

# East Fork Russian River Water Availability

Review of Preliminary Analysis and Modeling – June 6, 2022



# Presentation Overview

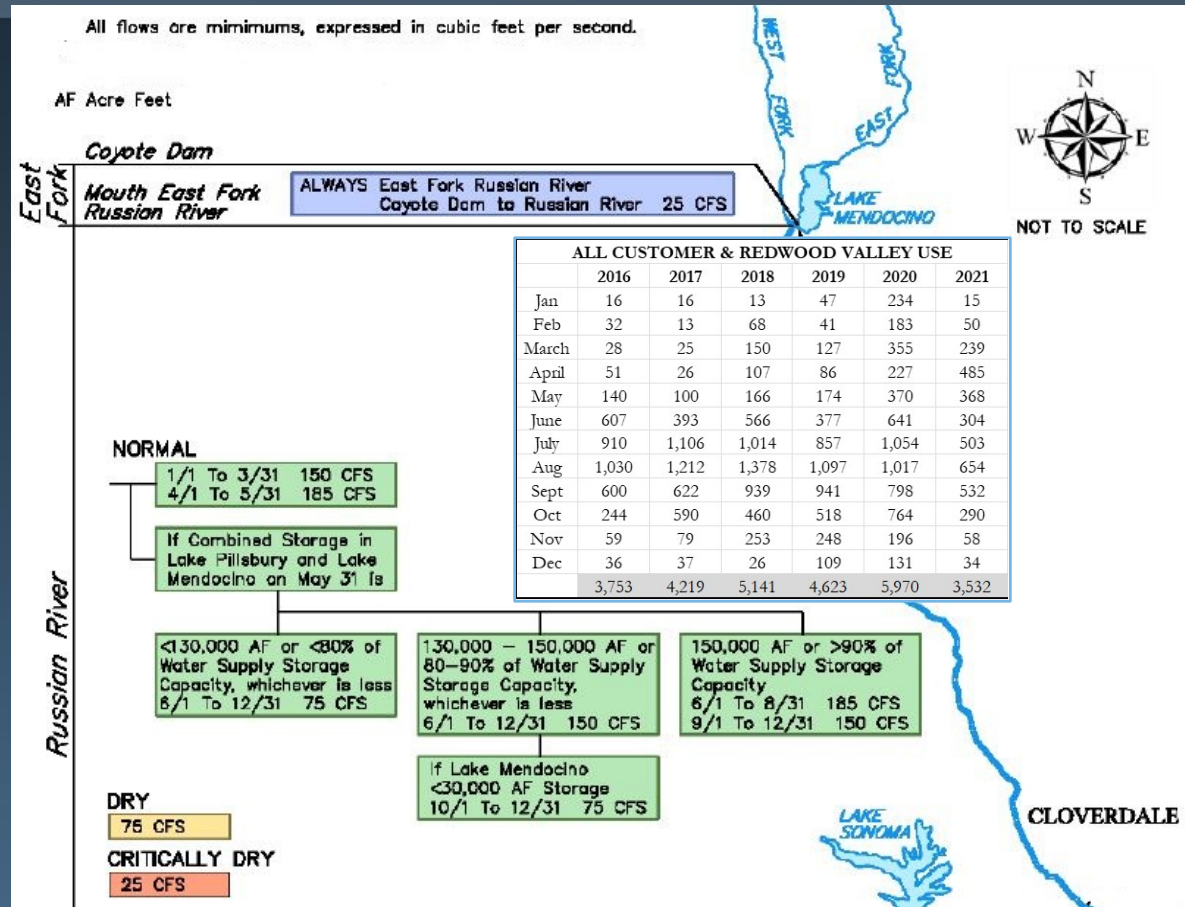
- ❖ Opportunity for Increasing Diversions
- ❖ Modeling Framework
- ❖ Modeling of Additional Diversions
  - Historical Conditions Basis
  - Updated Minimum Flow Basis
  - FIRO Basis
- ❖ Potter Valley Project
- ❖ Discussion and Next Steps



Figure 1.2 from the Lake Mendocino FIRO FVA

# Opportunity for Increasing Diversions

- ❖ Minimum flow requirements apply to the river by segment
  - 25 cfs must always be released from Lake Mendocino
  - West Fork natural flows often satisfy the upper river requirement
- ❖ Changes in minimum flow and reservoir operations could be quite favorable
- ❖ Current water rights have not been fully utilized



Adapted from Figure 1 in the 2008 Biological Opinion with inset of recent use statistics from RRFC

# Modeling Framework

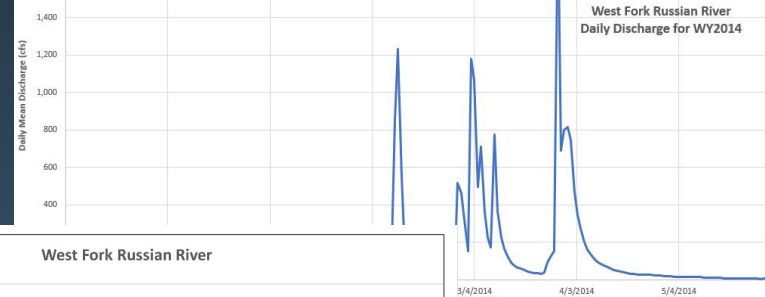
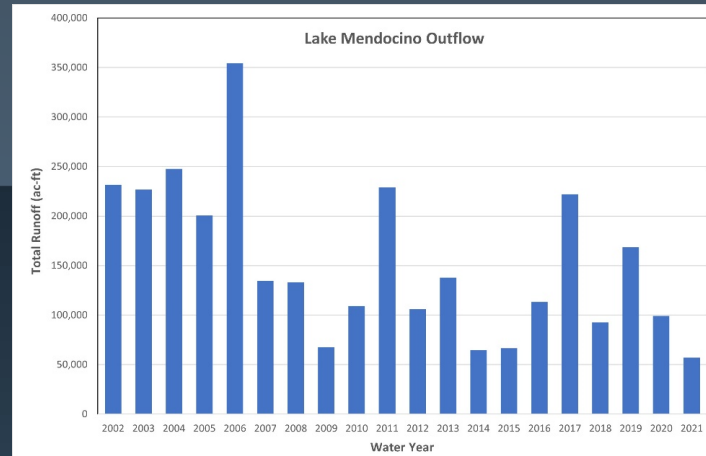
- ❖ Daily time step model for diversion upstream of Talmage
- ❖ 20-year continuous simulation period from WY2002 to WY2021
- ❖ Time step and study period selected to capture variability within each year and between years
- ❖ Upstream inflows:
  - Lake Mendocino outflow
  - West Fork Russian River
- ❖ Control points for minimum flow compliance tracking:
  - Upper river at Talmage, Hopland, Cloverdale and Healdsburg
  - Lower river at Guerneville



Adapted from Figure 1.2 from the Lake Mendocino FIRO FVA

# Historical Conditions Modeling

- ❖ Model runs completed with actual past minimum flow criteria (including TUCOs)
- ❖ USGS gage data used for all control points → all past diversions implicitly accounted for
- ❖ Diversion rates of 10, 15, and 20 cfs explicitly modeled
- ❖ Diversion limited to “pass-through” reservoir outflow only
- ❖ Minimum flow “buffered” and diversion limited to periods where greater than 4 cfs available



# Results Based on Historical Conditions

- ❖ Substantial potential additional diversions at all diversion rates
- ❖ Total diverted does not quite double with a doubling of the diversion rate
- ❖ Average for the latter 10-year period (WY12 to WY21) is approximately 10% below the overall average
- ❖ Diversion opportunities greatest in the December to April period with February and March the best months
- ❖ Little potential for June through September (particularly recently)

Distribution table for 20 cfs maximum diversion rate

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2002	860	1,030	1,230	1,230	1,110	1,230	1,190	1,230	860	630	190	240	11,030
2003	600	150	750	1,230	1,110	1,230	1,190	1,230	800	900	900	1,130	11,220
2004	700	1,190	1,190	1,230	1,150	1,230	1,190	1,150	1,120	520	350	480	11,500
2005	770	1,190	1,230	1,190	1,110	1,230	1,190	1,230	1,190	980	1,050	990	13,350
2006	1,020	600	1,110	1,230	1,110	1,230	1,190	1,230	670	620	950	40	11,000
2007	590	1,190	990	1,230	1,110	1,230	1,190	720	90	490	70	250	9,150
2008	1,190	1,190	1,080	1,230	1,150	1,230	1,070	310	440	290	410	890	10,480
2009	410	950	1,180	490	780	1,230	1,190	1,000	1,080	1,230	1,130	1,190	11,860
2010	330	960	950	860	1,110	1,230	1,190	1,230	1,190	950	800	690	11,490
2011	670	1,070	1,230	1,230	1,110	1,230	1,190	1,230	380	100	80	1,040	10,560
2012	1,200	1,160	840	750	1,100	1,230	1,190	620	160	310	300	470	9,330
2013	680	1,010	1,110	1,190	1,110	1,230	860	280	170	150	370	570	8,730
2014	330	640	830	320	830	1,230	590	500	490	180	540	280	6,760
2015	330	250	1,230	1,230	1,110	930	180	70	610	970	1,120	900	8,930
2016	1,000	300	820	1,160	1,150	1,230	1,190	240	0	10	570	290	7,960
2017	800	970	1,160	1,230	1,110	1,230	1,190	1,230	750	420	610	610	11,310
2018	900	970	370	1,000	450	1,230	1,190	470	250	1,060	990	770	9,650
2019	1,050	580	1,060	1,160	1,110	1,230	1,190	1,230	1,040	230	490	620	10,990
2020	690	1,050	1,230	1,080	1,110	1,010	640	130	80	320	1,040	1,000	9,380
2021	1,130	1,190	1,230	1,230	1,110	1,220	730	70	80	0	190	10	8,190
Avg 02-11	710	950	1,090	1,120	1,090	1,230	1,180	1,060	780	670	590	690	11,160
Avg 12-21	810	810	990	1,040	1,020	1,180	900	480	360	370	620	550	9,120

Water Year	Total Potential Diversion (ac-ft)		
	10 cfs	15 cfs	20 cfs
<b>Average</b>	<b>5,550</b>	<b>7,970</b>	<b>10,140</b>

0-300	acre-feet/month
300-600	acre-feet/month
600-900	acre-feet/month
900+	acre-feet/month



## Results Based on Historical Flows with Updated Criteria

- ❖ Results here are “hypothetical” because past reservoir outflows are used. If the minimum flow criteria change, then reservoir operations will need to change as well
- ❖ Essentially across the board increase in potential additional diversions
- ❖ At a 20 cfs diversion rate the average additional over the study period increases by approximately 31% to 13,240 acre-feet
- ❖ Trends within each year and across years are generally the same

<b>Water Year</b>	<b>Total Potential Diversion (ac-ft)</b>		
	<i>10 cfs</i>	<i>15 cfs</i>	<i>20 cfs</i>
<b>2002</b>	6,630	9,900	13,170
<b>2003</b>	7,140	10,680	14,200
<b>2004</b>	7,220	10,810	14,340
<b>2005</b>	7,180	10,770	14,360
<b>2006</b>	7,240	10,860	14,480
<b>2007</b>	6,710	9,800	12,740
<b>2008</b>	7,240	10,860	14,470
<b>2009</b>	7,090	10,580	13,990
<b>2010</b>	7,240	10,860	14,460
<b>2011</b>	6,910	10,330	13,560
<b>2012</b>	6,890	10,260	13,580
<b>2013</b>	7,140	10,710	14,260
<b>2014</b>	5,610	8,280	10,830
<b>2015</b>	6,920	10,260	13,430
<b>2016</b>	6,990	10,160	12,790
<b>2017</b>	7,230	10,780	14,210
<b>2018</b>	6,980	10,340	13,590
<b>2019</b>	5,870	8,680	11,400
<b>2020</b>	7,100	10,550	13,880
<b>2021</b>	3,770	5,450	7,110
<b>Average</b>	<b>6,760</b>	<b>10,050</b>	<b>13,240</b>



# Forecast Informed Reservoir Operations

- ❖ Lake Mendocino is the focus of some of the most advanced FIRO study and implementation in the nation
- ❖ Lake Mendocino and the Russian River are ideal locations for FIRO
- ❖ Modeling updated to include hypothetical FIRO control over the study period with the proposed 2016 permit application flow requirements
- ❖ Updated model uses the Modified Hybrid guide curve with the winter control pool at 80,000 acre-feet and spring ramp up beginning on February 15

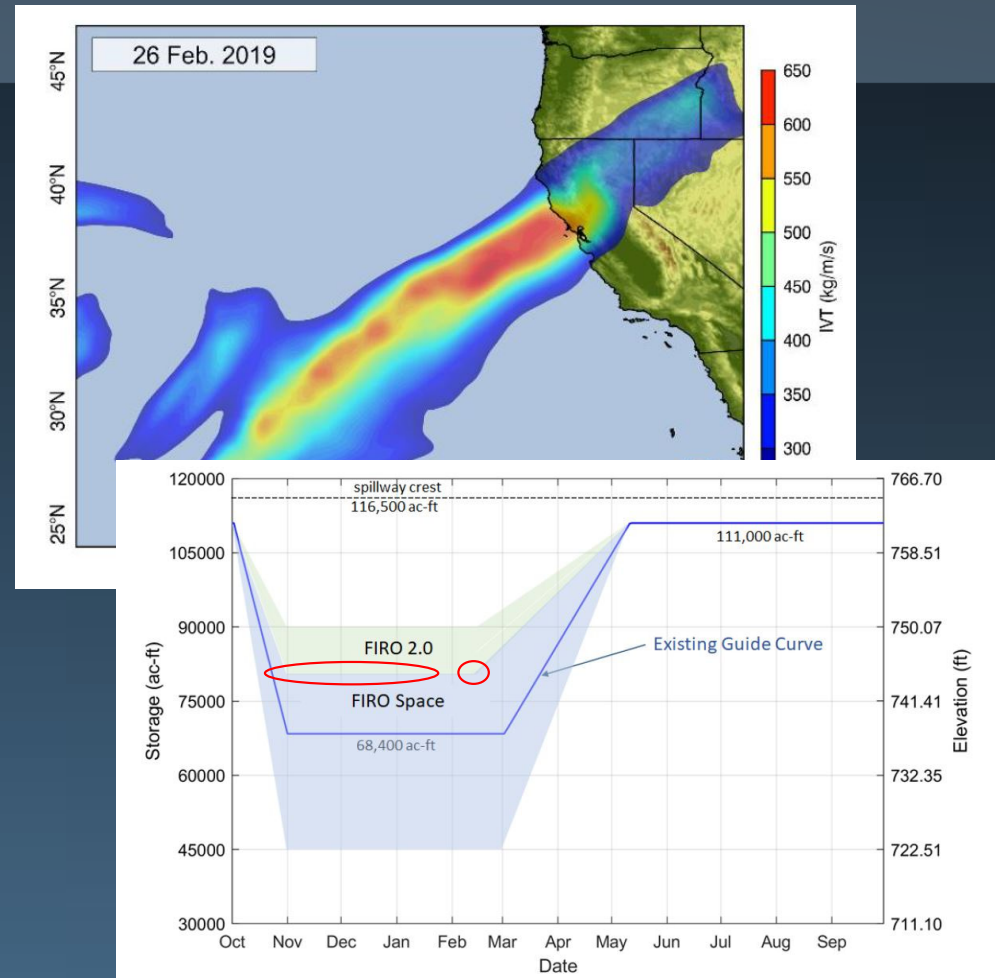


Figure excerpts from the Lake Mendocino FIRO FVA with annotation

# Results Based on Updated Minimum Flows + FIRO

- ❖ Overall potential increased diversions are quite similar to those with updated minimum flows only
- ❖ At a 20 cfs diversion rate the average additional over the study period increases by approximately 34% to 13,590 acre-feet
- ❖ Diversion potential is much more uniform across months and across years
- ❖ Much lower decrease in potential diversions in the latter 10-year period (only 4% lower)
- ❖ This is an idealized FIRO case!

Distribution table for 20 cfs maximum diversion rate

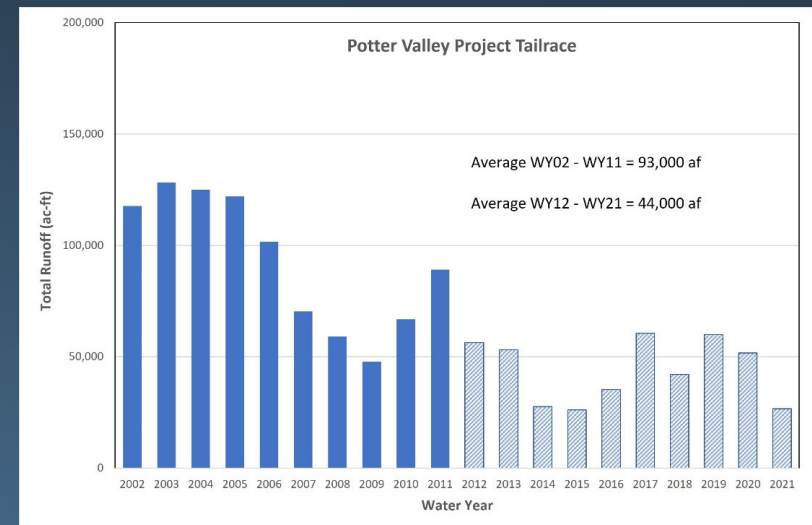
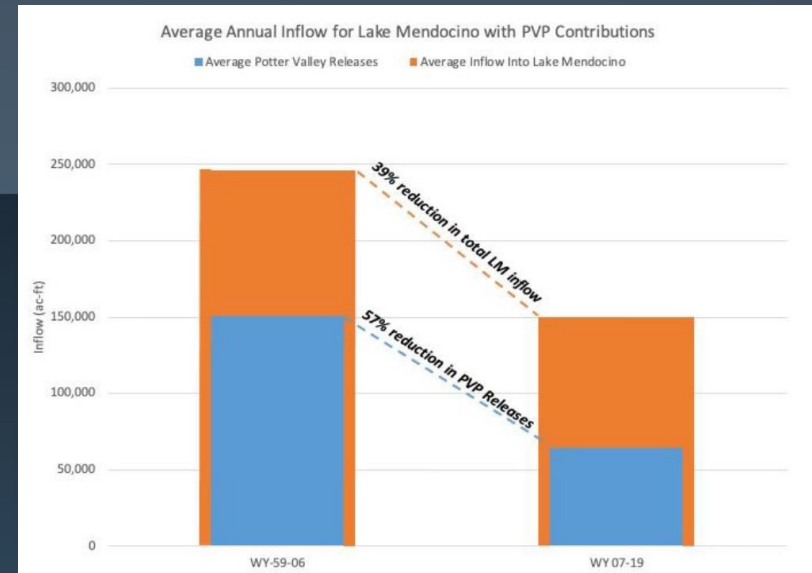
WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2002	170	520	1,230	1,230	1,110	1,230	1,190	1,230	1,190	1,220	1,210	1,150	12,680
2003	1,220	1,180	1,200	1,230	1,110	1,230	1,190	1,230	1,190	1,220	1,230	1,190	14,420
2004	1,230	1,190	1,190	1,230	1,150	1,230	1,190	1,230	1,190	1,230	1,190	1,190	14,440
2005	1,220	1,190	1,230	1,190	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,150	14,390
2006	1,230	1,190	1,230	1,230	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,190	14,480
2007	1,230	1,190	990	1,230	1,110	1,230	1,190	1,230	1,150	1,230	1,230	1,190	14,200
2008	1,230	1,190	1,210	1,230	1,150	1,230	1,180	1,230	1,150	1,230	1,230	1,190	14,450
2009	1,230	1,190	1,210	1,230	1,090	1,230	1,190	1,230	1,190	1,230	1,230	1,190	14,440
2010	1,220	1,190	1,140	1,230	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,180	14,370
2011	690	1,070	1,230	1,230	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,190	13,820
2012	1,150	1,190	1,230	1,230	1,150	1,230	1,190	1,230	1,190	1,230	1,190	1,150	14,360
2013	1,230	1,190	1,070	1,190	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,170	14,260
2014	1,110	1,140	1,090	800	920	1,220	1,130	1,060	840	830	950	880	11,970
2015	650	780	1,230	1,180	1,050	1,170	1,190	1,230	1,190	1,190	1,190	1,120	13,170
2016	1,140	950	1,090	1,230	1,150	1,230	1,190	1,230	1,190	1,230	1,220	1,190	14,040
2017	1,230	1,190	1,230	1,230	1,110	1,230	1,190	1,230	1,190	1,230	1,230	1,190	14,480
2018	1,220	1,190	1,030	1,190	1,110	1,230	1,190	1,230	1,180	1,230	1,230	1,190	14,220
2019	1,230	1,190	1,230	1,230	1,110	1,230	1,190	1,230	1,190	1,230	1,200	1,190	14,450
2020	1,230	1,190	1,230	1,230	1,130	1,090	760	750	670	920	730	430	11,360
2021	820	750	630	1,170	1,110	1,050	600	460	390	200	360	230	7,770
Avg 02-11	1,070	1,110	1,190	1,230	1,120	1,230	1,190	1,230	1,180	1,230	1,220	1,180	14,170
Avg 12-21	1,100	1,080	1,110	1,170	1,100	1,190	1,080	1,090	1,020	1,050	1,050	970	13,010

Water Year	Total Potential Diversion (ac-ft)		
	10 cfs	15 cfs	20 cfs
<b>Average</b>	<b>7,020</b>	<b>10,360</b>	<b>13,590</b>

0-300	acre-feet/month
300-600	acre-feet/month
600-900	acre-feet/month
900+	acre-feet/month

# Potter Valley Project Considerations

- ❖ Potter Valley Project inflow to Lake Mendocino is very substantial (39% of long-term flows)
- ❖ For this study period PVP inflow is more than halved in the latter 10-year period
- ❖ Initial model runs were started, but stopped due to numerous subjective criteria and need to consider the value given the complexity
- ❖ Clearly some PVP inflow is critical to the overall function of the Russian River system



## Discussion and Next Steps

- ❖ Identify preferred focus of continued modeling
- ❖ Continue to refine the modeling and expand as necessary (i.e., model the disposition of additional diversions)
- ❖ Complete ongoing tabulation of all existing rights to put potential additional diversions in context
- ❖ Continue praying for an end to the drought but be prepared if it's a long time coming

