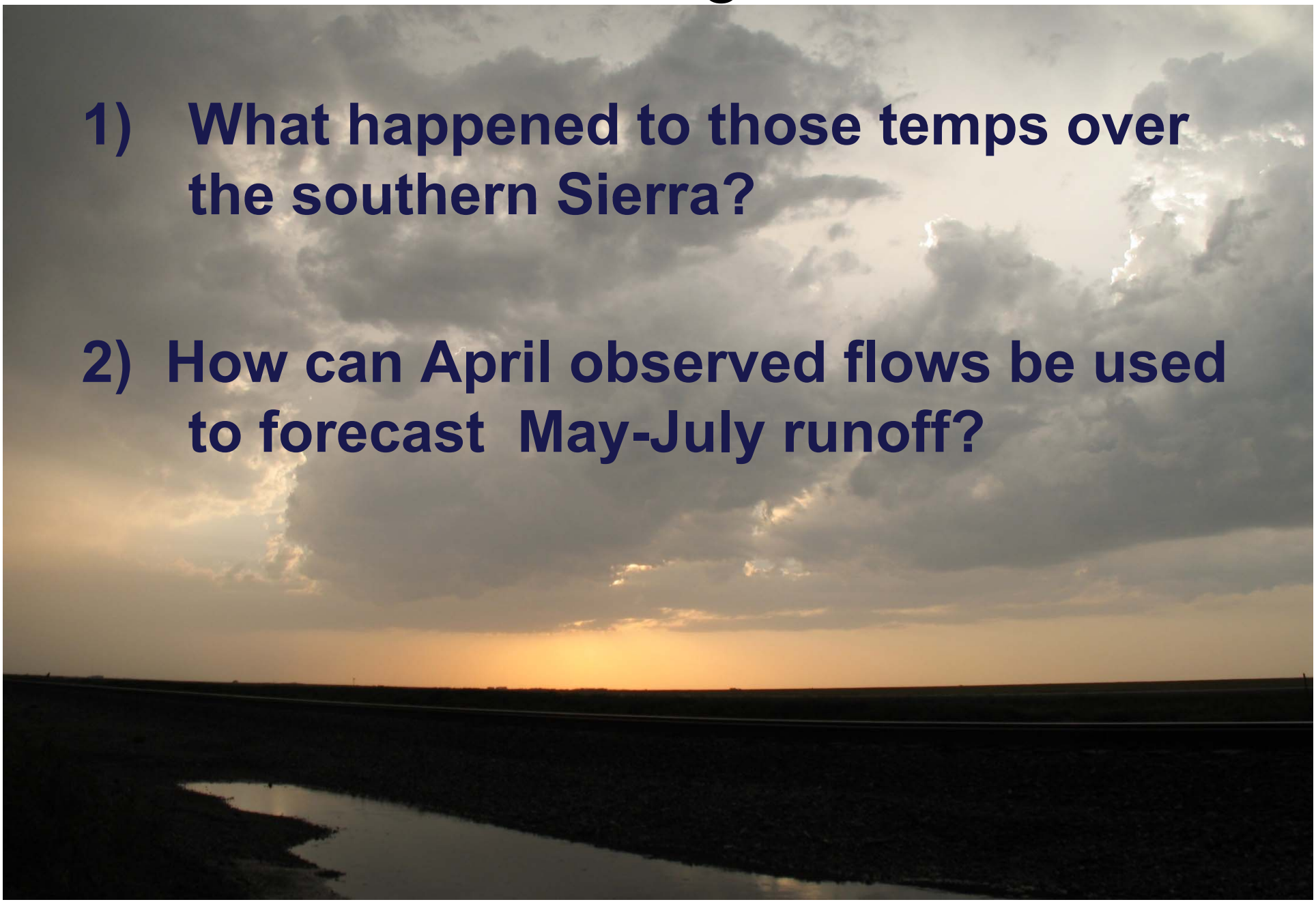
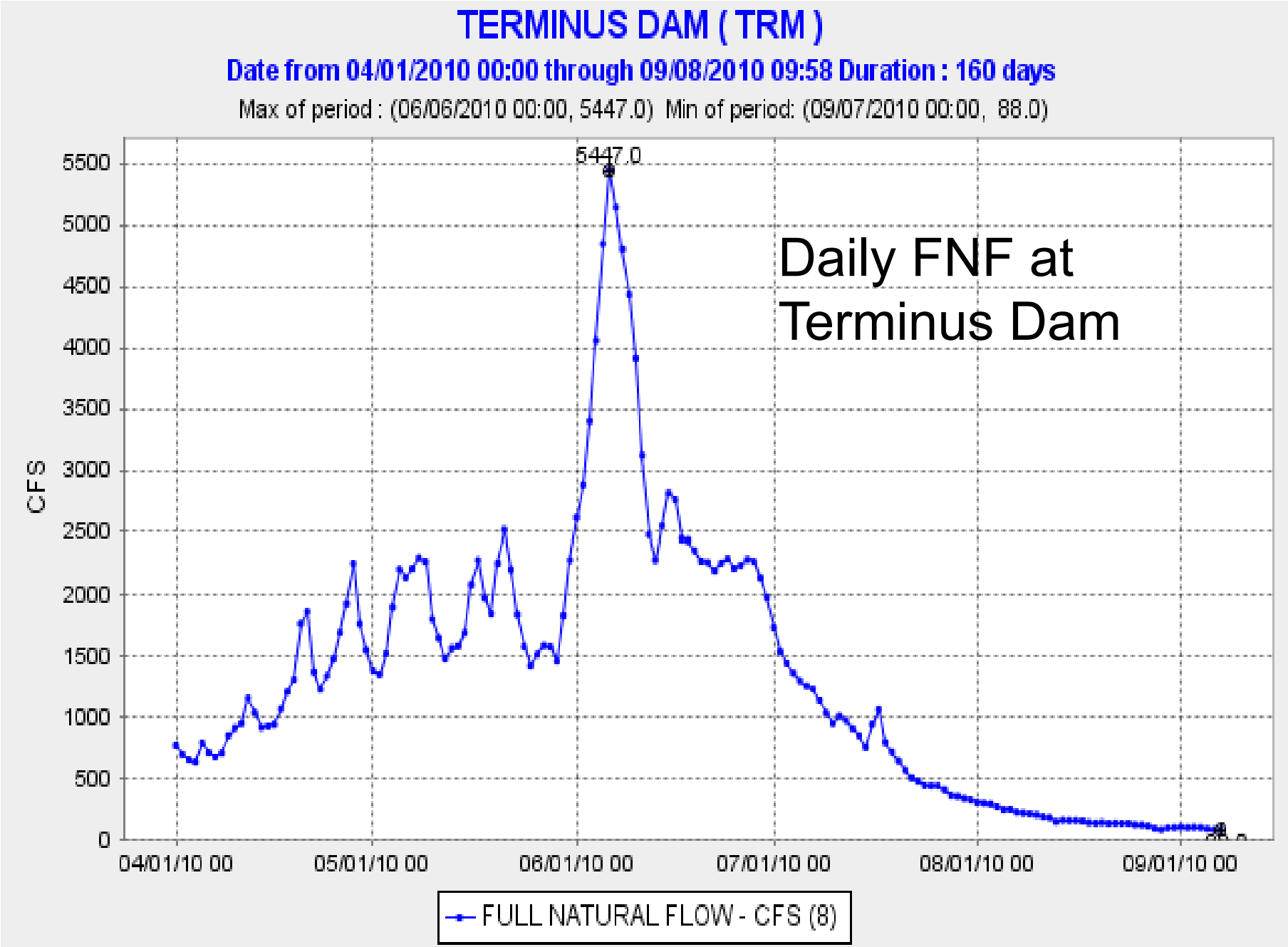
2010 California Cooperators Snow Conference – Bishop California

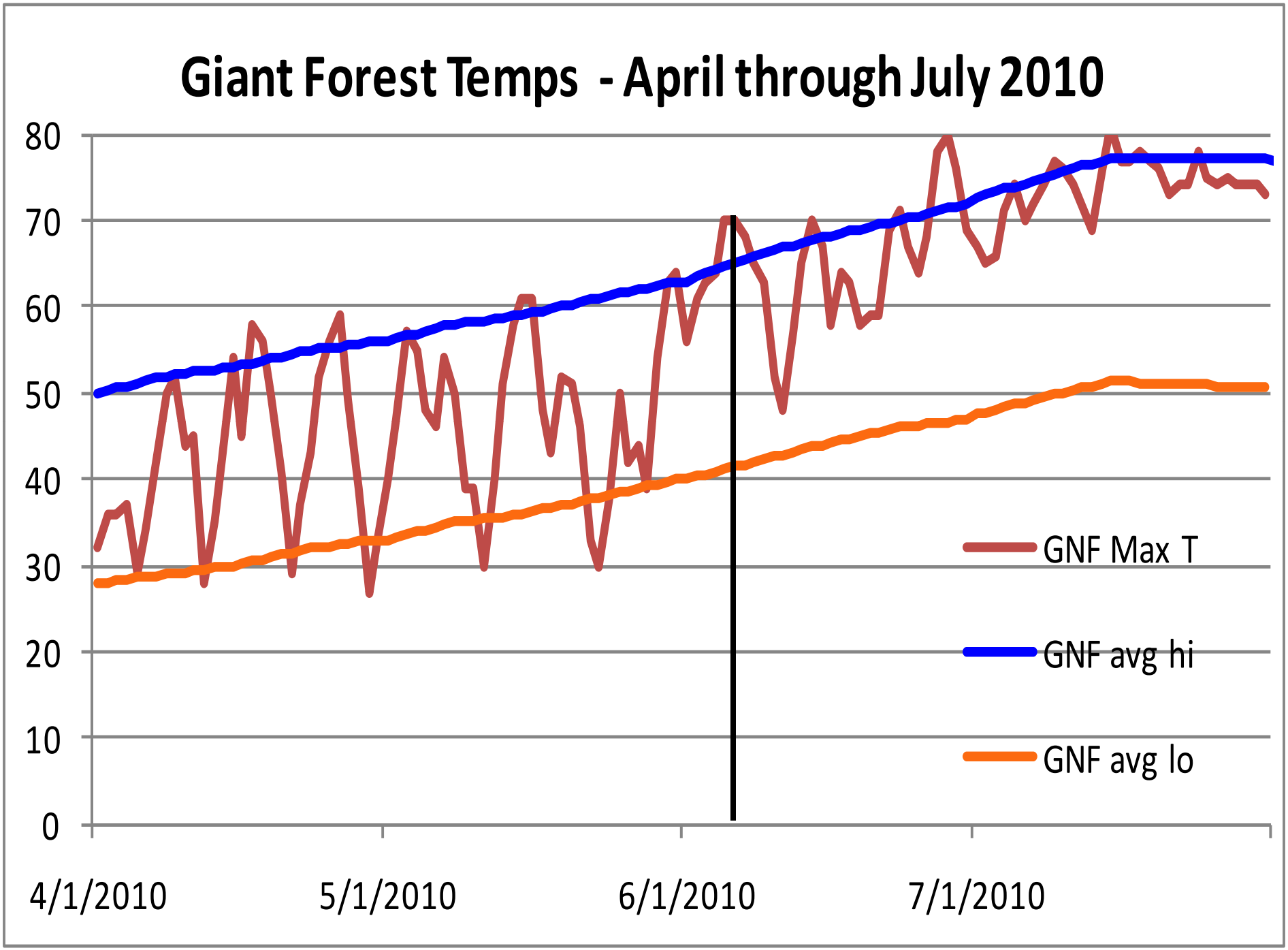
Two thoughts…

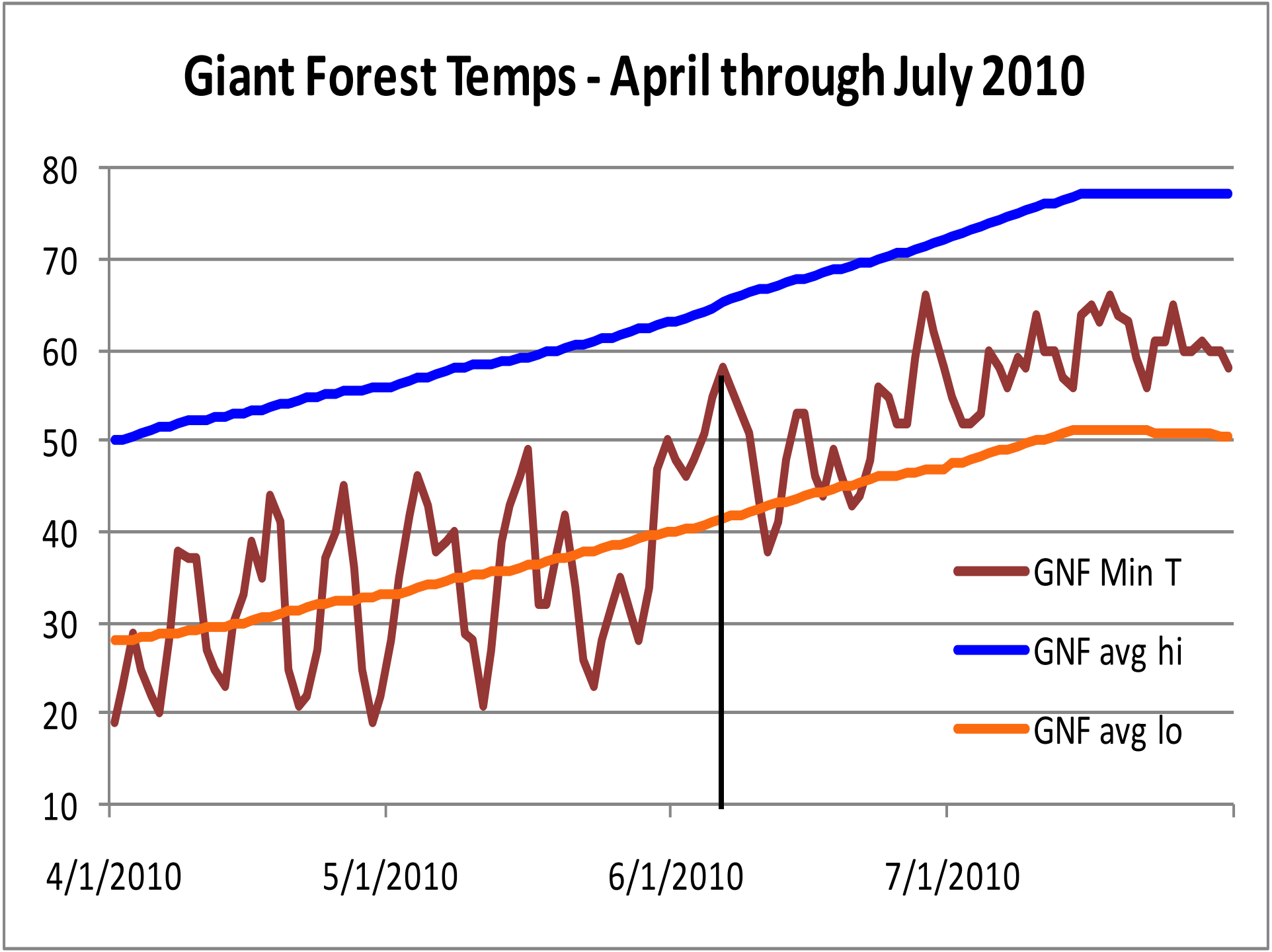


1) **What happened to those temps over the southern Sierra?**

2) **How can April observed flows be used to forecast May-July runoff?**


TERMINUS DAM (TRM)
Date from 04/01/2010 00:00 through 09/08/2010 09:58 Duration : 160 days
Max of period : (06/06/2010 00:00, 5447.0) Min of period: (09/07/2010 00:00, 88.0)
5447.0
Daily FNF at Terminus Dam
CFS
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
04/01/10 00
05/01/10 00
06/01/10 00
07/01/10 00
08/01/10 00
09/01/10 00
FULL NATURAL FLOW - CFS (8)


Giant Forest Temps - April through July 2010
80
70
60
50
40
30
20
10
0
4/1/2010
5/1/2010
6/1/2010
7/1/2010
GNF Max T
GNF avg hi
GNF avg lo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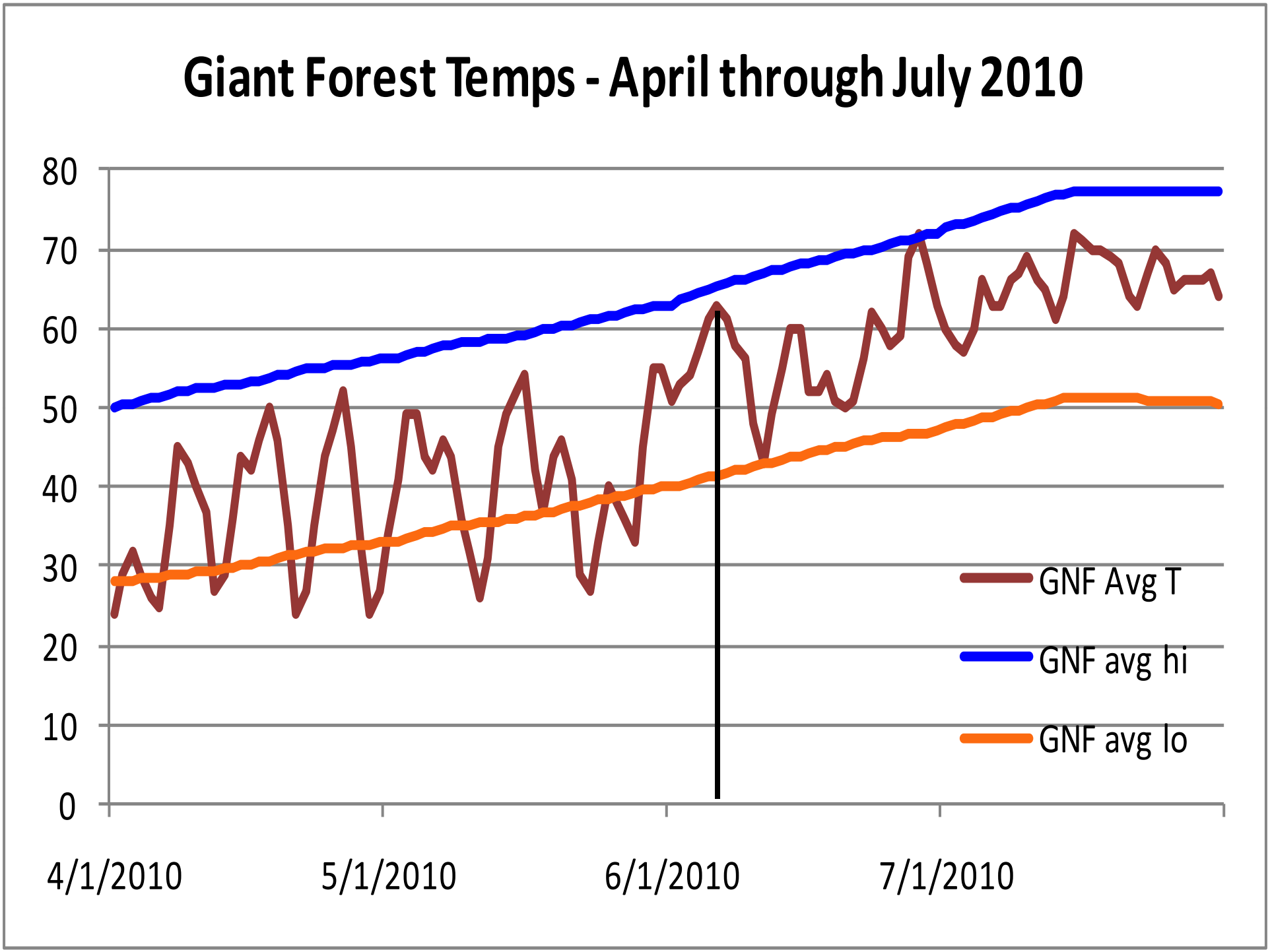
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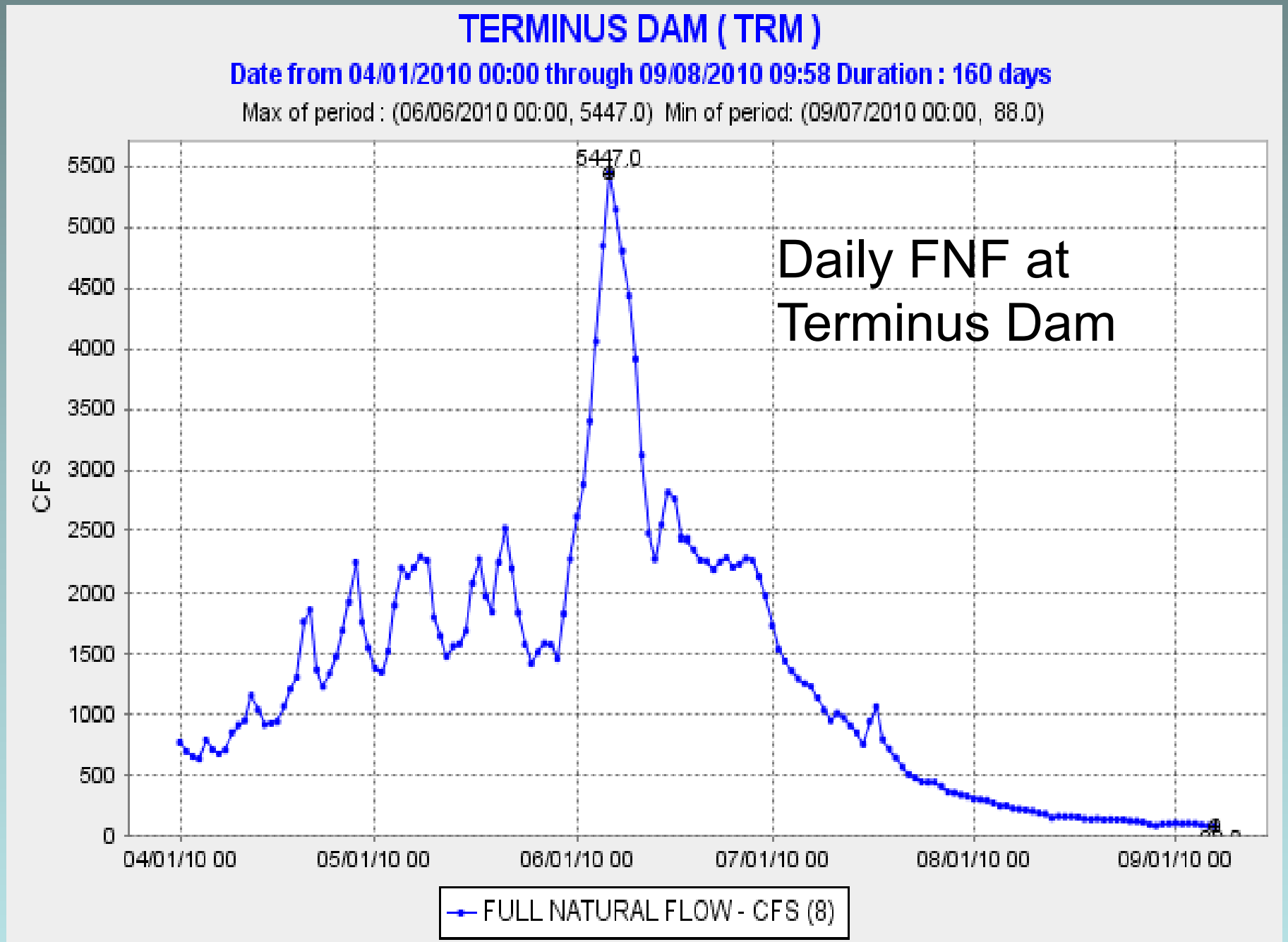
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FULL NATURAL FLOW - CFS (8)

Kings River inflow to Pine Flat Reservoir
April-July runoff forecast
Example is for April 1 forecast

		Parameter	
	Index	Coefficient	Runoff
pre A-J runoff	1010	0.05	47
Apr 1 High Snow	109	8.4	915
Apr 1 Low Snow	146	0.7	97
Oct-Mar precip	102	3.2	324
Apr-June precip	80	2.5	202
Constant	-	-372	-372
Sum			**1213**

Kings River inflow to Pine Flat Reservoir
April-July runoff forecast
Example is for May 1

		Parameter	
	Index	Coefficient	Runoff
pre A-J runoff	1010	0.0464	47
High Snow	109	8.3795	915
Low Snow	146	0.6661	97
Oct-Mar precip	102	3.1807	324
Apr-Jun precip	185	2.5271	466
Constant	-	-372	-372
Sum			**1477**

Goals: Introduce a **new** parameter to use April observed conditions AND develop a new eqn for **May-July**

- Possible new parameters:
  1) average Temp for April
  2) May 1 snow courses
  3) April observed runoff

May-July runoff parameters showing the new parameter for the Kings R

pre A-J runoff
High Snow
Low Snow
O-M precip
A-J precip
April FNF
Constant

But: The new equation did not produce a much better forecast…why?

The answer: the square root of the FNF reduced the variability

WY	Apr RO (taf)		Square Root of Apr RO (taf)
1977	71		8
1912	73		9
1976	74		9
1924	87		9
1975	97		10
1969	396		20
2006	397		20
1907	403		20
1916	433		21
1982	528		23
Max/Min =	7.4		2.9

Comparison of 4 equations one at a time

obs	Eqn1	Eqn 2		Eqn 2	Eqn 3
1460	1454	1438		1438	1500
1350	1327	1348		1348	1355
280	256	285		285	278
128	134	130		130	135
2508	2547	2503		2503	2605
1306	1227	1247		1247	1305
1989	2134	2077		2077	2201
927	934	945		945	930
Tally →	2	6		5	3

Another check…

…The Standard Deviation of the errors

Def: a value such that **68%** of the distribution falls with **+ or - one Standard Deviation** from the mean

The Standard Deviation provides:

1) **a confidence interval for the error of an equation**

2) **a confidence interval for any distribution**

EX: 68% chance that the Kern AJ for WY 2011 will be < 810 and > 110

Summary:

- Used April RO in May 1 equation to forecast May-Jul FNF
- Compared eqns one at a time, not all together (avoid group comparisons)
- Compared eqns using the Standard Deviation of the errors
- Std Dev can be used as a confidence interval
- May-Jul eqn was superior using the side-by-side comparison and the Std Dev of errors

Thanks for listening……Questions?