

# A Recession can be a Good Thing...

CCSS Get-Together  
Mt. Shasta City  
November 6-8, 2013



# The Bulletin 120 forecast includes, among many things...

- April-July (AJ) and Water Year (WY) forecasts
- 10%, 90%, and 50% exceedance level forecasts for AJ and WY volumes
- **Monthly breakdown of 50% exc AJ volume**
- Precipitation, Snow (courses and pillows), Flow, and Storage data by region

# Goal:

- Describe the tools Snow Surveys uses to calculate monthly volumes and the recedance after the peak month



# Monthly and AJ FNF sorted, smallest to largest

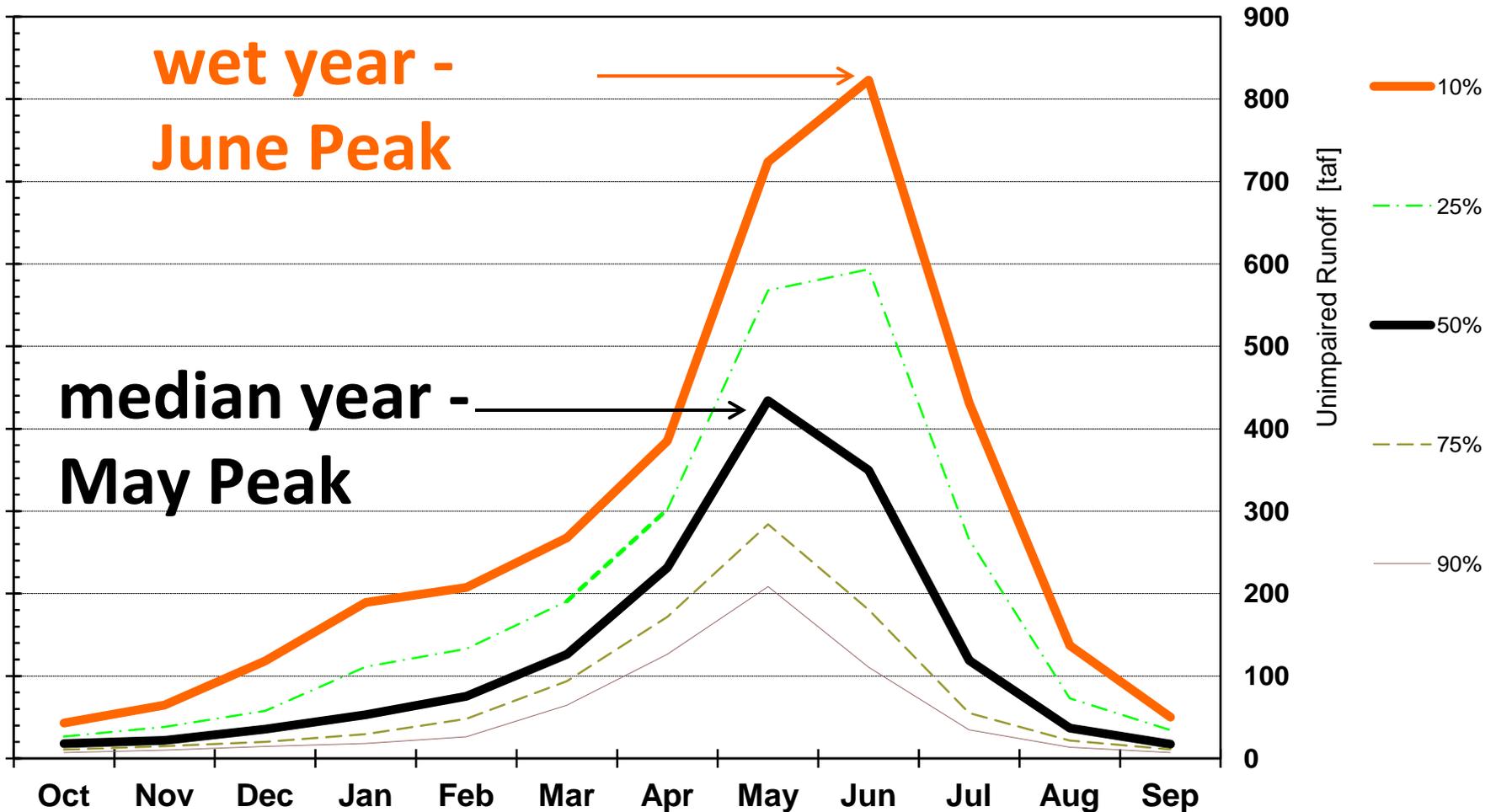
Ex: May 1 forecast with April obs and fcast'd AJ

Sacramento River at Bend Bridge Unimpaired Flow [taf]							
<i>Monthly data ranked for individual months</i>							
Apr	May	Jun	Jul	Aug	Sep	Apr-Jul	%exc
255	243	214	185	159	167	943	99%
269	263	232	186	176	174	1044	98%
300	324	244	192	177	180	1106	97%
327	335	245	208	186	184	1185	96%
382	338	249	215	188	186	1186	95%
426	338	263	218	189	188	1267	94%
438	339	264	225	190	190	<b>1311</b>	94%
441	342	265	225	195	191	1343	93%
454	353	266	229	198	191	1426	92%
455	365	271	234	198	191	1433	91%
455	373	271	235	199	199	1475	90%
470	374	288	242	200	202	1497	89%
485	391	297	242	201	208	1501	88%
516	415	298	244	204	210	1508	87%
<b>526</b>	425	304	244	209	212	1519	86%
554	431	310	246	212	215	1535	85%
555	431	312	246	215	217	1565	84%
556	432	314	247	219	217	1601	83%

# San Joaquin River AJ, WY, and monthly FNF at various exceedance levels

<b>%exc</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Apr-Jul</b>	<b>WY</b>
<b>99%</b>	5	6	7	10	11	19	57	75	35	16	9	4	262	362
<b>90%</b>	7	10	15	18	26	65	127	209	111	35	14	7	552	809
<b>75%</b>	11	15	20	30	48	94	172	284	180	55	22	11	783	1111
<b>50%</b>	18	22	36	53	75	126	231	434	350	119	37	17	1151	1654
<b>25%</b>	27	38	58	111	133	191	302	568	593	266	73	33	1643	2272
<b>10%</b>	43	65	118	189	207	268	385	724	823	431	137	47	2294	3228
<b>1%</b>	142	247	461	735	472	485	613	1096	1166	1000	280	170	3355	4642

# San Joaquin River AJ, WY, and monthly FNF at various exceedance levels



# Finding similar years...in 55 seconds

## Start with a chronological record

San Joaquin River at Friant Dam Unimpaired Flow [taf]										
<i>Chronological monthly flow</i>										
WY	Oct		Feb	Mar	Apr	May		Sep	A-Jul	Sum
1901	25	....	277	258	278	724	....	20	2125	
1902	30	....	43	101	273	422	....	23	1328	
1903	21	....	62	86	228	550	....	18	1365	
2010	54	....	101	142	222	383	....	16	1535	
2011	60	....	114	277	393	545	....	47	2243	
2012	48	....	35	75	209	244	....	6	559	

**Assume: April 1 f'cast and a Feb-Mar flow of 120 taf:**

**Find: April FNF after a similar Feb-Mar**

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<i>Chronological monthly flow</i>										
WY	Oct		Feb	Mar	Apr	May		Sep	A-Jul	Sum
1901	25	....	277	258	278	724	....	20	2125	
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2011	60	....	114	277	393	545	....	47	2243	
2012	48	....	35	75	209	244	....	6	559	

# Feb + Mar are summed and shown in right column

San Joaquin River at Friant Dam Unimpaired Flow [taf]										
<i>Chronological monthly flow</i>										
WY	Oct		Feb	Mar	Apr	May		Sep	A-Jul	Sum
1901	25	....	277	258	278	724	....	20	2125	535
1902	30	....	43	101	273	422	....	23	1328	143
1903	21	....	62	86	228	550	....	18	1365	148
2010	54	....	101	142	222	383	....	16	1535	243
2011	60	....	114	277	393	545	....	47	2243	391
2012	48	....	35	75	209	244	....	6	559	110

# The summed values are sorted smallest to largest to find similar April, San Joaquin R

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Apr-Jul	SUM
1977	20	10	7	12	15	19	57	75	111	20	11	4	262	34
1924	28	16	14	14	21	26	95	164	35	17	9	6	310	47
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
1994	19	17	21	23	42	75	150	258	159	36	14	12	602	117
1990	23	22	17	25	34	85	173	165	122	54	14	8	514	119
1953	17	19	43	85	48	72	197	211	320	172	30	13	900	120
1955	6	18	31	42	49	74	127	338	348	88	30	11	900	123
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
1983	126	146	212	227	271	428	280	728	1166	686	280	92	2860	699
1986	24	38	68	93	472	426	361	624	593	222	76	32	1801	899

# The percent of WY flows for a given month and exceedance level, San Joaquin R

Monthly distribution for bands of years surrounding given exceedence [% of annual]															
%exc	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Ap-Jl	WY	
99%	3%	3%	3%	3%	6%	10%	21%	28%	14%	5%	2%	2%	68%	100%	
90%	3%	3%	3%	3%	5%	10%	20%	28%	16%	6%	3%	2%	69%	100%	
75%	2%	2%	3%	3%	5%	9%	18%	29%	20%	7%	2%	1%	73%	100%	
50%	2%	2%	3%	4%	6%	8%	14%	27%	24%	8%	2%	1%	73%	100%	
25%	1%	1%	3%	6%	6%	8%	13%	24%	23%	11%	3%	1%	70%	100%	
10%	1%	1%	3%	6%	6%	8%	11%	21%	23%	14%	4%	2%	69%	100%	
1%	1%	1%	3%	5%	5%	9%	11%	20%	24%	15%	5%	2%	69%	100%	

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Monthly distribution for bands of years surrounding given exceedence [% of annual]

%exc	Dec	Feb	Apr	May	Jun	Jul	Ap-Jl
99%	3%	6%	21%	28%	14%	5%	68%
<b>90%</b>	3%	5%	<b>20%</b>	28%	<b>16%</b>	6%	<b>69%</b>
75%	3%	5%	18%	29%	20%	7%	73%
50%	3%	6%	14%	27%	24%	8%	73%
25%	3%	6%	13%	24%	23%	11%	70%
<b>10%</b>	3%	6%	<b>11%</b>	21%	<b>23%</b>	14%	<b>69%</b>
1%	3%	5%	11%	20%	24%	15%	69%

# 3 Scenarios and Questions



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- **Assume a near-average year and an April 1 f'cast...the initial monthly distribution shows no river with April as the peak month.**

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- **Question 1: For how many west-side Sierra rivers (including Sac. and Klamath rivers) is April the peak month in a normal year?**
  - a) 6
  - b) 3
  - c) 0

# Scenario 1:

- Assume a near-average year and an April 1 f'cast ...the initial monthly distribution shows no river with April as the peak month.
- **Question 1: For how many west-side Sierra rivers (including Sac. and Klamath rivers) is April the peak month in a near-avg year?**
  - a) 6
  - b) 3
  - c) 0**

# Scenario 2:

- **Assume a normal year...the preliminary May 1 forecast indicates 2 peaks for the Feather through American rivers AND for the Kaweah.**  
**( 2 peaks = rain and snow peaks)**

# Scenario 2:

- Assume a normal year...the preliminary May 1 forecast indicates 2 peaks for the Feather through American rivers AND for the Kaweah.  
( 2 peaks = rain and snow peaks)
- **Question 2: In a normal year, how many rivers south of the American R. have two peaks?**
  - a) 3
  - b) 2
  - c) 0

# Scenario 2:

- Assume a normal year...the preliminary May 1 forecast indicates 2 peaks for the Feather through American rivers AND for the Kaweah.  
( 2 peaks = rain and snow peaks)
- Question 2: In a normal year, how many rivers south of the American R. have two peaks?
  - a) 3
  - b) 2
  - c) 0

# Scenario 3:

- **Given: San Joaquin AJ avg = 1258**

**Kings AJ avg = 1236**

**Assume: a May 1 f'cast when**

**April Kings FNF > San Joaquin FNF**

# Scenario 3:

- **Given: San Joaquin AJ avg = 1258**

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- **Question 3: In what percentage of years is the Kings AJ greater than the San Joaquin AJ?**
  - a) 20%
  - b) 31%
  - c) 42%

# Scenario 3:

- **Given: San Joaquin AJ avg = 1258**

**Kings AJ avg = 1236**

**Assume: a May 1 f'cast when**

**April Kings FNF > San Joaquin FNF**

- **Question 3: At what percentage is the Kings AJ greater than the San Joaquin AJ?**

**a) 25%**

**b) 31%**

**c) 38%**

**Scenarios 4-125 will be covered at a later date**



**THE END**