

# RECLAMATION

*Managing Water in the West*

## Presentation to SWRCB Periodic Review Topic #8



U.S. Department of the Interior  
Bureau of Reclamation

# SWRCB Periodic Review

## Topic #8

- Part A – Concerns with 1999 SWRCB EIR analysis.
- Part B – Concerns with San Joaquin River Base-flow Construct.
- Part C – New San Joaquin Basin Representation.
- Part D – New Melones Interim Plan of Operation (NMIPO) and sensitivity to new analysis data.

Part A – Concerns with 1999  
SWRCB EIR analysis.

# Nov. 1999 EIR for Implementation of the Bay/Delta WQCP

- Significant flaw in the analysis used to support implementation of the SJR flow objectives.
- Page A3-4 quantifies the need for “Supplemental Water for Vernalis Objective (Add(3))”
- This water is commonly known as “Add Water” or “Magic Water”

# Significance of “Add Water”

- Add water is fictitious water – not produced by rainfall, groundwater or water re-allocation.
- Add water was simply added to the simulation to quantify the shortage toward meeting a desired objective.

# Add Water and SJR Water Balance

- No significant reservoir management change occurred to produce the add water or the desired objective.
- Therefore, no change to the environment or changes to reservoir system beneficial use objectives was reasonably evaluated.
- Total water budget and balance of water objectives for the SJR basin is misrepresented by this approach.

# Stanislaus River Water Budget

- Reclamation has current responsibility for Feb. to June San Joaquin River base flow objective.
- New Melones water-right based obligations also include
  - 1987 DFG Fishery Agreement
  - W.R. Stipulation supplies for Oakdale and SSJID water districts
  - Stanislaus River Dissolved Oxygen standard
  - San Joaquin River Salinity standard at Vernalis.
  - Remaining CVP Yield is available for CVP water supply contracts and CVPIA Implementation.

# Stanislaus River and NMIPO

- Based on the numerous obligations attributable to the Stanislaus River and the New Melones Project, a risk management assessment was conducted and the NMIPO was adopted.
- (NMIPO) analysis demonstrated that the project could not satisfy all water-right obligations due to a lack of long-term water supply.



# Stanislaus River and NMIPO

- If the project were to satisfy the “add water” required to meet the SJR base flow objectives then,
  - During an extended dry or drought sequence New Melones water supply would ultimately reach crisis management for all water-right based objectives due to lack of water supply.

# Stanislaus River and NMIPO

- The NMIPO limits the water supply to meet the SJR base flow to years in which the overall water supply at New Melones Reservoir is adequate to manage (balance) the risk to long-term commitments.
- Per NMIPO, New Melones Mar. 1 storage plus forecasted Mar. to Sept. Inflow needs to be greater than 2.5 MAF in order to manage the long-term risk.

# Reclamation Temporary Urgency Petitions

- The basis for Reclamation's temporary urgency requests to the SWRCB regarding SJR base-flow objectives has been the long-term risk to New Melones water supply obligations.

# Part B – Concerns with San Joaquin River Base-flow Construct.

# Concerns with current San Joaquin River Base-flow objective Construct

- The linkage to the X2 standard construct
- San Joaquin River seasonality of flow
- Potential fishery management conflict

# SJR Base Flow X2 Linkage

- Current San Joaquin River base-flow objective is directly linked to the X2 requirement which is highly influenced by runoff conditions in the Sac. Valley.

60-20-20 San Joaquin Basin Yeartype @ 75% Exceedence  
Monthly Flow Objective (CFS)

	W	AN	BN	D	C
X2 Chipps Standard					
Required # Days	3420	3420	2280	2280	1140
Not Required # Days	2130	2130	1420	1420	710

Sample Calculation

1) BN Year

2) February X2 standard requires 20 days @ Chipps

$(20 \times 2280 + 8 \times 1420) / 28 = 2034$  cfs Monthly flow objective at Vernalis

$(2034 \times 80\%) = 1627$  Minimum 7-day flow average at Vernalis

# SJR Base Flow X2 Linkage

- X2 proportional basis of current SJR standard

Hydrologic basis of San Joaquin River base flow objective  
Expressed as % of X2 Delta outflow equivalent

X2 Req. standard	W	AN	BN	D	C
Higher Chipps Std.	30%	30%	20%	20%	10%
Lower Confluence Std.	30%	30%	20%	20%	10%

X2 delta outflow equivalent by location

Location	Delta outflow (cfs)
Chipps	11400
Confluence	7100

# SJR flow seasonality

- The San Joaquin River basin is a snowmelt-dominant basin as opposed to the Sacramento basin which produces significant rain-flow runoff events.
- This is verified by the 60-20-20 index structure for the San Joaquin Basin, where 60% is the April-July snowmelt parameter.
- The current construct does not recognize the San Joaquin River seasonality.



# Potential Fishery management conflict

- Upstream Fishery management vs. Downstream (Vernalis) Fishery management.
- If short-term hydrologic conditions are dry, an increase in reservoir release(s) may be required to maintain Vernalis flow objective.
- When short-term hydrologic conditions change (ie. Rain and creek flows), the increased reservoir release(s) is no longer needed to maintain Vernalis flow objective.

# Potential Fishery management conflict

- This operation can cause substantial flow fluctuations at reservoir release location(s).
- Reservoir release flow fluctuations could be detrimental to same fishery as the flow objective is designed to protect.
- Analysis with monthly models does not capture the significant inter-month implication of the current Vernalis flow construct, but will be a real-time fishery management tradeoff.

# Part C – New San Joaquin Basin Representation

# New San Joaquin Basin Analysis

- Over the last 3 years Reclamation has funded San Joaquin Basin expert consultants to update and refine CALSIM II:
  - hydrology dataset.
  - water quality assessment methodology.
  - reservoir operations

# New San Joaquin Basin Analysis

- New and recently completed CALSIM II portrayal of the interactions of reservoir operations, hydrology and water quality is very different than previous analyses.
- Other agencies and stakeholders are just recently getting an opportunity to review and assess significance of these CALSIM II changes.

# New San Joaquin Basin Analysis

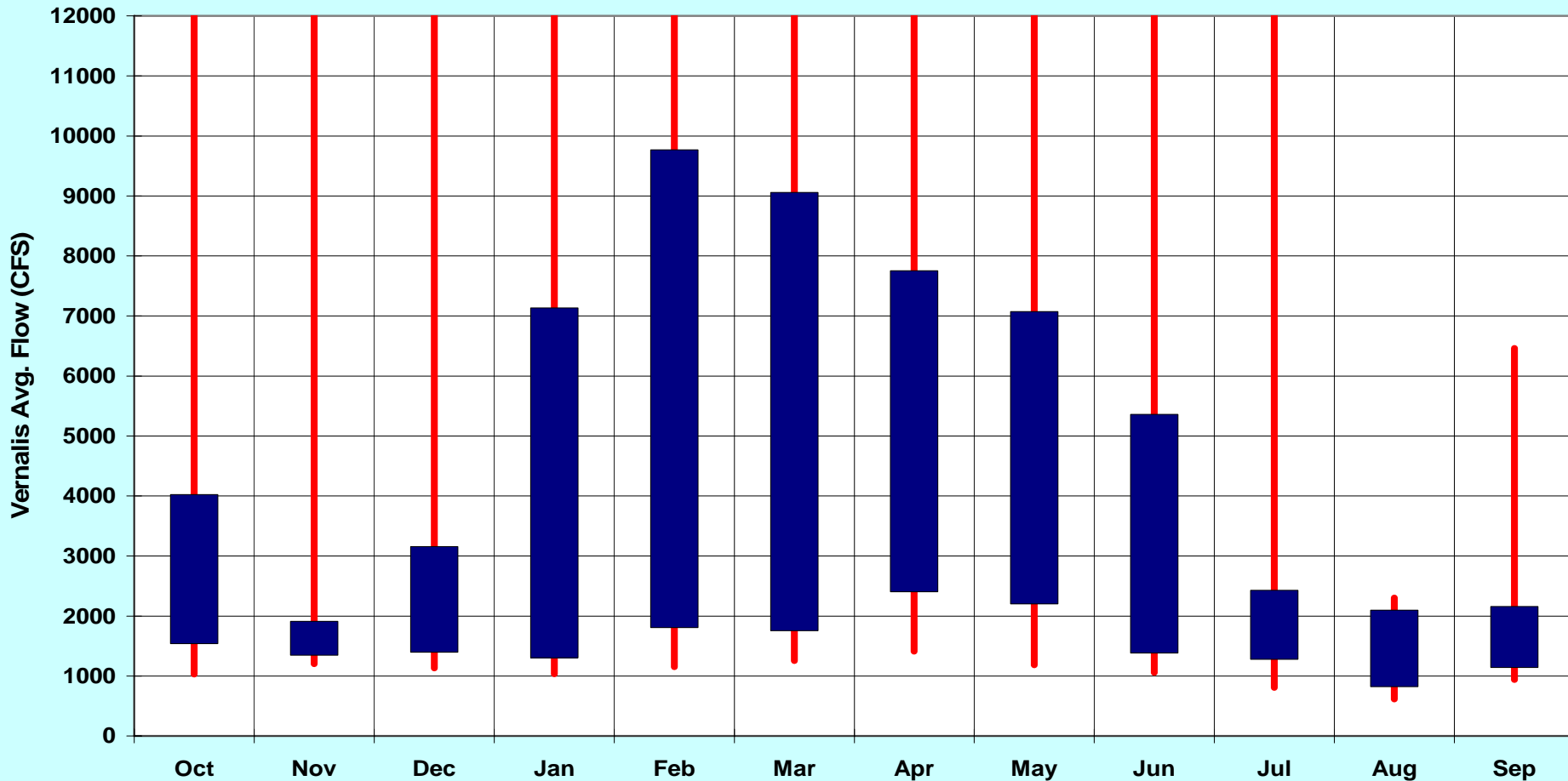
- Reclamation and expert consultants are confident that the new CALSIM II changes are a vastly superior portrayal of the current water operations activities and dynamics that occurs today in the San Joaquin River basin.

# New CALSIM II Hydrology

- Generally, the new hydrology portrayal is slightly wetter on a long-term average.
- The additional wetness of the hydrology is considered to be attributable to:
  - Analysis refinement of wet years when historical river gages had “flow around the gages”.
  - Land use/consumptive use portrayal of water demands.
  - Better portrayal of reservoir operation characteristics for New Don Pedro, New Exchequer, and Friant systems.

# Previous CALSIM II hydrology

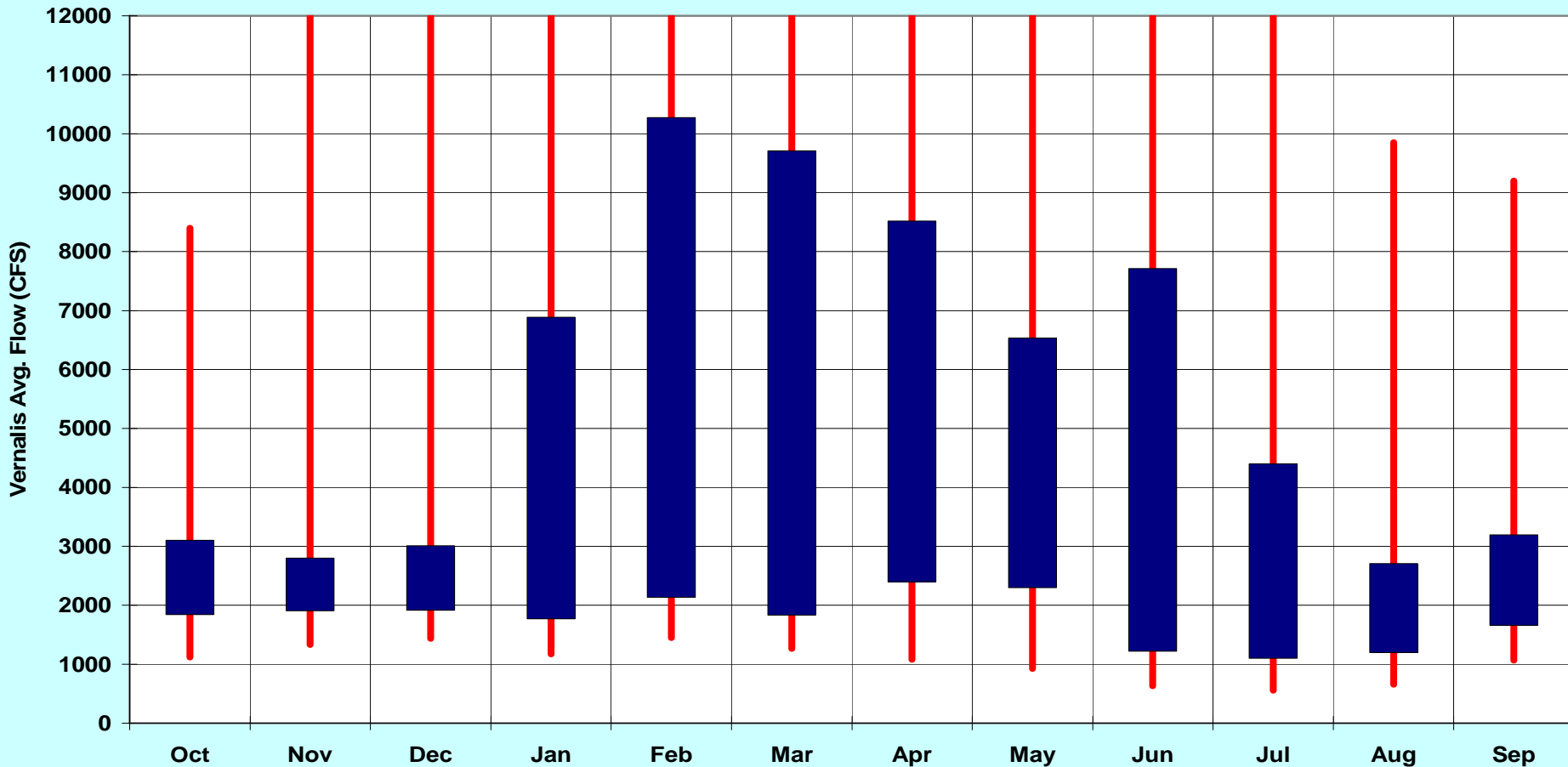
Simulated Vernalis Flow Distribution  
Previous San Joaquin Hydrology  
Box-67% of data  
Lines-Max,Min





# New CALSIM II hydrology

**Simulated Vernalis Flow Distribution  
New San Joaquin Hydrology  
Box-67% of data  
Lines-Max,Min**



# New CALSIM II WQ Methodology

- Previous WQ Methodology was based on a relationship known as modified Kratzer.
- Modified Kratzer technique is based on a single flow-to-salinity relationship at Maze Rd. that many have considered an out of date salinity relationship.



**Domain of Kratzer  
 Approach in Sep.  
 2002 CALSIM II**

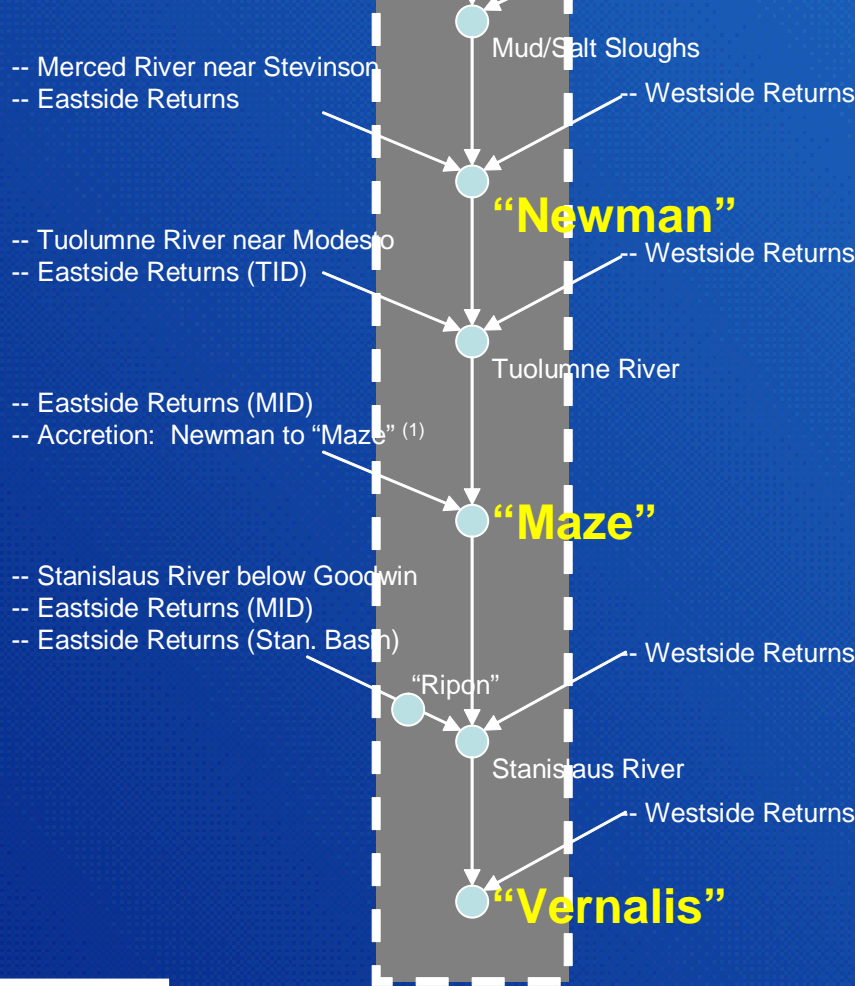
# New CALSIM II WQ Methodology

- New WQ Methodology is based on assigning best available water quality values to the major water flow inputs to the San Joaquin River.
  - Eastside Rivers
  - Eastside Return flows
  - Westside Ag. Return flows
  - Refuge Return flows

# New CALSIM II WQ Methodology

- New WQ Methodology then calibrates water quality at the Newman gage and the Maze gage to account for minor undetermined hydrologic sources and their water quality effects.
- WQ calibration process is based on recent (1999-2004) flow-to-salinity relationships at these gages.

- San Joaquin River at Lander Avenue
- Accretion: Upstream Dams to **Lander**
- Mendota Pool Exchange (VAMP)
- Mud/Salt Slough Base Flows
- San Luis Drain including Grasslands Bypass
- Mud/Salt Slough Accretions
- Level 2 Refuge Returns (10 districts)
- Exchange Contractor Returns

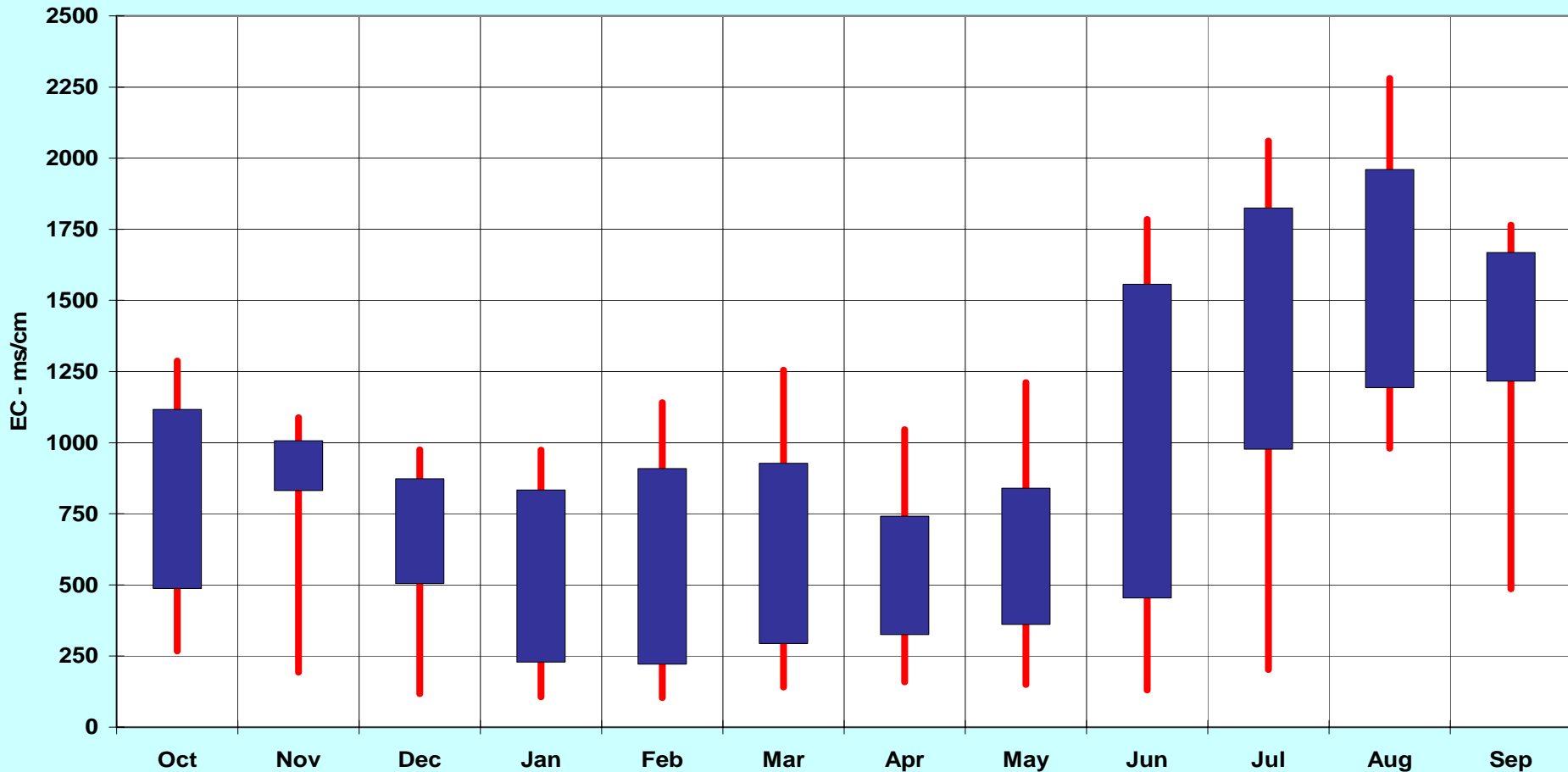


**Domain of SJR WQ  
Module in CALSIM II**

**RECLAMATION**

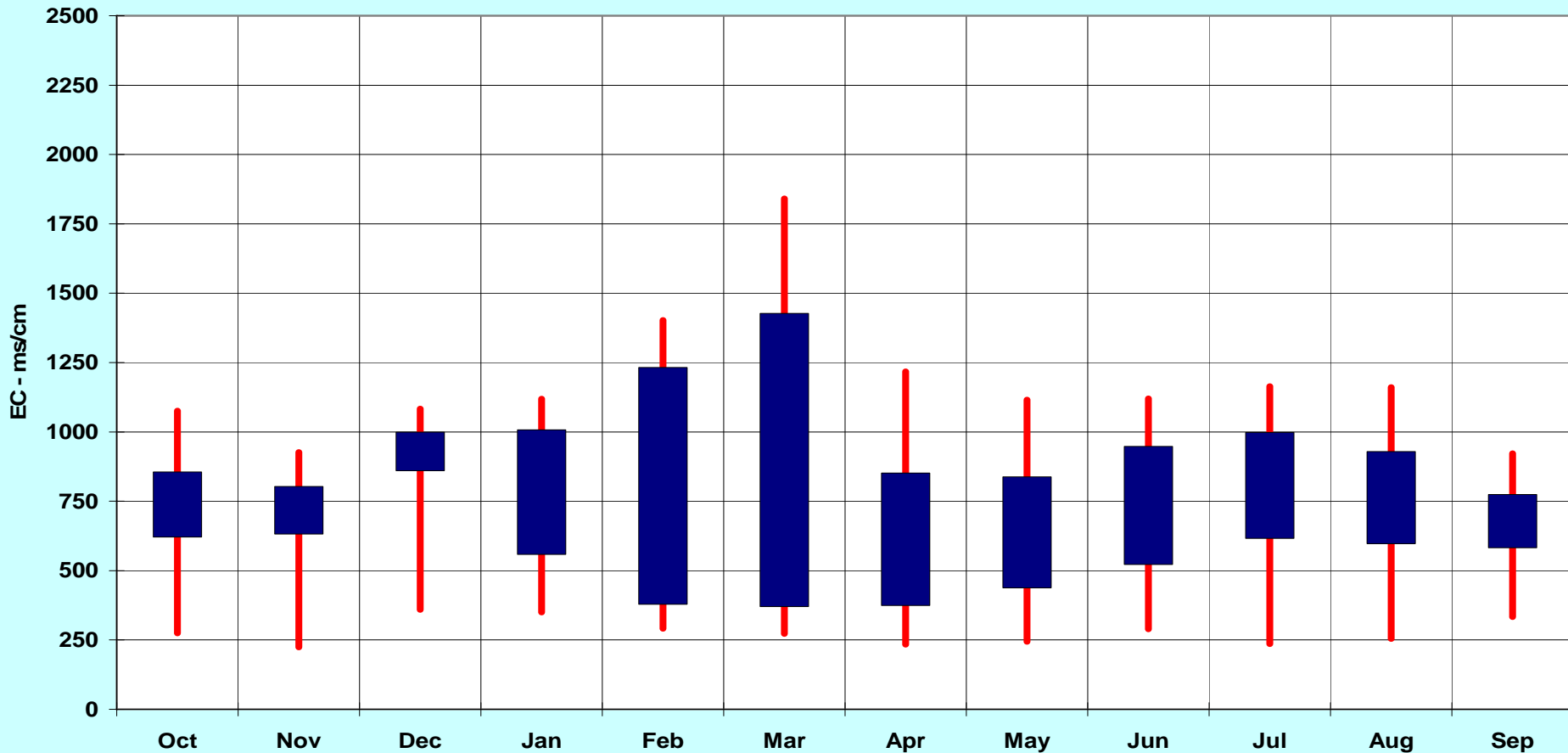
# Previous CALSIM II WQ Data

Simulated Water Quality at SJR Maze  
Previous San Joaquin Hydrology  
Box - 67% Data  
Lines - High,Low



# New CALSIM II WQ Data

Simulated Water Quality at SJR Maze  
New San Joaquin Hydrology  
Box - 67% Data  
Lines - High,Low





# What does the new analysis mean?

- Seasonal shift in water quality dynamics
- New CALSIM II portrayal has a much lower salt content for the irrigation season.
- New CALSIM II portrayal has a much higher salt content for the winter and early spring months of Jan. to early April.

# Potential reasons why the dramatic shift in water quality portrayal

- Farming and Refuge practices have changed substantially over last 10-15 years.
  - Much tighter water control systems and drip irrigation technologies
  - Some minimum flow changes on major rivers.
  - Some land retirement on the worst salt contributing lands of the westside.
  - Long-term reduction of CVP water deliveries to westside farming.

Part D – New Melones Interim Plan  
of Operation (NMIPO) and  
sensitivity to new analysis data.

# The New CALSIM II Dataset and New Melones Operations

- The New Melones IPO was developed based on the previous data set of hydrology and water quality.
- The NMIPO was meant to be an interim plan and there may be a better method to manage long-term risk in the Stanislaus Basin.

# The New CALSIM II Dataset and New Melones Operations

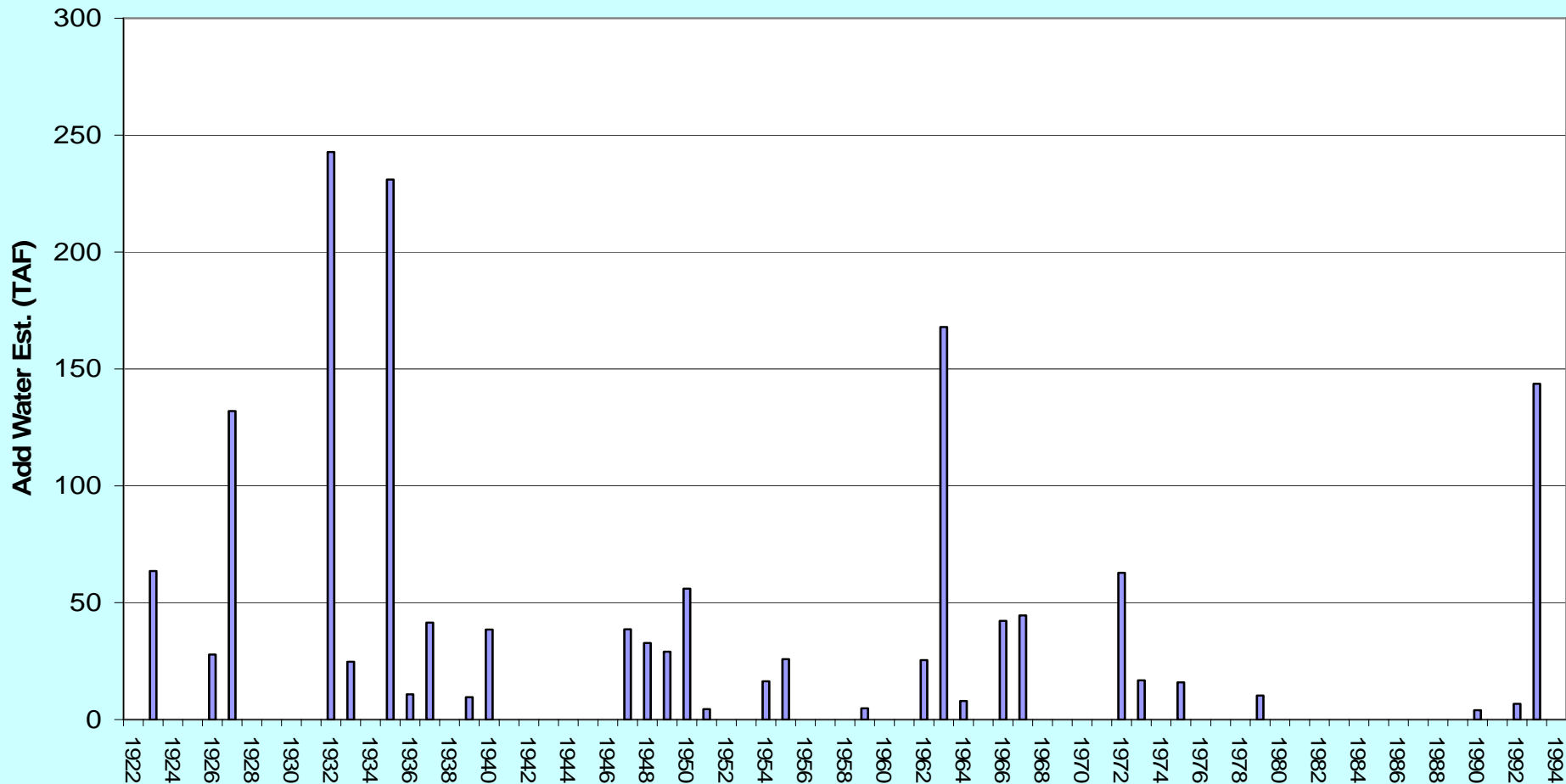
- Reclamation has initiated the process to involve stakeholders to develop a new long-term operating plan for New Melones. This will include a peer review of the new CALSIM II dataset and methodology.
- The new operating plan will be based on many factors including the new hydrology and water quality analysis, on-going fishery studies, and the outcome from this Periodic Review.
- As a result, it would be inappropriate to use the current NMIPO as the basis for any future long-term representations of New Melones operations.

# NMIPO and New Planning dataset

- A *test simulation* has been produced to illustrate the significant changes to the portrayal of the San Joaquin Basin dynamics using the framework of the NMIPO as a basis for Stanislaus River operations.

# New Hydrology and NMIPO

## New San Joaquin Hydrology Required "Add Water" for flow objective based on NMIPO Rules

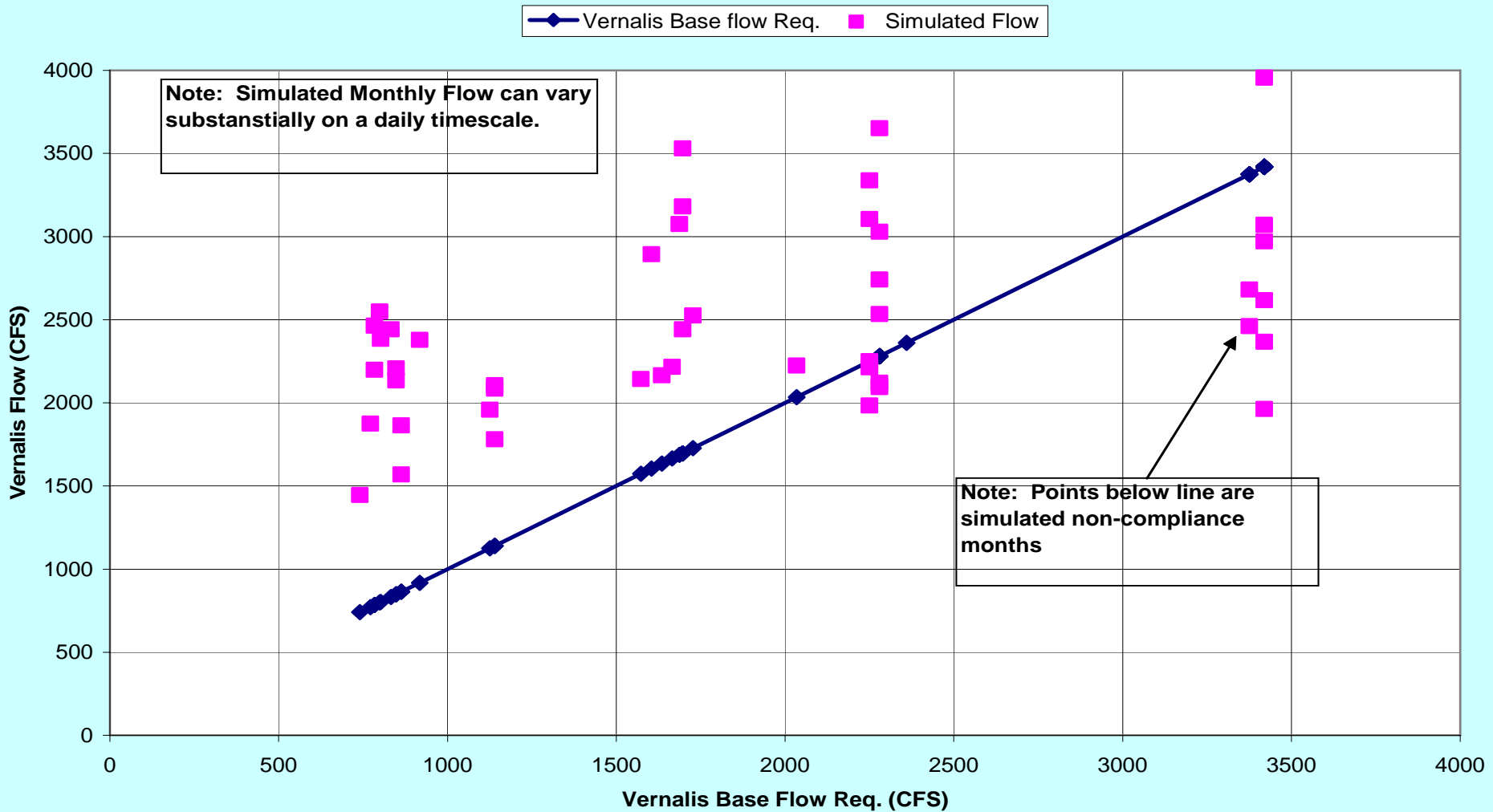






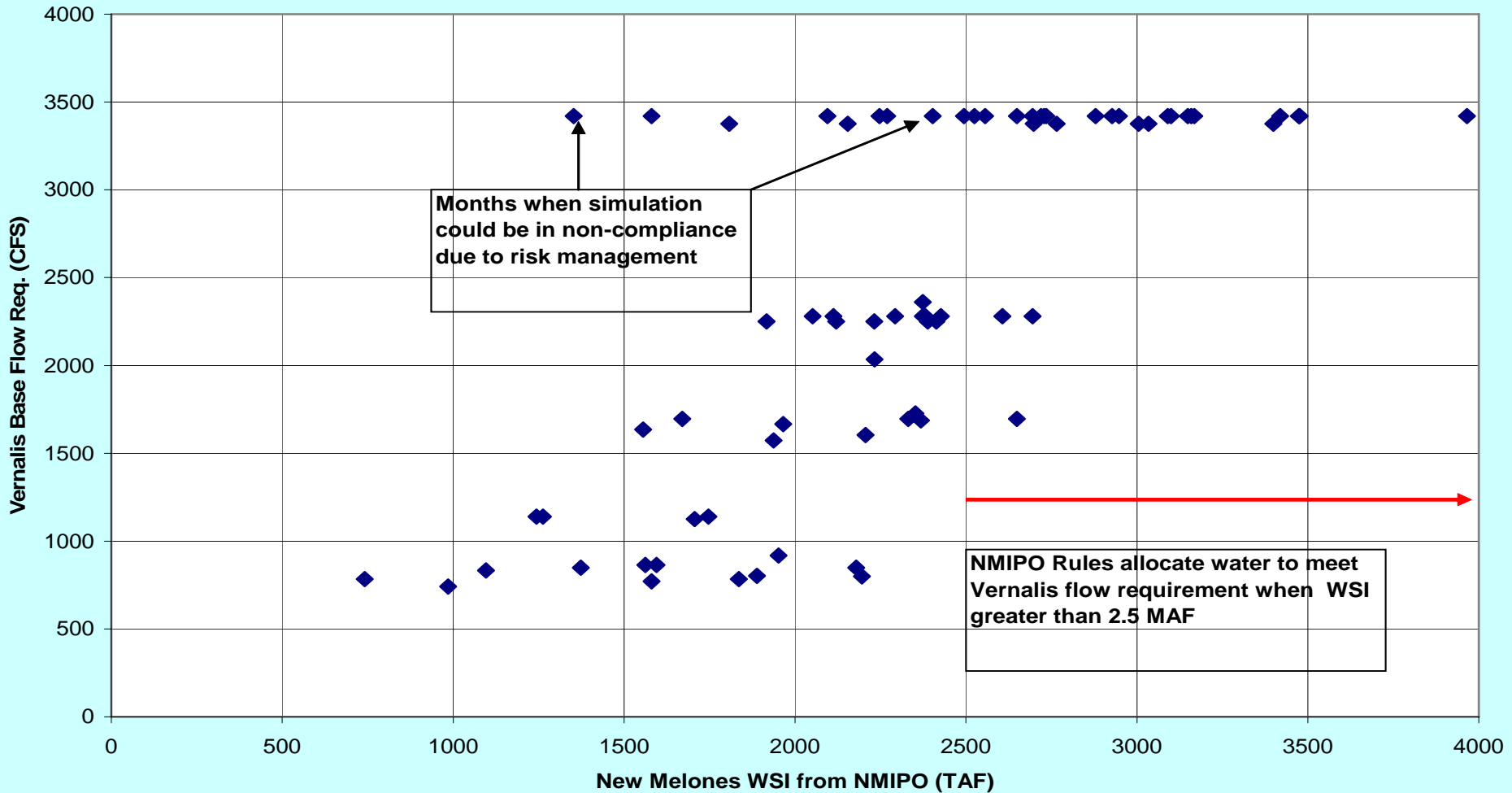
# New Hydrology and NMIPO

February - New San Joaquin Hydrology  
Based on NMIPO Rules



# New Hydrology and NMIPO

February - New San Joaquin Hydrology  
Based on NMIPO Rules



# New Hydrology and NMIPO

## Simulated Add Water Needs

	Feb.	Mar	Apr	May	Jun	Annual
#Years	11	10	16	16	18	30
Avg. Need (TAF)	32	41	12	15	21	53
Max. Need (TAF)	81	70	43	55	77	243

# New Hydrology and NMIPO Vernalis WQ Effects

- Next Table illustrates very significant changes of the new planning dataset to WQ performance.
- Yellow (near std) Green (small violation) Red (larger violation)
- Few green simulated months of not meeting WQ standard with NMIPO rules. When the NMIPO was adopted, there were a significant number of simulated months that did not meet WQ.
- Winter months (Feb-Mar) now are portrayed as significant water quality operations months.

950	950	950	950	950	950	600	600	600	600	600	600	950
1000	1000	1000	1000	1000	1000	700	700	700	700	700	700	1000
1050	1050	1050	1050	1050	1050	750	750	750	750	750	750	1050

VERNWQFINAL

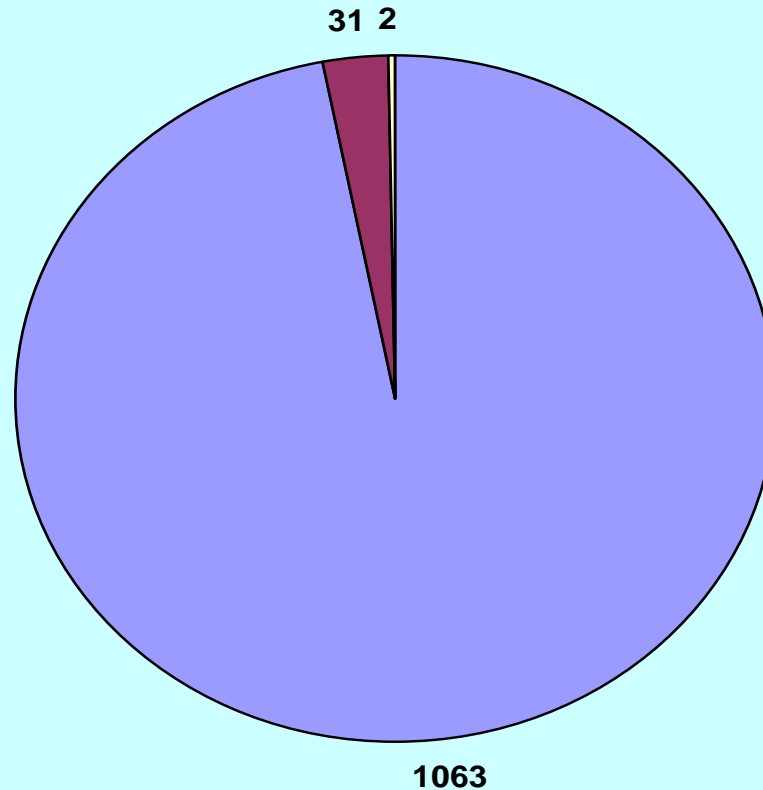
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WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1922	610	608	766	704	631	441	334	386	384	445	521	532
1923	563	591	640	497	443	955	373	368	582	625	614	528
1924	505	548	751	795	982	999	643	650	695	695	671	623
1925	662	654	802	878	998	951	452	425	645	659	635	586
1926	587	586	780	809	995	998	521	535	656	696	651	576
1927	632	660	795	851	972	692	438	394	657	637	584	537
1928	512	550	734	770	819	338	413	433	660	673	623	561
1929	579	575	776	782	951	999	577	582	696	687	663	600
1930	653	637	820	890	998	999	575	590	694	681	655	596
1931	630	621	808	872	999	999	660	663	695	694	674	630
1932	675	665	804	853	958	937	534	524	670	617	622	570
1933	592	602	799	854	998	999	575	581	690	687	659	609
1934	619	646	817	844	998	999	659	652	695	694	669	622
1935	672	665	823	875	1080	940	455	452	661	641	610	557
1936	556	597	776	814	488	385	369	415	635	653	575	524
1937	516	582	756	717	287	356	300	287	636	613	558	528
1938	545	572	530	515	372	323	281	262	245	347	333	334
1939	425	513	703	727	801	748	467	509	696	694	646	566
1940	595	621	800	802	892	357	309	322	548	655	610	550
1941	552	588	714	615	409	394	244	287	437	445	479	499
1942	488	537	632	422	330	339	321	353	425	455	364	353
1943	468	519	630	337	317	315	254	374	448	637	555	511
1944	513	533	703	733	814	756	428	469	632	657	612	548
1945	565	566	771	755	521	336	387	369	515	591	462	473
1946	446	520	476	536	389	522	405	397	535	651	582	543
1947	536	552	758	755	857	999	559	570	680	695	646	594
1948	604	608	796	842	999	1000	530	557	625	637	617	596
1949	594	625	821	853	999	999	582	591	648	679	634	600
1950	629	632	818	837	998	999	534	514	585	669	630	579
1951	610	656	385	339	267	457	393	245	511	663	618	571
1952	575	595	775	659	360	351	217	254	282	379	355	363
1953	506	527	725	516	559	926	385	351	527	611	605	557
1954	547	579	778	787	920	998	482	482	658	675	630	594
1955	606	620	766	742	998	999	570	588	695	696	656	601
1956	650	657	711	423	378	387	376	371	398	495	493	435
1957	503	547	759	755	923	710	360	363	560	650	606	563
1958	561	615	776	763	688	428	219	224	315	421	361	362
1959	526	556	720	734	707	879	449	489	689	683	637	567
1960	609	659	823	827	954	999	563	586	695	689	672	639
1961	690	689	840	883	1058	999	654	662	695	695	717	663
1962	705	690	829	928	749	832	488	485	696	662	619	582
1963	629	676	825	875	837	973	428	453	588	639	597	552
1964	586	636	885	849	998	999	571	581	695	688	652	604
1965	607	651	817	425	434	570	361	337	461	641	576	500
1966	548	564	567	579	630	807	493	531	695	695	658	616
1967	621	679	806	784	907	456	249	265	326	298	348	340
1968	501	568	726	743	715	772	429	464	684	689	632	590
1969	605	614	791	536	364	388	313	276	261	378	367	355
1970	399	500	598	274	268	313	385	398	451	643	604	547
1971	539	571	764	751	847	711	386	378	524	622	607	566
1972	542	632	806	815	915	998	526	541	696	693	645	616
1973	596	561	787	777	650	425	418	409	401	657	604	542
1974	531	617	737	481	534	426	365	394	427	610	514	494
1975	463	463	708	705	316	262	383	395	457	588	505	493
1976	411	496	769	769	906	998	565	575	696	695	641	608
1977	619	604	818	868	999	999	635	638	696	678	710	724
1978	746	749	879	799	710	664	393	366	414	557	508	413
1979	568	501	761	588	329	303	376	396	434	659	582	534
1980	516	542	783	354	335	376	347	373	404	468	471	451
1981	495	503	734	747	868	615	466	458	695	664	645	595
1982	584	603	781	643	273	247	220	265	362	413	339	252
1983	230	257	367	326	309	248	315	311	265	210	211	254
1984	357	195	305	351	291	371	367	367	526	633	524	438
1985	418	495	774	773	913	898	539	508	688	696	603	541
1986	573	568	757	825	390	304	286	298	392	603	483	404
1987	431	446	726	769	977	831	563	580	696	695	662	619
1988	644	597	810	854	998	1004	567	582	696	695	708	647
1989	729	707	859	929	1207	1001	622	627	694	661	679	557
1990	653	642	832	923	1139	999	635	655	696	704	681	651
1991	659	653	854	992	1253	983	660	651	696	683	692	691
1992	734	722	887	997	963	999	725	858	723	660	737	709
1993	789	789	913	669	853	928	539	547	619	575	551	510
1994	562	617	844	925	966	1006	630	640	735	718	725	683

# New Hydrology and NMIPO

**Stanislaus/New Melones**  
**Average Annual Water Supply (TAF)**  
**Total ~ 1.1 MAF/yr**



■ New Melones Inflow

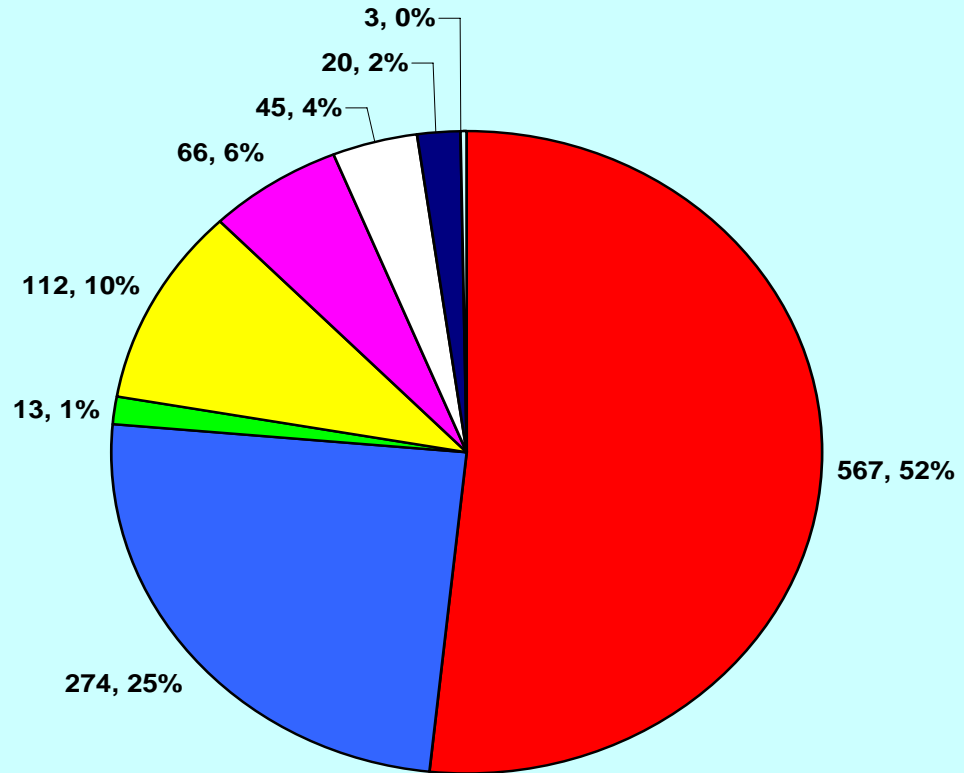
■ Tulloch Local Inflow

□ Goodwin Local Inflow

# New Hydrology and NMIPO

Stanislaus/New Melones  
New Hydrology - NMIPO Rules  
Avg. Annual Water Use (TAF)  
Total ~ 1.1 MAF/yr

- OID/SSJID CVP Settlement
- Instream Fish
- DO
- Spill
- Evap
- CVP Contract
- WQ-Salinity
- WQCP-Vernalis Flow



# NMIPO Pie Charts

- Long-term manageable inflow in the Stanislaus basin averages ~1.1 MAF
  - Largest beneficial use percentages are allocated to W.R. Stipulation and Instream Fish management.
  - All other beneficial use purposes must share the remaining inflow or water supply
  - Note: CVP contracts are represented as smaller than either Spill or Evaporation. This illustrates the significant risk management issues on the Stanislaus River and potential lack of long-term water supply flexibility.



# Conclusions to San Joaquin River base flow implementation

- Significantly improved new San Joaquin Basin analysis information now exists.
- “Add Water” implications and/or water supply to support San Joaquin River base flow objective still exists.
- NMIPPO guidance for Reclamation’s long-term operation at New Melones needs review based on new analysis information.

# Recommendations for San Joaquin River Base-Flow implementation

- Public review process for revising San Joaquin River base-flow objective.
- Review process needs to consider all the following information and management issues.
  - New improved San Joaquin Basin analysis information.
  - Better implementation construct for San Joaquin River base flow objective that recognizes hydrologic nature of San Joaquin Basin.
  - Better fishery management foundation than % of X2 flows.
  - Acknowledgement of potential fishery management tradeoff between fishery management below reservoir release(s) and flow management at Vernalis. (Reservoir release fluctuation issue)

# Short-term recommendations for San Joaquin River base flow implementation

- SWRCB provide relief from the current San Joaquin River base flow objective until public process can re-address issue based on new San Joaquin Basin analysis information.
- NMIPO beneficial use objectives (without SJR base flow) will continue to guide New Melones operations as long-term New Melones Plan of Operation is developed based on new San Joaquin Basin analysis information.