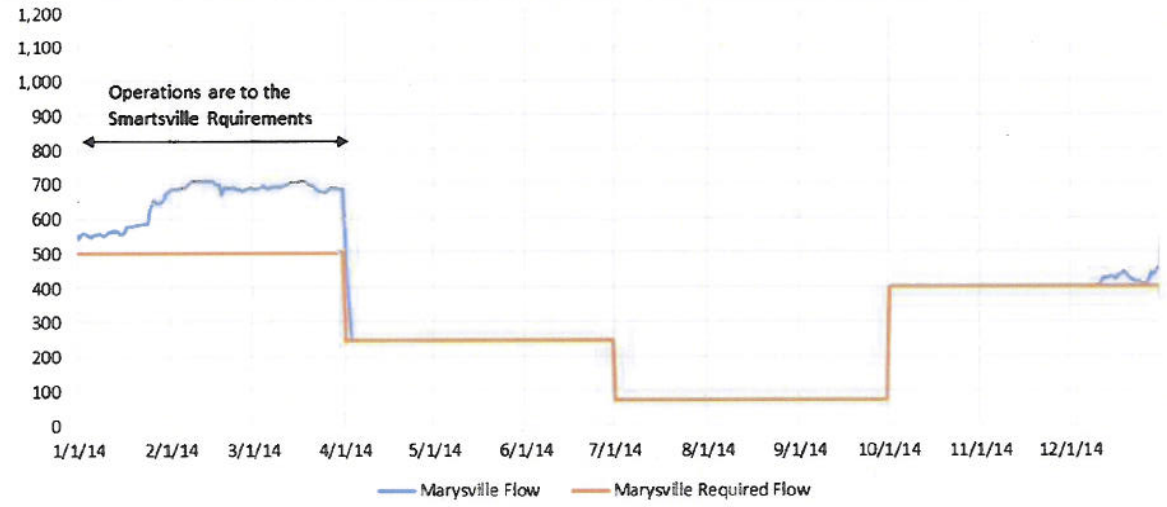


Figure 5 shows that if the flow reduction limits are not modified, then they will require releases sufficient to maintain Smartsville Gage flows at about 700 cfs until April 1. Once those limits end and the Conference Year minimum flow requirements start controlling, the Marysville Gage requirement of 245 cfs will be the compliance flow requirement, because there is no Smartsville Gage requirement after March 31 in the Conference Year schedule. The modeled flow at the Smartsville Gage drops by about 450 cfs for the first of April (or about the 10th of April if a Conference Year does not occur until the April 1 B-120) and ramps back up later in the month as irrigation deliveries increase. Typically in April there would be more irrigation deliveries, but due to irrigation shortages, the modeled irrigation releases for April 2014 diversions are about 50% of normal. The figure also shows that flows will be very low at the Smartsville Gage during the end of August and September as irrigation deliveries recede. Modeled flows increase on October 1, when the Marysville Gage minimum instream requirement increases to 400 cfs. As with the flows in April, modeled irrigation deliveries are severely restricted at this time and releases for these deliveries are much lower than normal.

Figure 6 is a graph of the modeled No Action Scenario resulting flows at the Marysville Gage and the required minimum flows at this location. Modeled flows until April 1 are a result of operations to the Smartsville Gage requirement with minimum irrigation diversions occurring. On the first of April (or by April 10th if the B-120 does not result in a Conference Year until then) modeled operations are to the Marysville Gage requirement and these modeled operations are to meet the requirements at this gage for the remainder of the water year.

Figure 6: Yuba River Required and Resulting Flows at Marysville for the No Action Scenario



3.3 Resulting Storage and Irrigation Deliveries

Figure 7 is a plot of the modeled storage in New Bullards Bar Reservoir for the No Action Scenario that would result from the operations shown in figures 5 and 6. The flood pool and minimum pool are also shown. Figure 7 shows that the minimum pool would be reached in mid-August, that the end of water year storage (on September 30) would 218,444 acre-ft, and that the December 1 storage would be 174,221 acre-ft. The reservoir would continue to drop after December 1, but typically rainfall has started to occur by this date.

Figure 7: New Bullards Bar Reservoir storage for the No Action Scenario

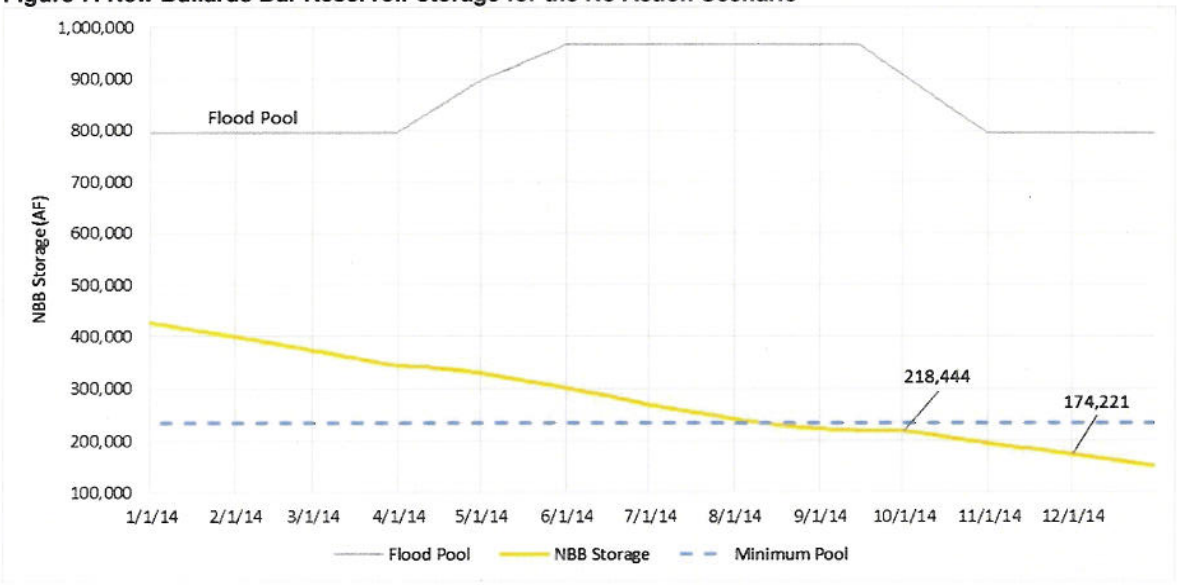
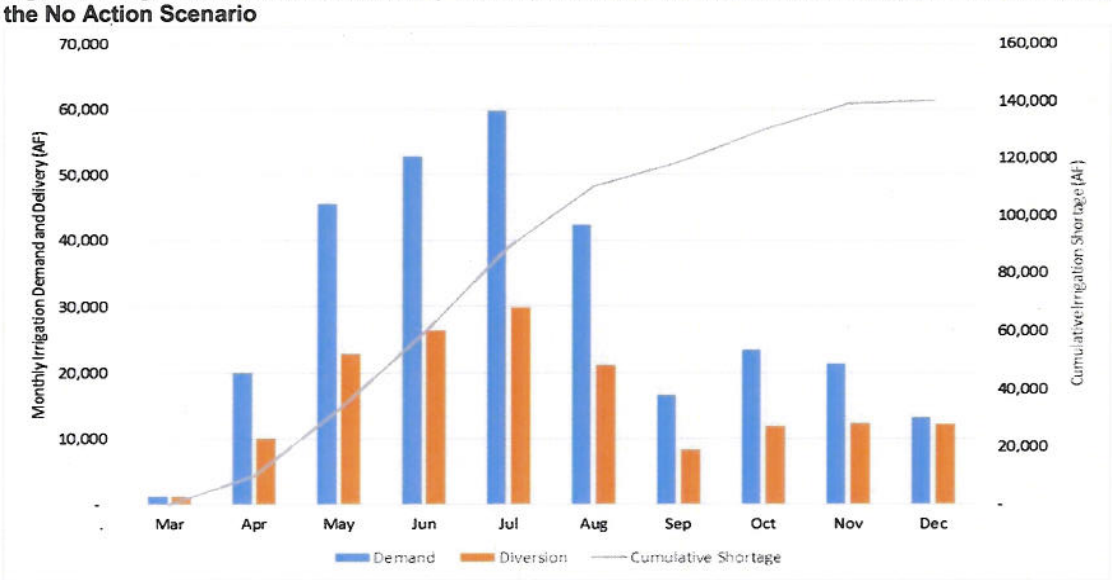


Figure 8 is the modeled irrigation demand, delivery and cumulative shortages for water supplies to the eight YCWA Member Units for 2014 under the No Action Scenario. The modeled total irrigation delivery for 2014 is 155 TAF, which would be 95 TAF less than the maximum delivery in Conference Years that is authorized by the Yuba Accord Fisheries Agreement. The Agreement has a limit on Yuba River surface water deliveries in a Conference Year of 250 TAF. The modeled cumulative shortage for April through December is more than 140 TAF and is more than twice the shortage anticipated for Conference Years in the Fisheries Agreement under present conditions. The modeled demand and resulting cumulative shortage amount may actually be underestimated for 2014, because the modeled demand is for an average dry year and in 2014, due to extremely dry soil conditions, irrigation demands may be higher than those assumed for the analysis.

Figure 8: Irrigation Demand and Delivery Monthly Volumes and Cumulative Irrigation Delivery Shortages for the No Action Scenario



4 PROPOSED PLAN OF ACTION

YCWA's proposal takes into account several conditions that need to be addressed to provide a more proactive plan for managing water supplies and flows for the lower Yuba River in 2014. First, given the uncertainties of the B-120 forecasts for February, March and possibly April, when it is clear that a Conference Year will eventually be in place with continued dry conditions, water should be conserved now by immediately shifting to the Conference Year and instream flow requirements that YCWA is proposing for the spring. Implementing this shift to Conference Year and the requested requirements now will results in lower, but more stable releases in the spring and will increase the possibility of shaping releases later in the year if some additional water is available from runoff. Even if only the runoff assumed in the No Rain hydrology occurs, saving some water in the spring will help to reduce the drawdown of New Bullards Bar Reservoir in the late summer, helping to improve release temperatures at that time. In addition, YCWA proposes to use some of the saved water to increase flows in April to alleviate the sharp reduction of flows that would occur in the No Action Scenario, as shown in Figures 5 and 6.

4.1 Resulting Flows of the Planed Actions with the No Rain Hydrology

As shown in figure 5, the graph of the estimated flows at the Smartsville Gage under the No Action Scenario these flows would have to be maintained at almost 700 cfs during February and March, as required by the flow reduction restrictions, and then would sharply drop on April 1. Instead of following the No Action Scenario, YCWA proposes to implement a more stable flow at 500 cfs in the lower Yuba River from Englebright Dam to Daguerre Point Dam (measured at the Smartsville Gage) as soon as YCWA's requests are approved. This flow rate then will remain until irrigation deliveries require higher flows at the Smartsville Gage sometime in mid to late April. This plan will save some water in February and March and then use some of that water to increase flows in April.

For Yuba River flows below Daguerre Point Dam (measured at the Marysville Gage), YCWA proposes to maintain the Schedule 6 flow requirement of 350 cfs from now until April 1 (even though under the Conference Year proposal only 245 cfs would be required). Then, on April 1, the Conference Year requirement of 245 cfs would begin. Any possible changes to instream flows and any possible additional releases to augment flows for the remainder of the water year, can be determined only after the hydrology is more certain.

Figure 9 shows the modeled flows and required flows at the Smartsville Gage for the YCWA Proposed Plan with the No Rain hydrology. This figure shows that, by temporarily eliminating the flow reduction requirements for 2014 that are currently in effect from now through March 31, and by transitioning to the requested required flow of 500 cfs at the Smartsville Gage, there will be a 200 cfs flow reduction, which is assumed would occur on about February 1, and that there then would be stable flows until late April when irrigation deliveries will require higher releases. This approach will eliminate the dip in flows of about 450 cfs at the beginning of April that would occur under the No Action scenario. The dip in flows will be mitigated by using the saved water in February and March for added flows in April.

Figure 9: Yuba River Required and Resulting Flows at Smartsville for the Proposed Plan

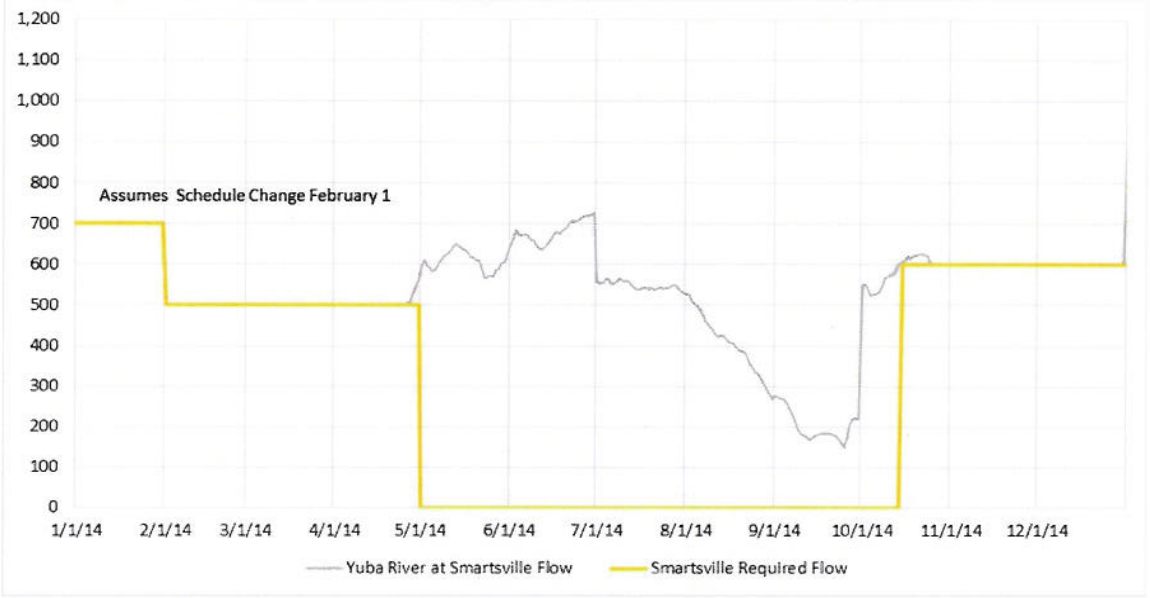
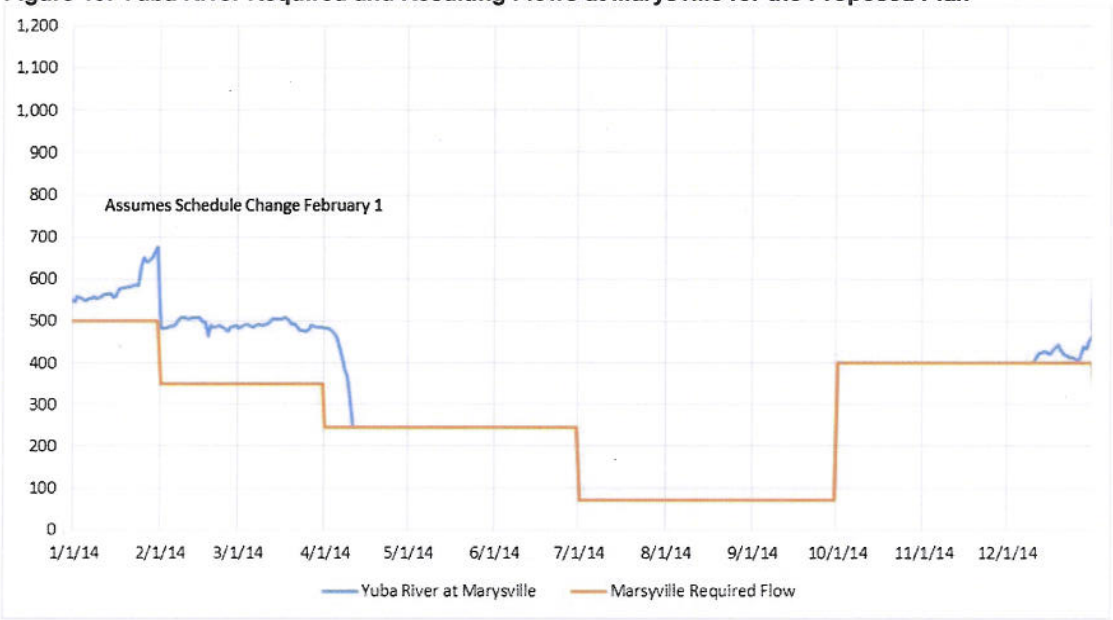


Figure 10 is the modeled resulting flow and required flow at the Marysville Gage for the YCWA Proposed Plan with the No Rain hydrology. The modeled flows at the Marysville Gage trend upward in late January as irrigation diversions for soil moisture maintenance of permanent crops and rice stubble decomposition and water fowl habitat recede. If conditions stay dry, then flows at this gage will likely remain relatively stable as the winter diversions continue, until the requested flow reduction to 500 cfs at Smartsville in early February results in a flow reduction of about 200 cfs at Marysville.

Figure 10: Yuba River Required and Resulting Flows at Marysville for the Proposed Plan



4.2 Resulting Storage and Irrigation Deliveries

Figure 11 is a plot of modeled storage in New Bullards Bar Reservoir for the YCWA Proposed Plan with the No Rain hydrology that will result from the modeled flows shown in figures 9 and 10. The flood pool and minimum pool are also shown.

Figure 11 shows that the minimum pool will be reached in early October, a month and a half later than under the No Action Scenario, that the end of water year storage will be 236,162 acre-ft, and the December 1 storage will be 191,901 acre-ft. The reservoir will continue to drop after December 1, but typically rainfall has started to occur by this time. The water savings under the YCWA Proposed Plan for the reduced flows in February and March that is not used in April to improve conditions during that month will result in increased storage at the end of the water year of about 17 TAF (compared to the No Action Scenario).

Figure 11: New Bullards Bar Reservoir storage for the YCWA Proposed Plan

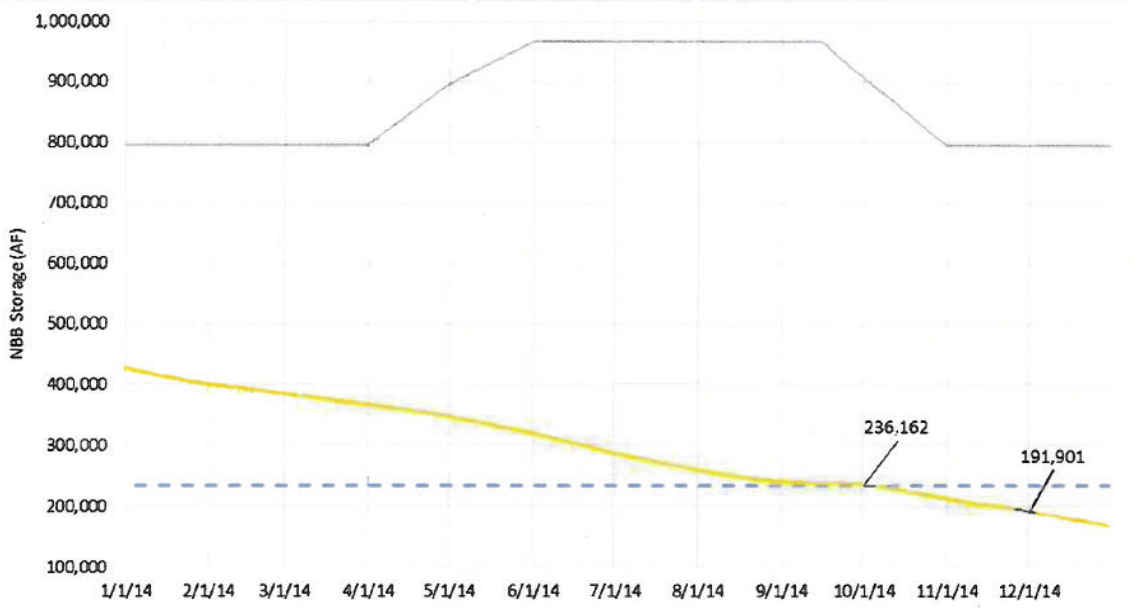
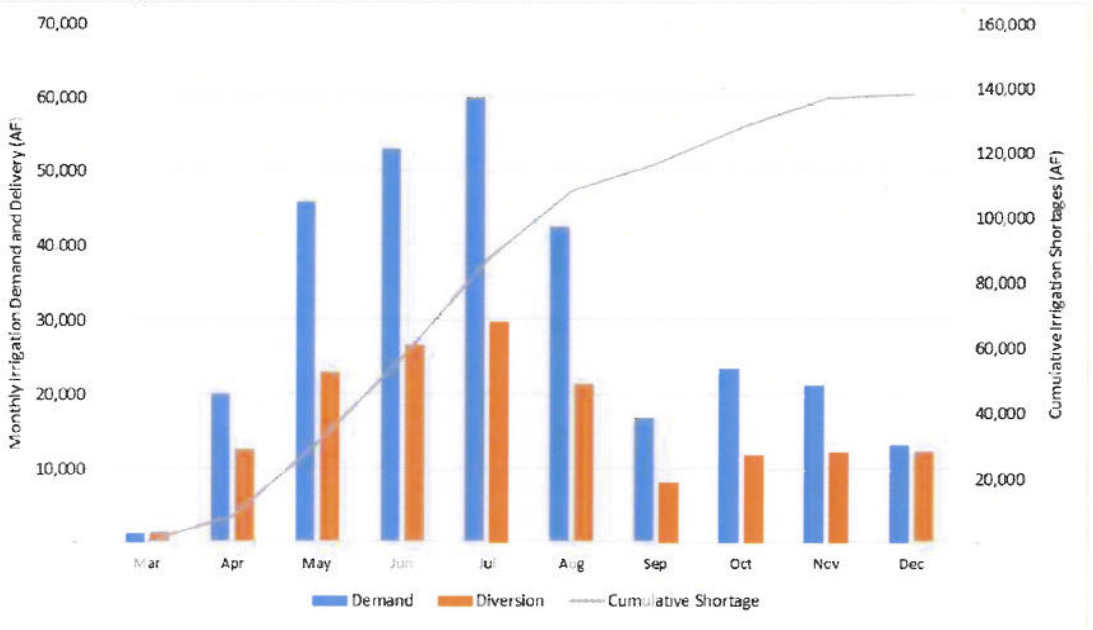


Figure 12 is the modeled irrigation demand, delivery and cumulative shortages for water supplies to the eight YCWA Member Units for 2014 under the YCWA Proposed Plan with the No Rain hydrology. The total modeled irrigation delivery for 2014 is almost identical to the modeled delivery under the No Action Scenario. This is because none of the water savings from the proposed spring flow reductions will be used for additional irrigation deliveries. Instead, these savings will be used to improve April flows and carryover storage.

Figure 12: Irrigation Demand and Delivery Monthly Volumes and Cumulative Irrigation Delivery Shortages for the YCWA Proposed Plan



5 SUMMARY

Table 1 lists the controlling minimum flow requirements under two scenarios, the No Action Scenario and the YCWA Proposed Plan, both with a "No Rain" hydrology. The No Action Scenario assumes that a Conference Year will be in effect beginning on April 10, when the April B-120 is released (modeled as beginning on April 1). There is the possibility that, due to the method of calculating forecasted runoff for the B-120, a Conference Year actually would not result until May, and this would require that 10 TAF more water be released to meet higher flow requirements. However, that condition is not assessed in this analysis. The No Action Scenario assumes that the flow reduction criteria would remain in effect until March 31 and that the B-120 forecast then would result in a Schedule 6 (having been triggered by the February or March B-120), and that Schedule 6 then would remain in effect until April 10th, when a Conference Year would result from the April B-120.

The YCWA Proposed Plan will provide for regulatory relief from the flow reduction criteria and for the Conference Year requirements to be imposed immediately, with 500 cfs being required at the Smartsville Gage for February through April and the Schedule 6 flow requirements for the Marysville Gage of 350 cfs for February and March, and then the Conference Year flow requirement of 245 cfs beginning in April. The change to Conference Year requirements is being requested only until May 15th, at which time the May 1 B-120 will have been released and will be used for the calculation of the NYI and resulting flow schedule designation. With continued dry conditions, this designation will be for a Conference Year.

Table 1: No Action and YCWA Proposed Plan Yuba Accord Schedules by Month

Scenarios	February	March	April*	May	June	July	August	September	October	November
No Action	FRC	FRC	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year
Proposed	Conf. Year/500	Conf. Year/500	Conf. Year/500	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year	Conf. Year

**From April 1 to April 10 prior months Schedule is in effect with B-120 released on the 10th.*
FRC means Flow Reduction Criteria
Proposal includes 500 cfs Smartsville February through April 30 and 350 cfs Marysville February through March 31

Table 2 lists the controlling flow requirements for February through November 2014 with the No Action scenario and the YCWA Proposed Plan. Generally, the requirement at the Smartsville Gage will govern until mid-April and then the Marysville Gage requirement will govern releases until mid-October.

Table 2: No Action and YCWA Proposed Plan Scenarios Yuba Accord Schedule Required Flows by Month

Control:	*SMV*	*SMV*	*Both**	*MRY*	*MRY*	*MRY*	*MRY*	*MRY*	*Both**	*MRY*
Scenarios	February	March	April	May	June	July	August	September	October	November
No Action	683	683	600/500	245	245	70	70	70	350/600	600
Proposed	500	500	500/245	245	245	70	70	70	350/600	600

Notes: Controlling refers to which flow requirement controls releases from Englebright Dam, SMV – Smartsville and MRY – Marysville. "Both" for April means the Smartsville requirement controls for the first half of the month and Marysville for the second half and for October means Marysville requirement controls for the first half of the month and Smartsville requirement for the second half.

Table 3 is a summary of monthly required flows for the controlling location for the No Action scenario and the YCWA Proposed Plan. The table shows the water savings of over 21 TAF for February and March and 5 TAF of that savings is used in April under the YCWA Proposed Plan in comparison to the No Action Scenario. The remainder of the saved water will used to increase the end of the water year storage in New Bullards Bar Reservoir.

Table 3: No Action and Proposed Scenarios Yuba Accord Schedule Required Release Volume by Month

Scenarios	February	March	April	May	June	July	August	September	October	November
No Action	37,932	41,996	14,579	15,064	14,579	4,304	4,304	4,165	29,455	35,702
Proposed	27,769	30,744	19,636	15,064	14,579	4,304	4,304	4,165	29,455	35,702
Difference	10,163	11,252	(5,058)	-	-	-	-	-	-	-

Under the most severe conditions anticipated, and without any action, Conference Year flows will eventually be needed and will result from the Bulletin 120 forecasts and the ensuing calculation of the NYI. Under these conditions, springtime flow will include significant fluctuations, irrigation deliveries to YCWA Member Units will be severely restricted, and storage in New Bullards Bar Reservoir will reach minimum pool by August. Because of these severe drought conditions, all reasonable efforts to conserve water are being pursued, including the YCWA Proposed Plan. This

plan will save water during the months of February and March and use this water to create stable flows in April in the reaches of the Yuba River above Daguerre Point Dam and to bolster storage in New Bullards Bar Reservoir to improve water temperature conditions later in the year and add to carryover storage for 2015. Any changes to flows and any additional releases to augment flows for the remainder of the water year after May can only be determined after the hydrology is more certain. This planning will be done by YCWA and the River Management Team as more information about specific water conditions becomes available, as envisioned in the Yuba Accord.