B-120 Equation Updates in the American and San Joaquin Basins

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Background

- Use of Regression equations for B-120
- Need for equation updates even with the models
- American and San Joaquin Basin equation updates last updated in 2006

Outline

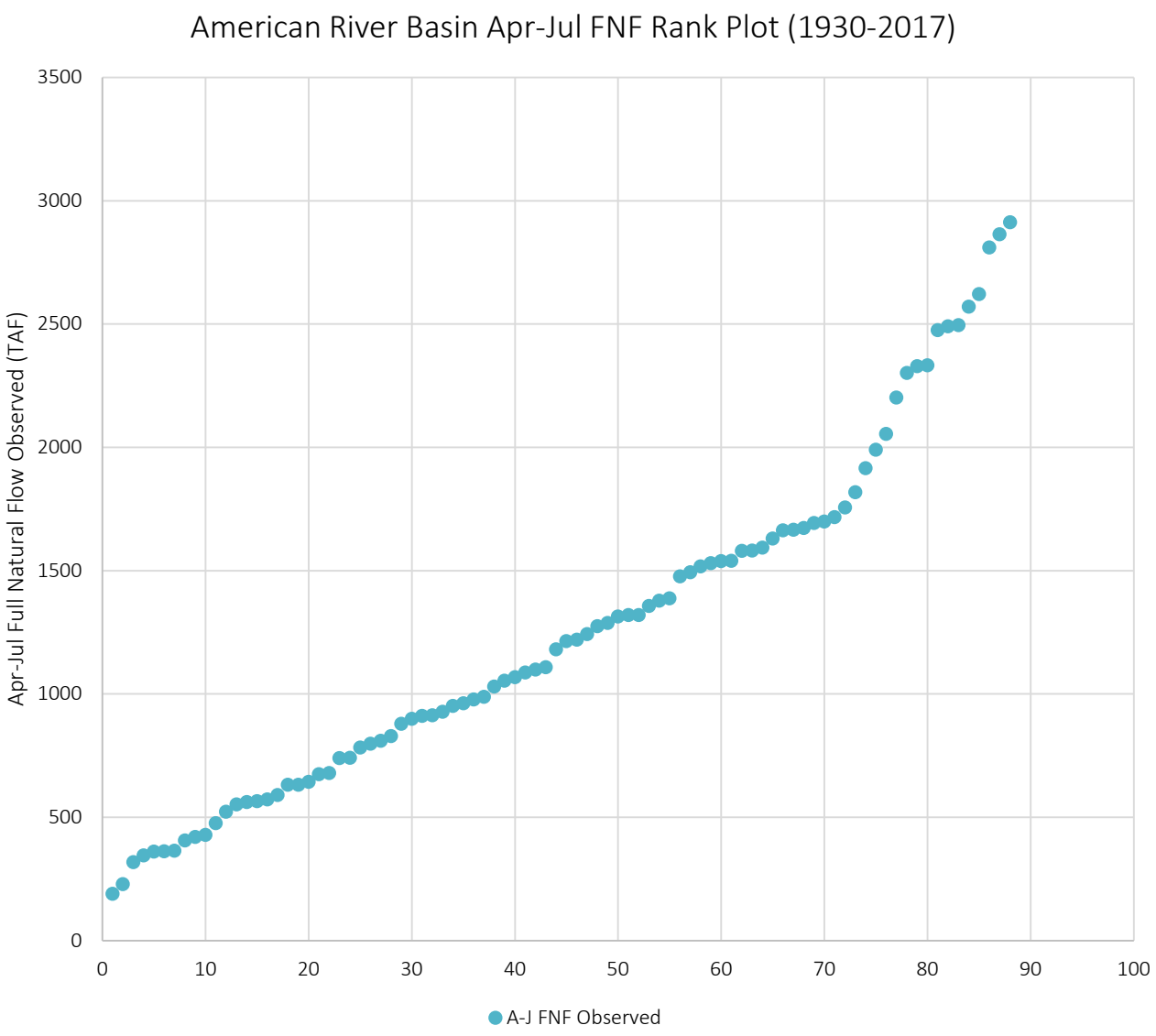
- Methodology
- New Equations
- Estimation method
- Application

Independent Variables:

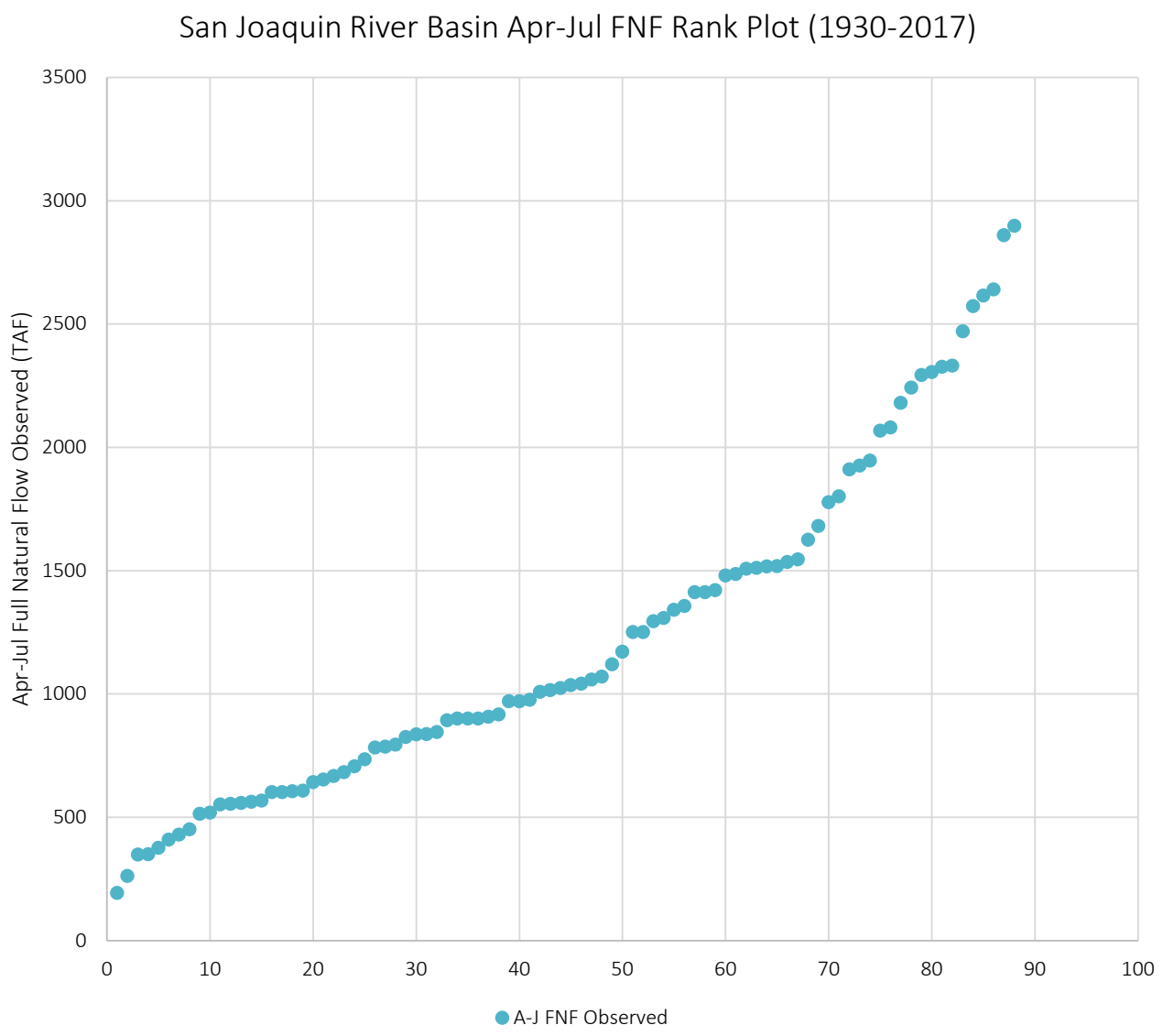
1. Oct-Mar Precipitation Index
2. Apr-Jun Precipitation Index
3. April 1 High Snow Index
4. April 1 Low Snow Index
5. Prior Year A-J Runoff
6. Oct-Mar FNF

$$Y = aX1 + bX2 + cX3 + dX4 + \ldots\ldots + c$$

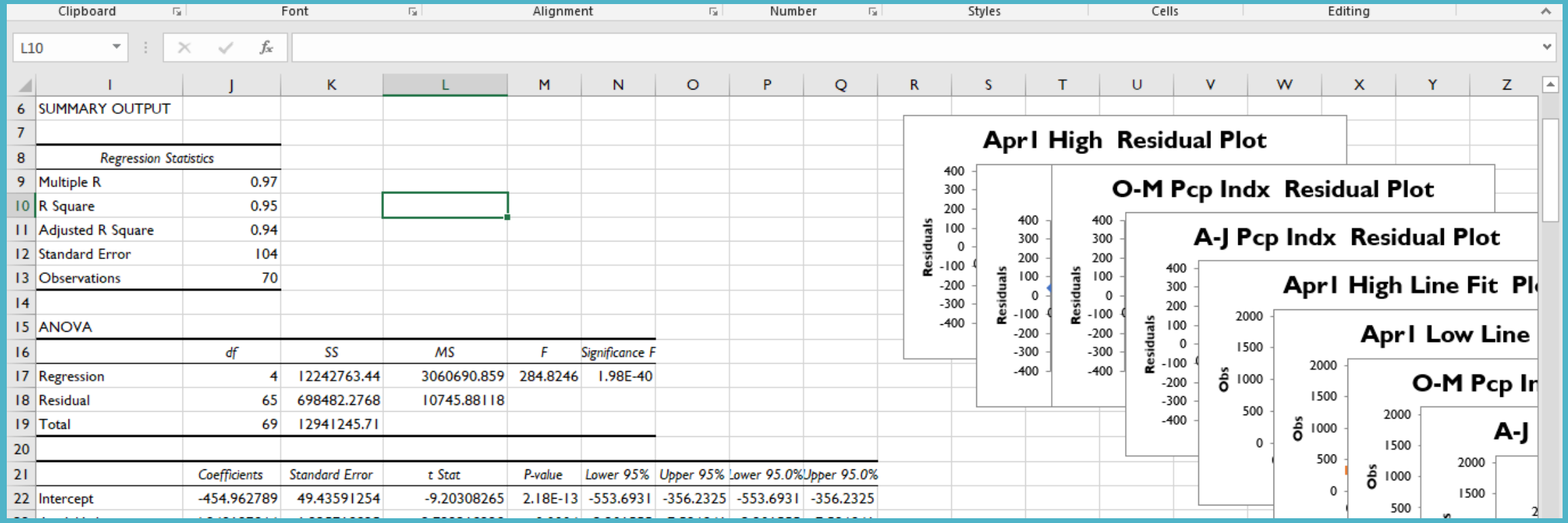
Methodology



American River Basin AJ FNF Rank Plot



San Joaquin River Basin AJ FNF Rank Plot



6	SUMMARY OUTPUT								
7									
8	*Regression Statistics*								
9	Multiple R	0.97							
10	R Square	0.95							
11	Adjusted R Square	0.94							
12	Standard Error	104							
13	Observations	70							
14									
15	ANOVA								
16		*df*	*SS*	*MS*	*F*	*Significance F*			
17	Regression	4	12242763.44	3060690.859	284.8246	1.98E-40			
18	Residual	65	698482.2768	10745.88118					
19	Total	69	12941245.71						
20									
21		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
22	Intercept	-454.962789	49.43591254	-9.20308265	2.18E-13	-553.6931	-356.2325	-553.6931	-356.2325

Estimation Method

Multiple Linear Regression using MS Excel Data Analysis Package

① Y = 0.056*PrAJRO + 6.81*OMPcpInd + 5.30*AJPcpInd + 8.87*Apr1Low - 2.64*Apr1High - 610.54 (All 50 WYs) Adjusted R square = 0.97, Error = 136

② Y = 3.54*OMPcpInd + 4.96*AJPcpInd + 3.67*Apr1Low + 4.95*Apr1High - 454.96 (Normal WYs) Adjusted R square = 0.94, Error = 104

③ Y = 5.65*OMPcpInd + 3.71*AJPcpInd + 3.15*(Apr1Low + Apr1High) (Wet WYs) Adjusted R square = 0.92, Error = 184

American Basin New Equations

① Y = 0.05PrAJRO + 3.27*AJPcpInd + 1.69*Apr1Low + 10.96*Apr1High - 438.1
(All 50 WYs) Adjusted R square = 0.98, Error = 115

② Y = 0.06PrAJRO + 2.78*AJPcpInd + 1.64*Apr1Low + 10.76*Apr1High - 424.8
(Normal WYs) Adjusted R square = 0.95, Error = 80

③ Y = 5.78*OMPcpInd + 3.05*AJPcpInd + 2.55*(Apr1Low + Apr1High)
(Wet WYs) Adjusted R square = 0.94, Error = 130

San Joaquin Basin New Equations

Application on WY 2018 (Hindcast)

American River Full Natural Flow into the Folsom Lake from April through July

Apr 1, High Snow Index	65
Apr 1, Low Snow Index	57
Oct-Mar Precipitation Index	100
Apr-Jun Precipitation Index	107
Previous Year Apr-Jul Runoff	2302TAF
Obs AJ Runoff	1071TAF
% average	89%
Normal Year Equation (1930-17)	961TAF
Equation with Most Recent 50 yrs (1968-17)	1101TAF

Application on WY 2018 (Hindcast)

San Joaquin Full Natural Flow into Millerton Lake from April through July

Apr 1, High Snow Index	76
Apr 1, Low Snow Index	51
Oct-Mar Precipitation Index	84
Apr-Jun Precipitation Index	82
Previous Year Apr-Jul Runoff	2641TAF
Obs AJ Runoff	948TAF
% average	77%
Normal Year Equation (1930-17)	863TAF
Equation with Most Recent 50 yrs (1968-17)	881TAF

Next Steps

Evaluate	**The equations in WY 2019**
Fine-tune	**Using programs such as R**
Similar	**Analysis on other basins**

Thank you!

Andy Reising

Steve Nemeth

John King