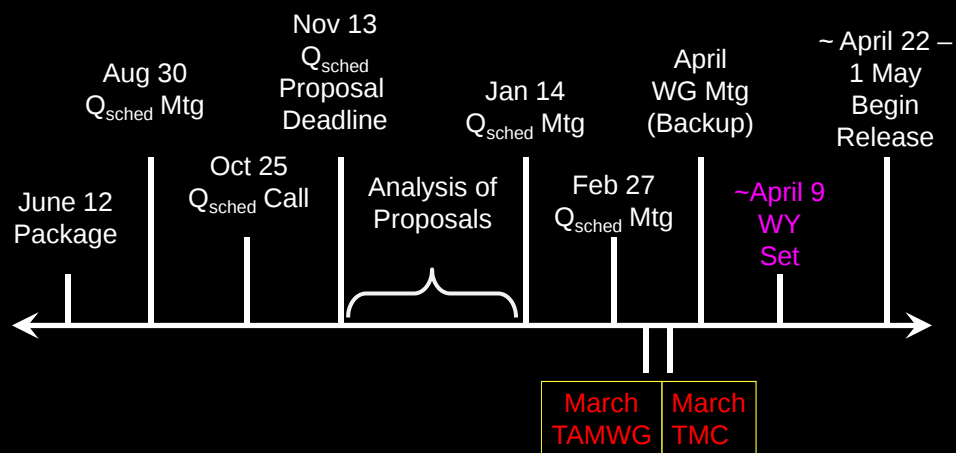




2014 Trinity River Hydrograph Design

TMC
27 March 2014

2014 Flow Scheduling Process





CURRENT CONDITIONS UPDATE

3

DAILY CVP WATER SUPPLY REPORT

MARCH 26, 2014

RUN DATE: March 27, 2014

RESERVOIR RELEASES IN CUBIC FEET/SECOND

RESERVOIR	DAM	WY 2013	WY 2014	15 YR MEDIAN
TRINITY	LEWISTON	319	295	300
SACRAMENTO	KESWICK	3,867	3,068	3,867
FEATHER	OROVILLE (SWP)	2,100	800	1,750
AMERICAN	NIMBUS	1,303	529	1,745
STANISLAUS	GOODWIN	208	428	452
SAN JOAQUIN	FRIANT	649	141	230

STORAGE IN MAJOR RESERVOIRS IN THOUSANDS OF ACRE-Feet

RESERVOIR	CAPACITY	15 YR AVG	WY 2013	WY 2014	% OF 15 YR AVG
TRINITY	2,448	1,819	2,052	1,293	71
SHASTA	4,552	3,611	3,748	2,092	58
OROVILLE (SWP)	3,538	2,432	2,944	1,631	67
FOLSOM	977	617	586	412	67
NEW MELONES	2,420	1,641	1,559	1,045	64
FED. SAN LUIS	966	838	775	469	56
MILLERTON	520	374	320	169	45
TOT. N. CVP	11,360	8,527	8,720	5,311	62

ACCUMULATED INFLOW FOR WATER YEAR TO DATE IN THOUSANDS OF ACRE-Feet

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	15 YR AVG	% OF 15 YR AVG
TRINITY	210	74	1,170	538	39
SHASTA	1,427	1,357	6,629	2,986	48
FOLSOM	426	190	3,385	1,087	39
NEW MELONES	172	0	1,097	375	46
MILLERTON	64	107	1,542	415	15

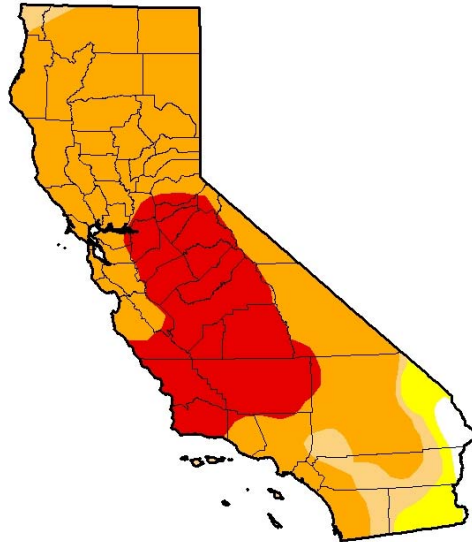
ACCUMULATED PRECIPITATION FOR WATER YEAR TO DATE IN INCHES

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	AVG (N YRS)	% OF AVG	LAST 24 HRS
TRINITY AT FISH HATCHERY	13.24	8.94	47.73	26.56 (52)	50	0.43
SACRAMENTO AT SHASTA DAM	23.11	10.78	96.82	51.27 (57)	45	0.99

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U.S. Drought Monitor California

January 7, 2014
(Released Thursday, Jan. 9, 2014)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	1.43	4.32	6.71	59.94	27.59	0.00
Last Week 12/31/2013	2.61	3.14	6.71	59.94	27.59	0.00
3 Months Ago 10/8/2013	2.52	1.53	11.83	72.77	11.36	0.00
Start of Calendar Year 12/31/2013	2.61	3.14	6.71	59.94	27.59	0.00
Start of Water Year 10/1/2013	2.63	1.42	11.83	72.77	11.36	0.00
One Year Ago 1/6/2013	32.42	12.56	33.65	21.37	0.00	0.00

Intensity:

D0 Abnormally Dry D3 Extreme Drought
D1 Moderate Drought D4 Exceptional Drought
D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Mark Svoboda
National Drought Mitigation Center

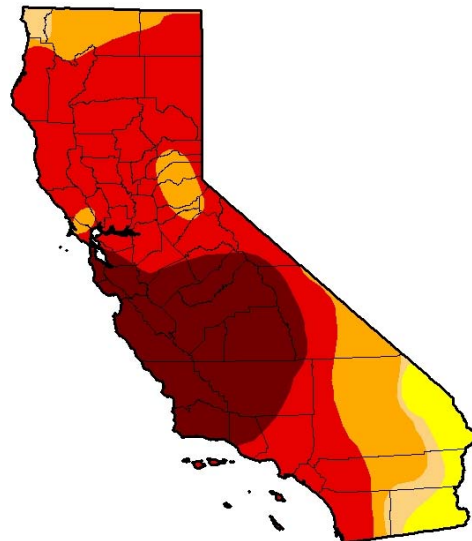


<http://droughtmonitor.unl.edu/>

5

U.S. Drought Monitor California

February 25, 2014
(Released Thursday, Feb. 27, 2014)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	94.56	90.82	73.83	26.21
Last Week 2/18/2014	0.00	100.00	94.54	90.82	68.30	14.62
3 Months Ago 11/28/2013	2.61	97.39	94.15	82.53	27.59	0.00
Start of Calendar Year 12/31/2013	2.61	97.39	94.25	87.53	27.59	0.00
Start of Water Year 10/1/2013	2.63	97.37	95.95	84.12	11.36	0.00
One Year Ago 2/26/2013	0.02	99.98	47.13	26.96	0.00	0.00

Intensity:

D0 Abnormally Dry D3 Extreme Drought
D1 Moderate Drought D4 Exceptional Drought
D2 Severe Drought

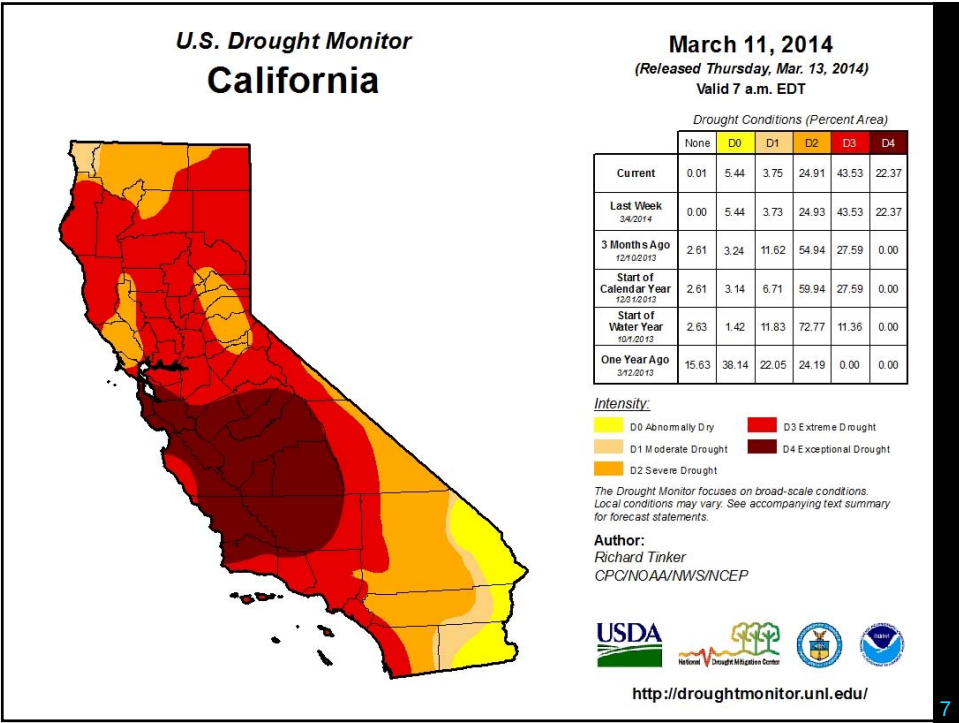
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture

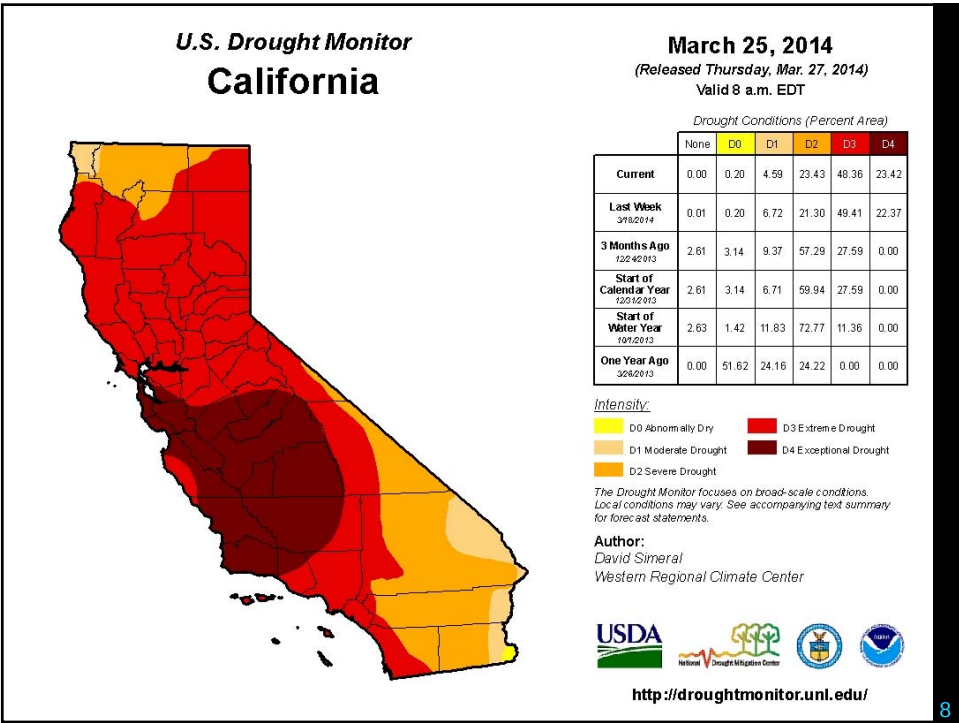


<http://droughtmonitor.unl.edu/>

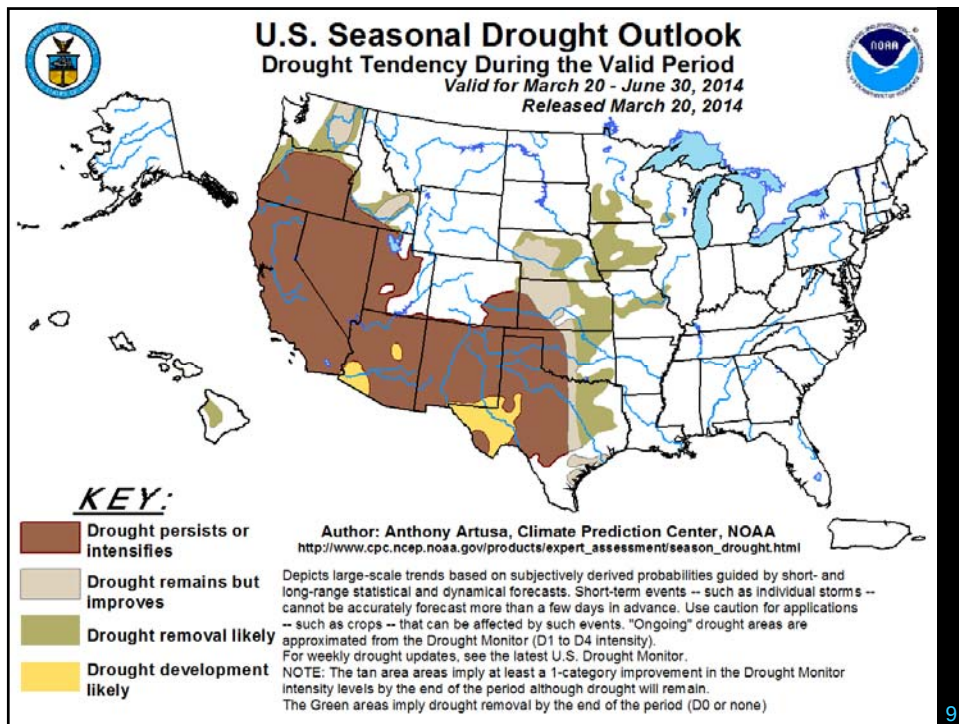
6



7



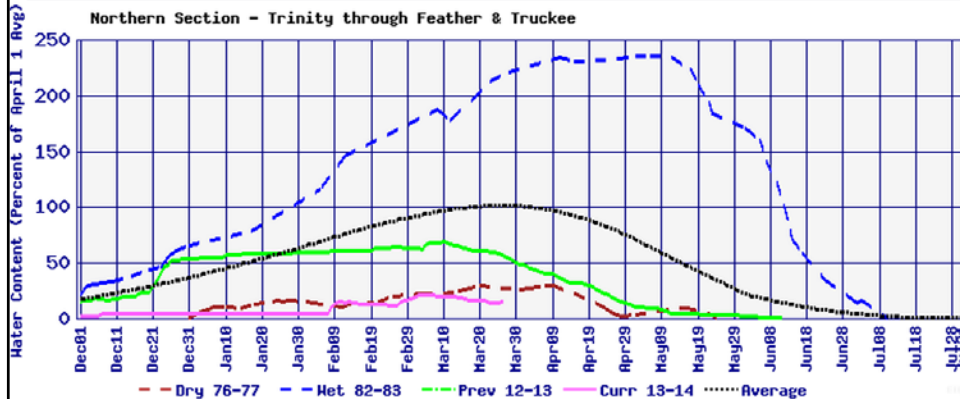
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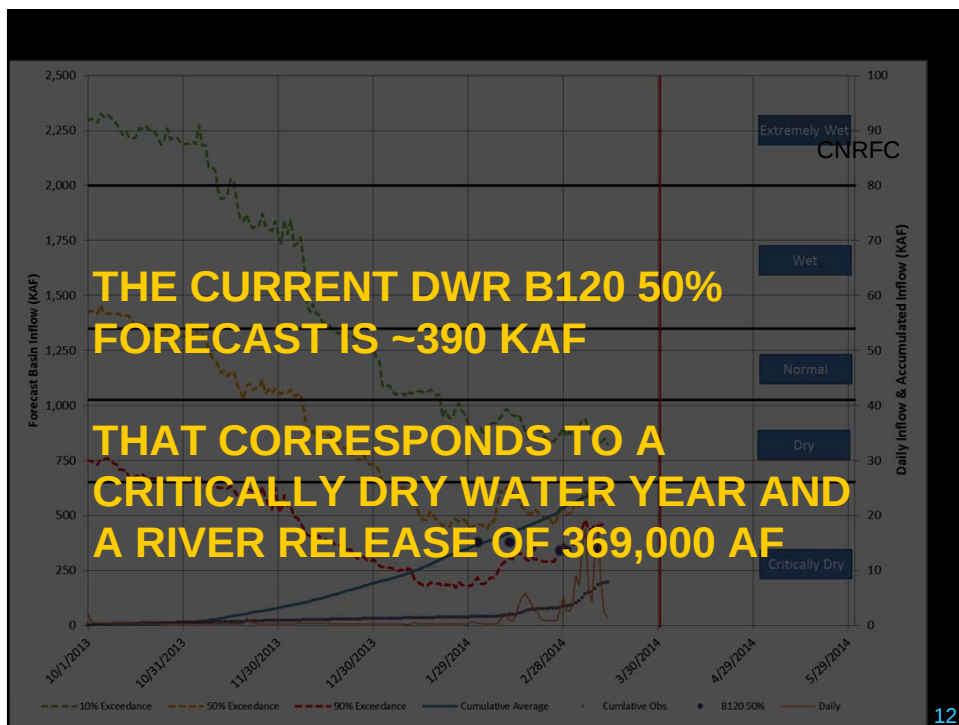
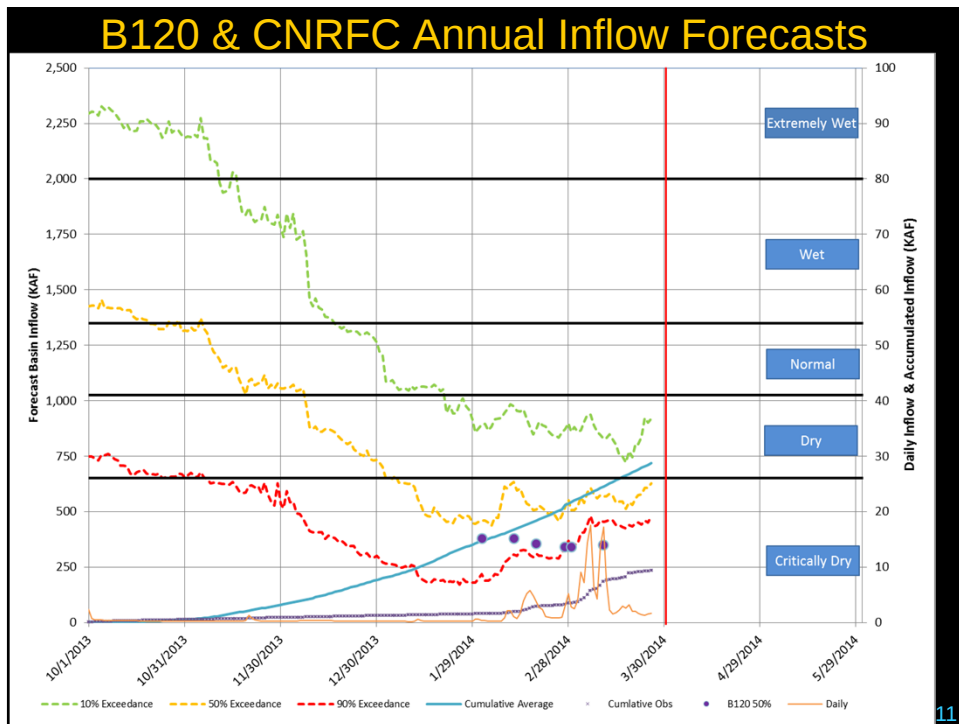


California Snow Water Content

California Snow Water Content

PERCENT OF APRIL 1 AVERAGE, MARCH 27, 2014





Feb 2014 50% b2 Forecast

Storages

Federal End of the Month Storage/Elevation (TAF/Feet)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Trinity	1162	1187	1257	1302	1178	993	818	636	457	434	431	463
Elev.	2275	2282	2286	2274	2254	2233	2208	2177	2172	2171	2178	2189
Whiskeytown	205	206	206	238	238	238	238	238	206	206	206	206
Elev.	1199	1199	1209	1209	1209	1209	1209	1209	1199	1199	1199	1199
Shasta	1656	1795	1942	1993	1995	1770	1462	1221	1155	1139	1235	1424
Elev.	945	954	957	957	943	923	904	899	898	905	920	948
Folsom	164	290	405	419	454	367	328	286	238	283	343	378
Elev.	385	404	406	411	398	392	385	375	384	394	400	406
New Melones	1046	1055	1054	994	891	774	656	539	452	438	456	480
Elev.	950	950	942	927	909	888	866	847	844	848	853	861
San Luis	333	403	419	366	256	95	18	16	166	302	485	735
Elev.	429	445	430	408	380	350	348	368	394	430	469	501
Total	4935	5282	5311	5013	4236	3520	2937	2707	2802	3155	3686	4410

Monthly River Releases (TAF/cfs)

Trinity	TAF	17	18	36	92	47	28	28	27	28	18	18
cfs	300	300	600	1,498	783	450	450	450	450	300	300	300
Clear Creek	TAF	11	12	12	12	12	5	5	9	12	13	12
cfs	200	200	200	200	200	85	85	150	200	225	200	200
Sacramento	TAF	194	200	297	384	550	610	536	357	283	212	200
cfs	3500	3250	5000	6250	9250	9923	8723	6000	4602	3562	3250	3250
American	TAF	28	31	97	42	128	74	77	74	31	30	77
cfs	500	500	1630	686	2149	1287	1250	1251	500	500	1250	1750
Stanislaus	TAF	12	15	29	25	32	22	23	14	35	12	13
cfs	214	245	480	410	536	364	368	240	577	200	200	213

Trinity Diversions (TAF)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Carr PP	3	10	50	118	156	155	156	154	8	17	7	3
Spring Crk. PP	35	35	30	120	150	150	150	145	30	10	10	25

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Feb 2014 90% b2 Forecast – Min Reg Stds

Storages

Federal End of the Month Storage/Elevation (TAF/Feet)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Trinity	1162	1148	1150	1111	963	795	639	484	334	302	#N/A	#N/A
Elev.	2271	2271	2287	2251	2230	2208	2182	2146	2142	#N/A	#N/A	#N/A
Whiskeytown	205	206	206	238	238	238	238	230	206	201	186	206
Elev.	1199	1199	1209	1209	1209	1209	1209	1207	1199	1197	1192	1199
Shasta	1656	1678	1703	1566	1326	948	442	194	150	84	93	152
Elev.	937	939	930	913	880	819	765	751	722	727	752	786
Folsom	164	290	310	312	316	273	210	174	127	133	143	165
Elev.	385	389	389	390	382	369	360	346	348	351	358	366
New Melones	1046	1051	1026	962	876	762	675	569	491	472	474	479
Elev.	949	946	937	924	910	892	872	856	852	852	853	854
San Luis	333	342	350	344	310	245	170	124	189	335	464	617
Elev.	415	413	404	389	374	356	341	354	391	431	464	494
Total	4714	4744	4533	4028	3281	2375	1781	1521	1532	#N/A	#N/A	#N/A

Monthly River Releases (TAF/cfs)

Trinity	TAF	17	18	36	92	47	28	28	27	23	18	18
cfs	300	300	600	1,498	783	450	450	450	373	300	300	300
Clear Creek	TAF	11	12	12	12	9	7	5	9	12	12	12
cfs	200	200	200	200	150	120	85	150	200	200	200	200
Sacramento	TAF	180	200	351	483	631	738	467	268	295	230	218
cfs	3250	3250	5900	7850	10600	12000	7595	4501	4800	3873	3552	3250
American	TAF	28	31	33	33	54	65	49	58	31	30	31
cfs	500	500	556	534	908	1054	798	973	500	500	500	500
Stanislaus	TAF	12	16	29	25	33	24	22	14	35	12	13
cfs	214	268	480	410	561	396	352	240	577	210	200	213

Trinity Diversions (TAF)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Carr PP	6	1	39	76	127	128	127	122	17	15	10	29
Spring Crk. PP	5	8	10	70	120	120	120	120	30	10	17	4

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Feb 2014 90% b2 Forecast – Min Releases

Storages

Federal End of the Month Storage/Elevation (TAF/Feet)

		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Trinity	Elev.	1162	1148	1150	1111	963	795	639	484	334	302	#N/A	#N/A
		2271	2271	2267	2251	2230	2208	2182	2166	2142	#N/A	#N/A	#N/A
Whiskeytown	Elev.	205	206	206	238	238	238	238	230	206	201	186	206
		1199	1199	1209	1209	1209	1209	1209	1207	1199	1197	1192	1199
Shasta	Elev.	1656	1678	1703	1625	1462	1244	928	707	690	654	692	762
		937	939	934	923	906	878	855	853	849	853	861	874
Folsom	Elev.	164	290	310	315	321	302	273	254	235	240	251	272
		385	389	390	391	388	382	379	375	376	378	382	388
New Melones	Elev.	1046	1051	1026	962	876	782	675	569	491	472	474	479
		949	946	937	924	910	892	872	856	852	852	853	854
San Luis	Elev.	333	342	350	344	310	245	170	106	64	107	230	374
		414	412	402	386	372	356	340	331	360	399	434	466
Total		4714	4744	4595	4170	3607	2924	2358	2043	1981	#N/A	#N/A	#N/A

Monthly River Releases (TAF/cfs)

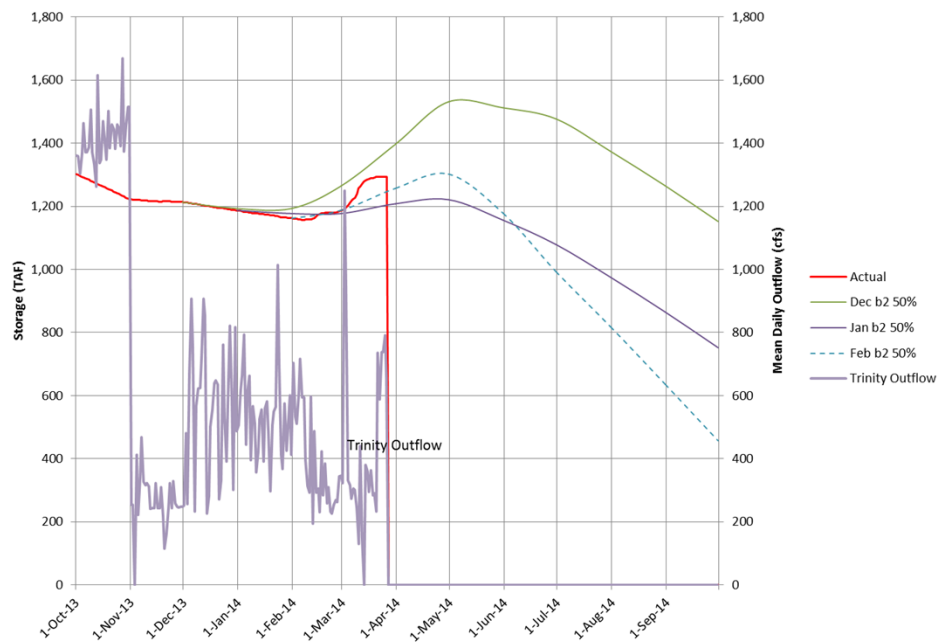
Trinity	TAF	17	18	36	92	47	28	28	27	23	18	18	18
	cfs	300	300	600	1,498	783	450	450	450	373	300	300	300
Clear Creek	TAF	11	12	12	12	9	7	5	9	12	12	12	12
	cfs	200	200	200	200	150	120	85	150	200	200	200	200
Sacramento	TAF	180	200	292	406	470	546	436	238	264	201	200	200
	cfs	3250	3250	4900	6600	7900	8889	7095	4001	4300	3373	3250	3250
American	TAF	25	31	30	31	30	31	31	30	31	30	31	31
	cfs	500	500	500	500	500	500	500	500	500	500	500	500
Stanislaus	TAF	12	16	29	25	33	24	22	14	35	12	12	13
	cfs	214	268	480	410	561	396	352	240	577	210	200	213

Trinity Diversions (TAF)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Carr PP	6	1	39	76	127	128	127	122	17	15	4	29
Spring Crk. PP	5	8	10	70	120	120	120	120	30	10	11	4

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Trinity Reservoir Storage



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b2 Summary

Dec 2013

- 50% Exceedance
 - EOS Storage
 - 1,152 KAF
 - 2014 Carr Export
 - 461 KAF
- 90% Exceedance
 - EOS Storage
 - 507 KAF
 - 2014 Carr Export
 - 812 KAF

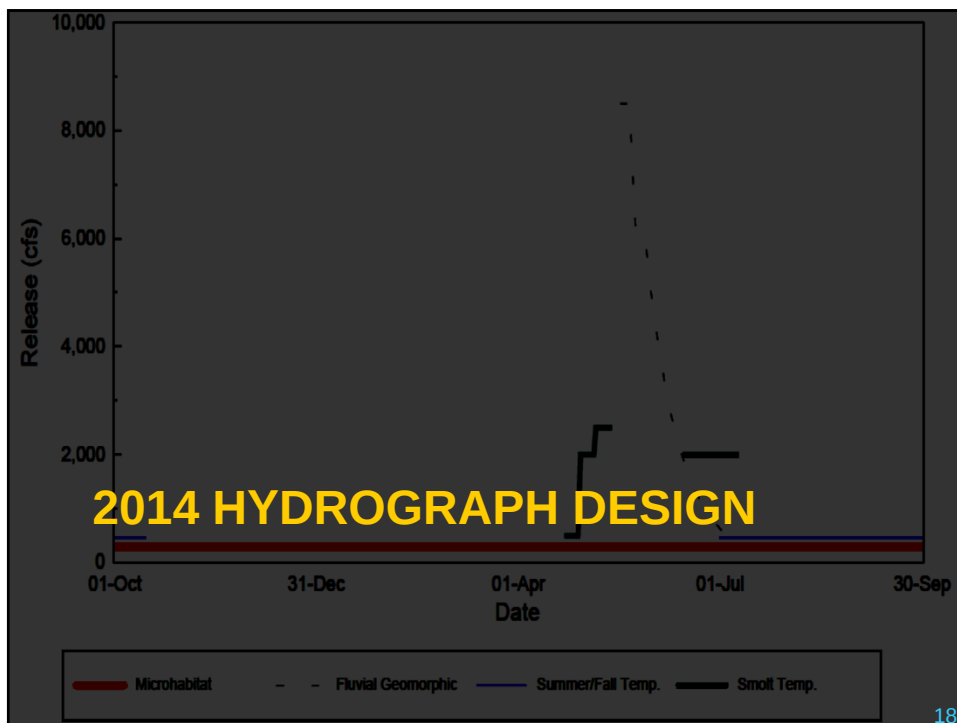
Feb 2014

- 50% Exceedance
 - EOS Storage
 - 457 KAF
 - 2014 Carr Export
 - ~ 896 KAF
- 90% Exceedance – Min Reg.
 - EOS Storage
 - 334 KAF
 - 2014 Carr Export
 - ~ 720 KAF
- 90% Exceedance – Min Rel.
 - EOS Storage
 - 334 KAF
 - 2014 Carr Export
 - ~ 720 KAF

Mar 2014

- UNOFFICIAL!!**
- 50% Exceedance
 - EOS Storage
 - 546 KAF
 - 2014 Carr Export
 - ~??? KAF
 - 90% Exceedance w/Salinity Barriers
 - EOS Storage
 - 455 KAF
 - 2014 Carr Export
 - ??? KAF

17

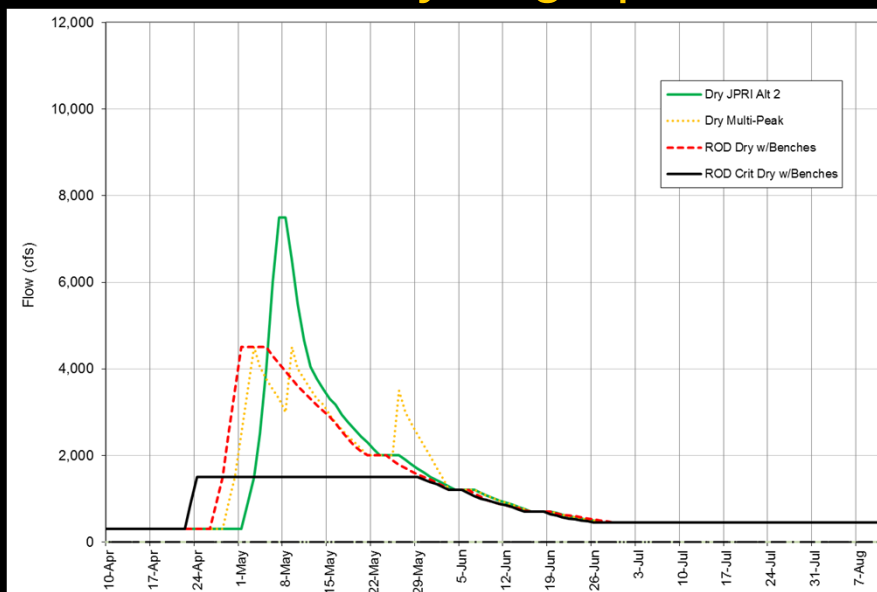


18

Initial Array of Hydrograph Alternative	Hydrograph Alternatives Subjected to Evaluation	Hydrograph Alternatives Relevant to WY2014
(EW) ROD*	(EW) ROD*	-
(EW) Riparian Initiation	(EW) Riparian Initiation	-
(W) ROD	(W) ROD	-
(W) Alt 1	(W) Alt 1	-
(W) Alt 2	(W) Alt 2	-
(W) Multi-peak 1	(W) Multi-peak 1	-
(W) Multi-peak 2	(W) Multi-peak 2	-
(W) 11,000 cfs	-	-
(N) ROD	(N) ROD	-
(N) Multi-peak 1	(N) Multi-peak 1	-
(N) Multi-peak 2	(N) Multi-peak 2	-
(N) 2004 Modified	-	-
(N) 2008 Modified	-	-
(N) Riparian Descending Limb	-	-
(N) Riparian/Wildlife Peak plus Monitoring	-	-
(N) 7000 cfs Model Calibration	-	-
(N) Joint Physical-Riparian	(N) Joint Physical-Riparian	-
(D) ROD	(D) ROD	(D) ROD
(D) Multi-peak	(D) Multi-peak	(D) Multi-peak
(D) Monitoring Benches	-	-
(D) Spring Habitat Bench	-	-
(D) Joint Physical-Riparian Alt 1	-	-
(D) Joint Physical-Riparian Alt 2	(D) Joint Physical-Riparian Alt 2	(D) Joint Physical-Riparian Alt 2
(CD) ROD	(CD) ROD	(CD) ROD

19

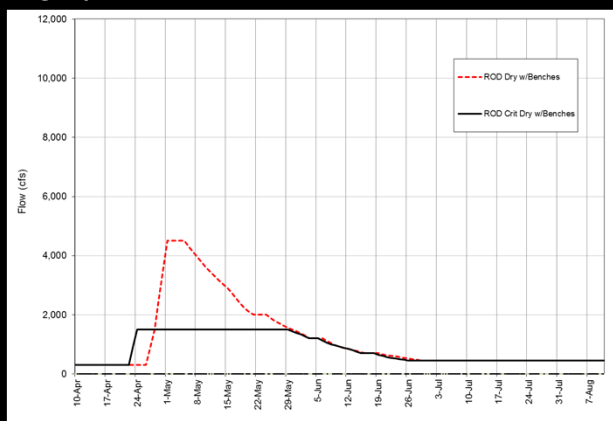
2014 Hydrographs



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ROD Critically Dry & ROD Dry

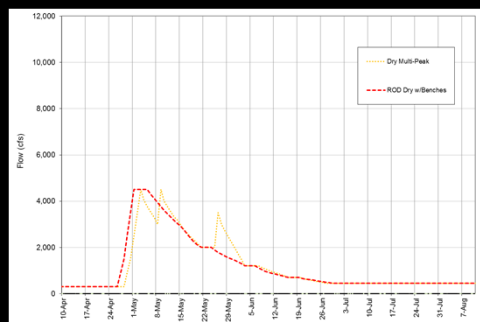
- Chapter 8 of the Trinity River Flow Evaluation Final Report (USFWS and HVT 1999) describes the ROD Critically Dry and Dry hydrographs



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Dry Water Year Multi-peak

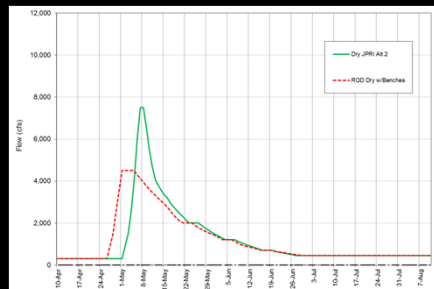
- tests the effect of multiple flow peaks on sediment transport
- mimics natural flow regime of multiple snowmelt peaks
- achieves temperature and smolt migration objectives for a dry water year
- provides diverse rearing and feeding conditions for salmonid juveniles and smolts



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Dry Water Year Joint Physical Riparian Alternative 2

- The peak of the ROD Dry hydrograph is modified from five-days @ 4,500 cfs to two-days @ 7,500 cfs
 - Increase sediment transport to closer meet sediment transport objectives defined in the Trinity River Flow Evaluation Final Report
 - Increase the mobilization of sediments from the Rush Creek Delta
 - Induce fine sediment flushing and gravel sorting at the Upper Junction City rehabilitation site constructed in 2012



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Analyses – Evaluation Factors

- Temperature Compliance (Appendix C)
- Sediment Transport (Appendix D)
- Salmonid Rearing Habitat (Appendix E)
- Riparian Initiation & Scour
- Outmigrant Timing
- Learning Opportunities

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Dry Year Evaluation Results

Factor Hydrograph	Temperature Compliance	Sediment Transport	Riparian Scour	Bed Scour / Mobility	Rearing Habitat	Riparian Initiation / Inundation	Juvenile Outmigration	Learning Opportunity
ROD	2	1.5	1.5	2	1.5	3	2	1
Multi Peak	2	1.5	1.5	1	1.5	1.5	2	2.5
JPRI Alt 2	2	3	3	3	3	1.5	2	2.5

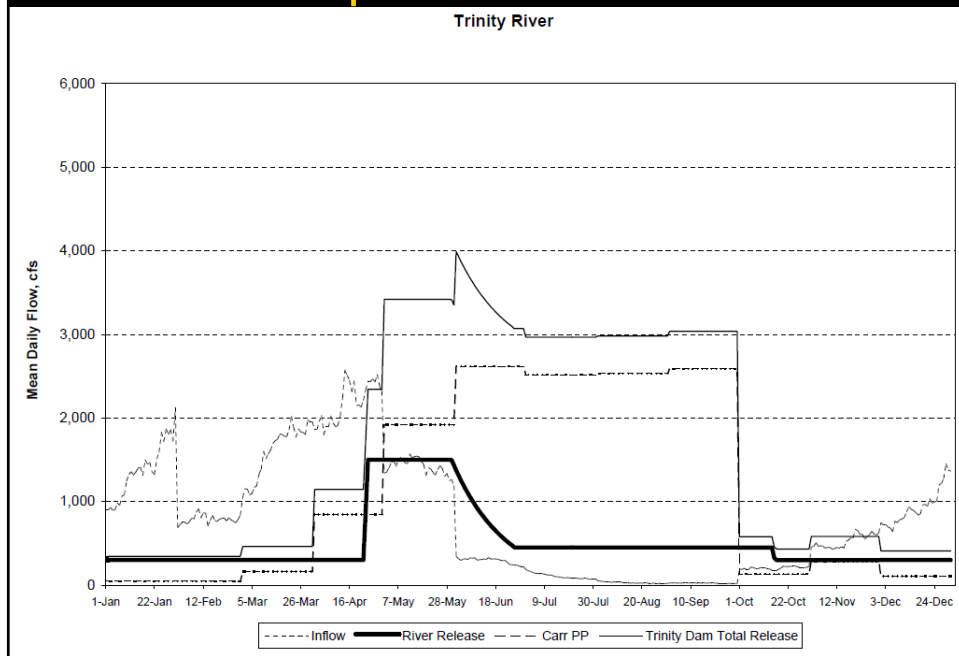
25

Consensus Recommendation by the Flow Workgroup

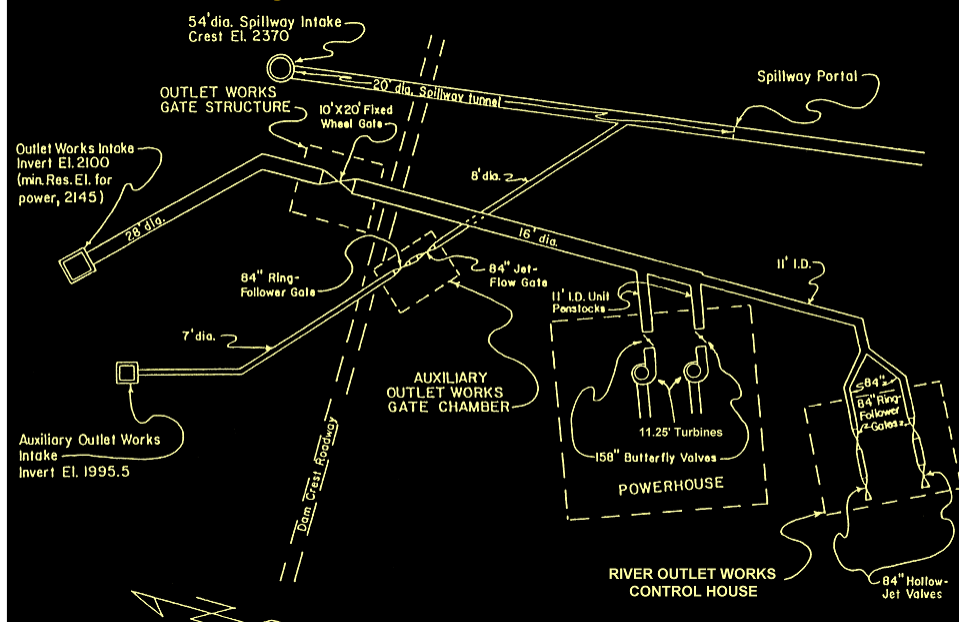
- If it is a Critically Dry year the group recommends the ROD hydrograph.
- If it is a Dry year the group recommends JPR Alt. 2.

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TRD Operations Forecast



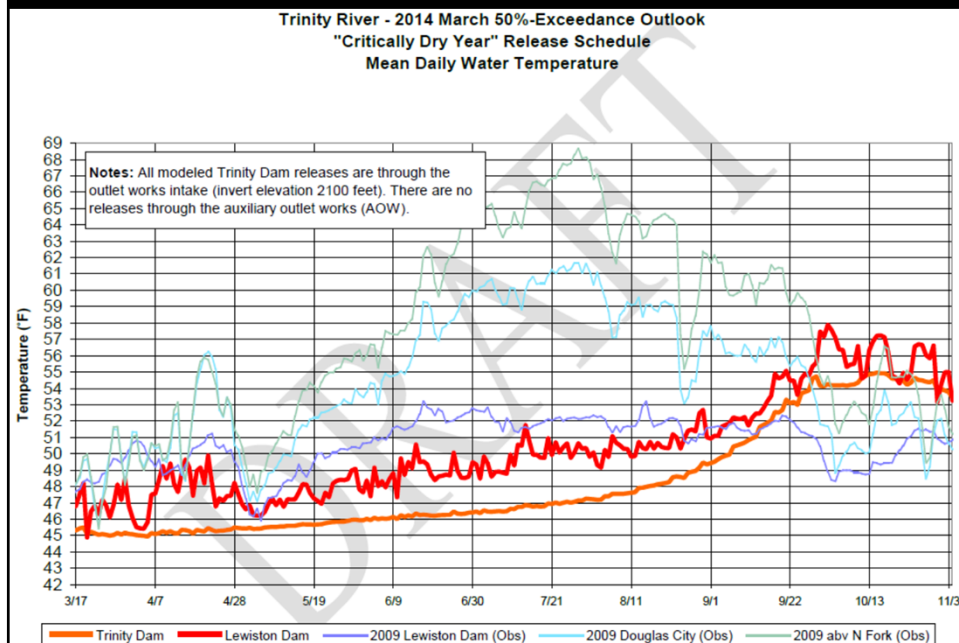
Trinity Dam Outlet Works



Trinity River Temperature Targets

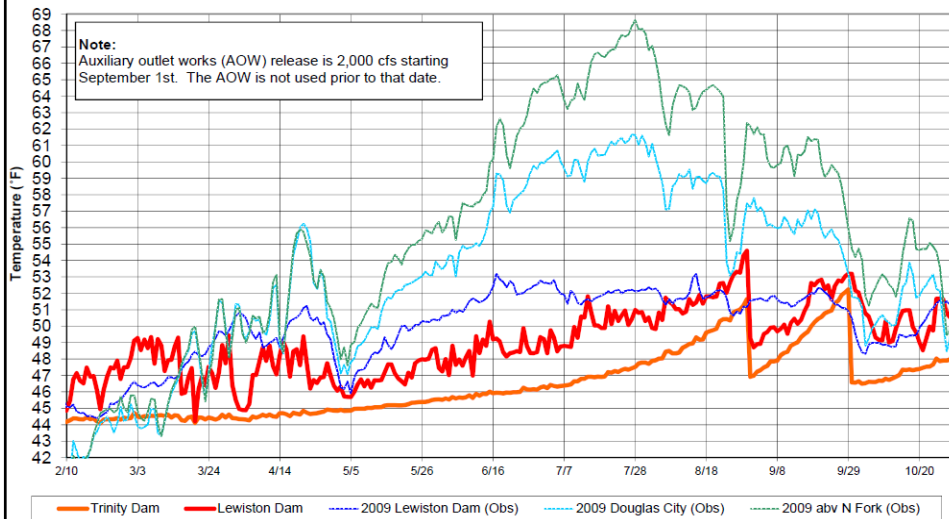
Source	Target Reach	Dates	Temperature Objective
Basin Plan for the North Coast Region (Regional Water Quality Control Board, 1994)	Lewiston to Douglas City	<u>All Years</u> • July 1 to September 15	≤ 60° F
		• September 15 – 30	≤ 56° F
	Lewiston to Douglas City	• October 1 to December 31	≤ 56° F
WR 90-5 ROD	Lewiston to North Fork Trinity River		
Spring-Time Objectives of the Record of Decision for the Trinity River EIS/EIR (USFWS et. al., 2000)	Lewiston to Weitchpec	<u>Normal & Wetter Water Years</u> • April 15 to May 22	≤ 55° F
		• May 23 to June 4	≤ 59° F
		• June 5 to July 9	≤ 62.5° F
		<u>Dry and Critically Dry Water Years</u> • April 15 to May 22	≤ 59° F
		• May 23 to June 4	≤ 62.5° F
		• June 5 to June 15	≤ 68° F

TRD Ops Forecast – NO AOW

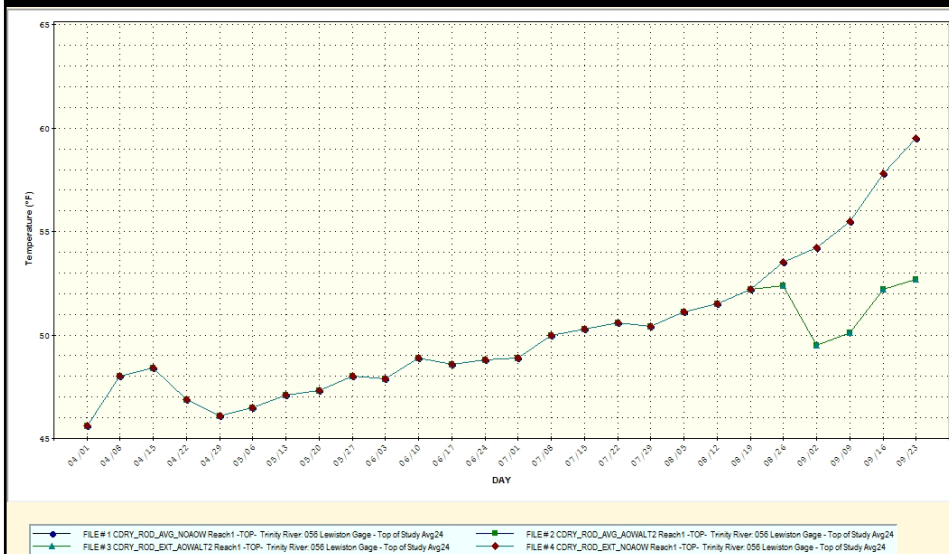


TRD Ops Forecast – AOW Alt 2

Trinity River - 2014 February 50%-Exceedance Outlook
"Critically Dry Year" Release Schedule
Mean Daily Water Temperature



Critically Dry – Avg & Extreme – Lewiston



Critically Dry – Avg & Extreme – Douglas City

