Surface Water / Groundwater Integration in URGWOM

Long Term Plan

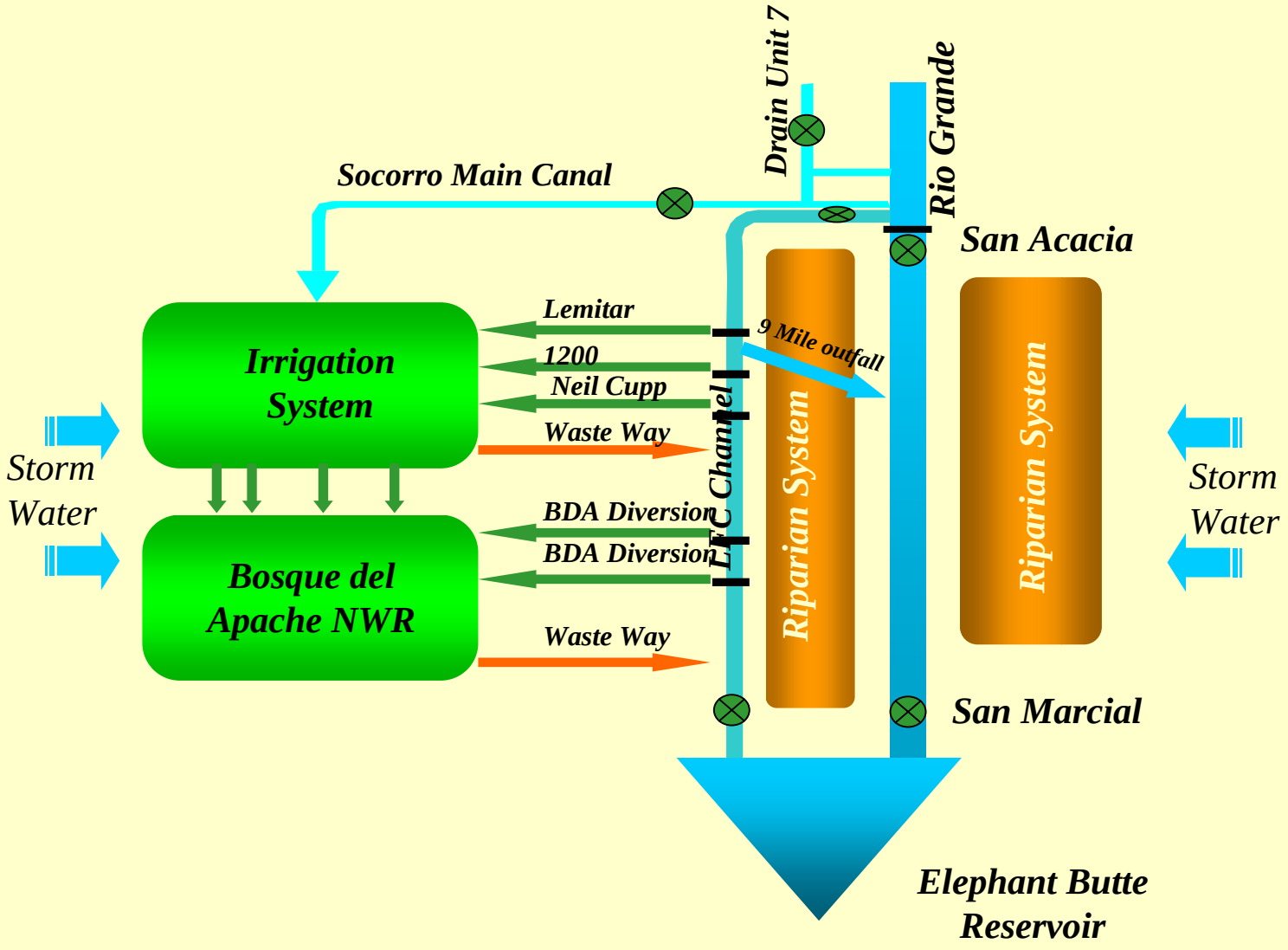
Surface Water and Groundwater Interaction in URGWOM:

- *Look up tables*
- *RIVERWARE Methods*
- *Dynamic link to MODFLOW*

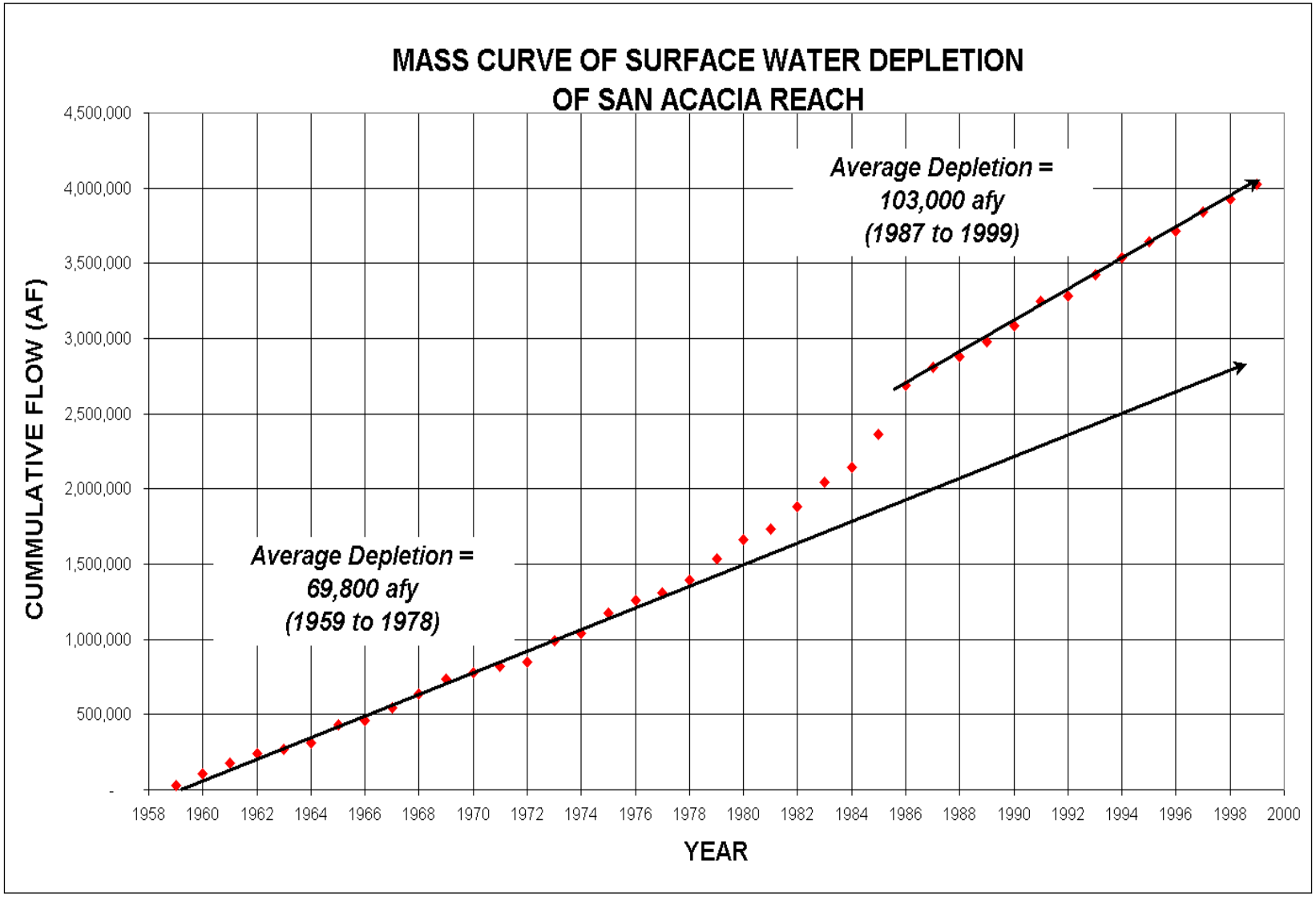
Need for SW/GW Link

- *Model was calibrated with no diversion to LFCC.*
- *Distribution of groundwater levels impacts river Seepage loss.*
- *High variability of riparian ET.*
- *Magnitude of river loss is high compared to river flow.*

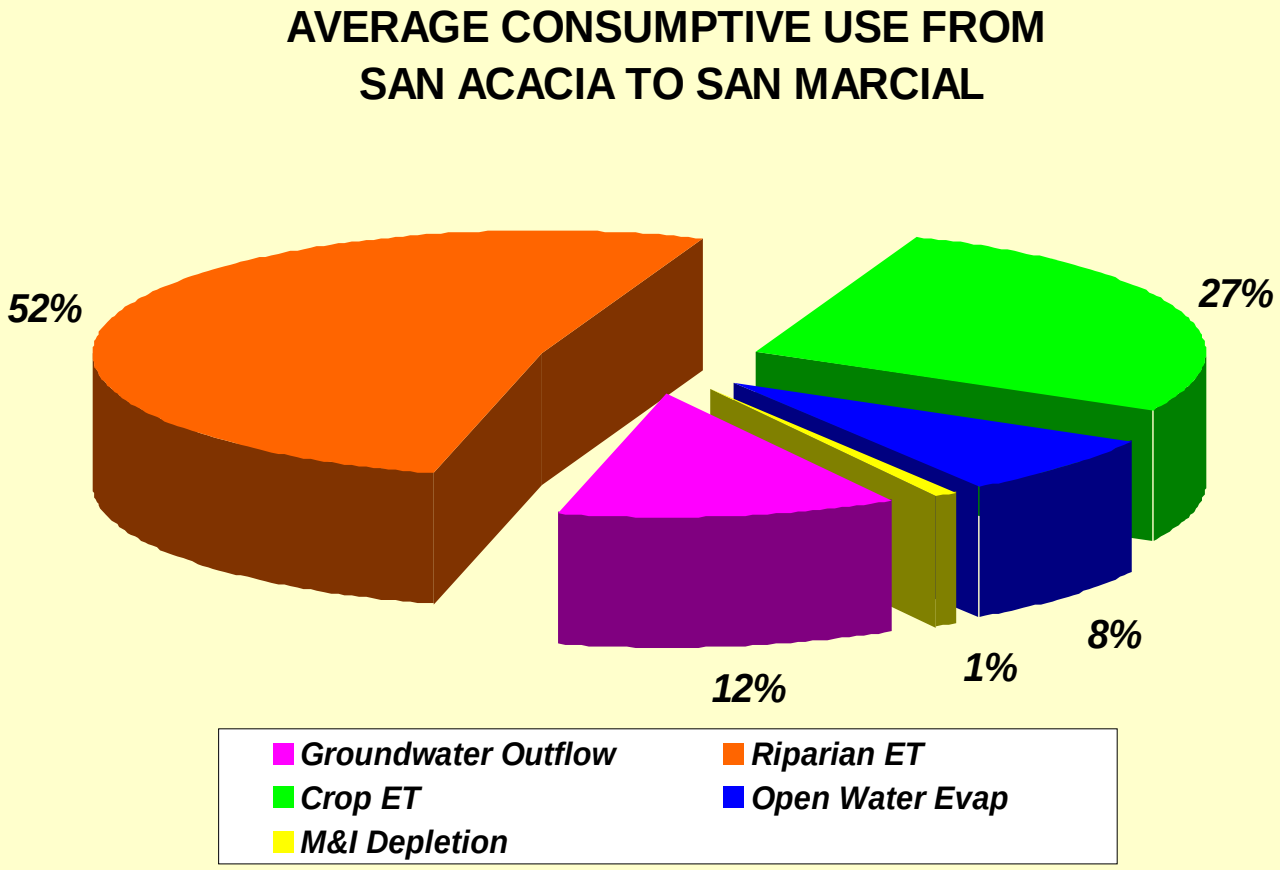
Schematic of the Flow System in San Acacia Reach



SW System Depletions Through Time

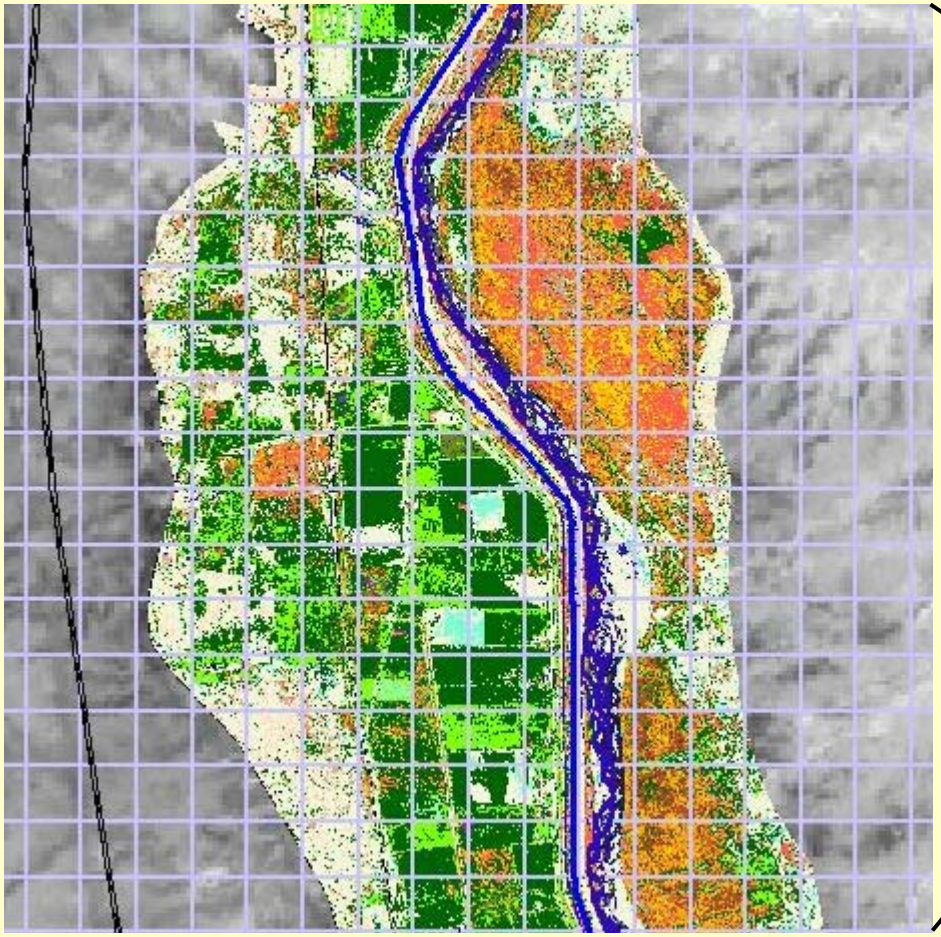


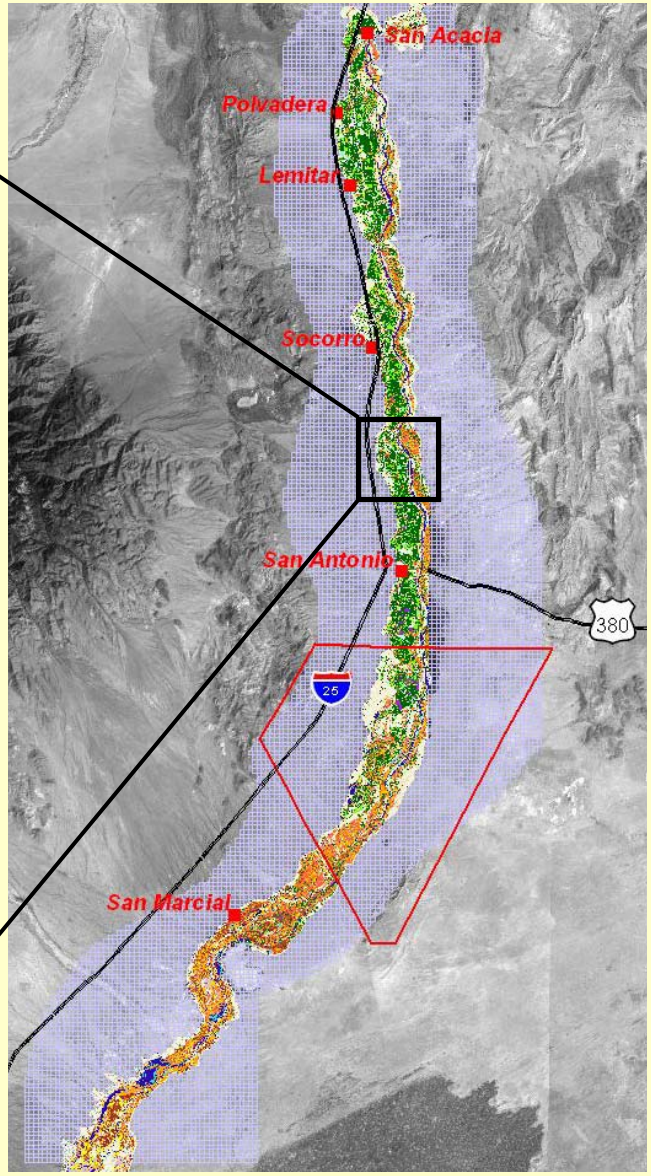
San Acacia to San Marcial Depletions



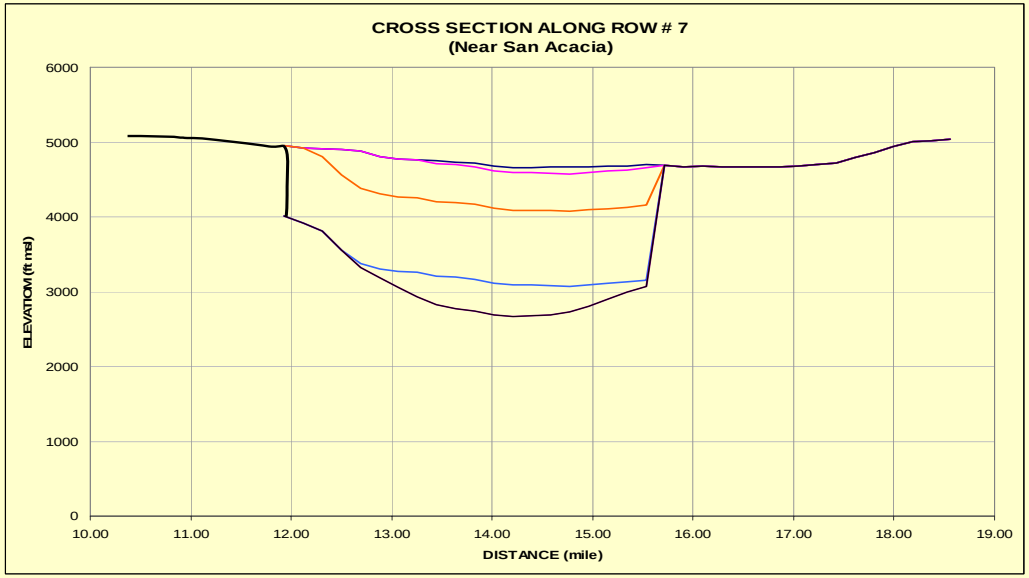
Average CU 123,000 acre-feet

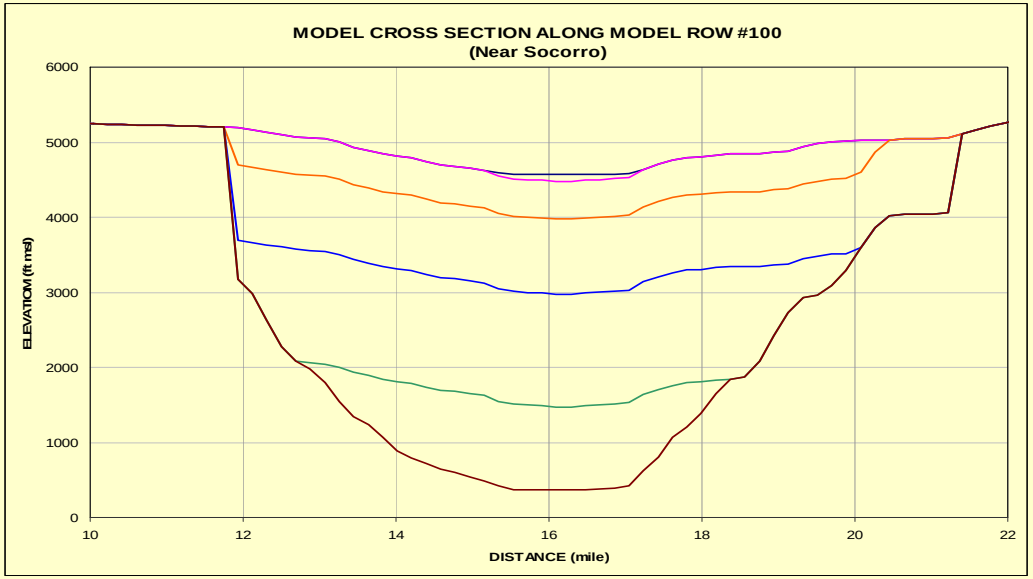
Numerical Model Grid



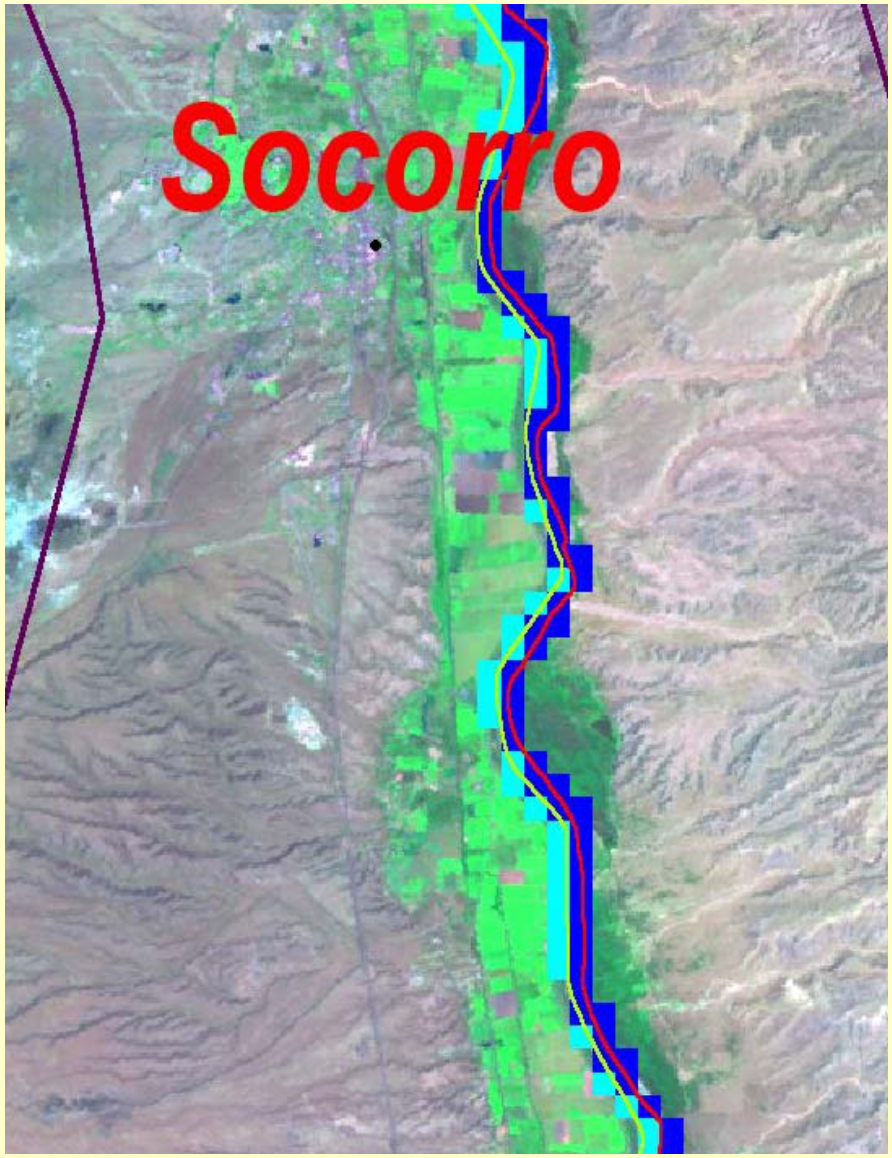


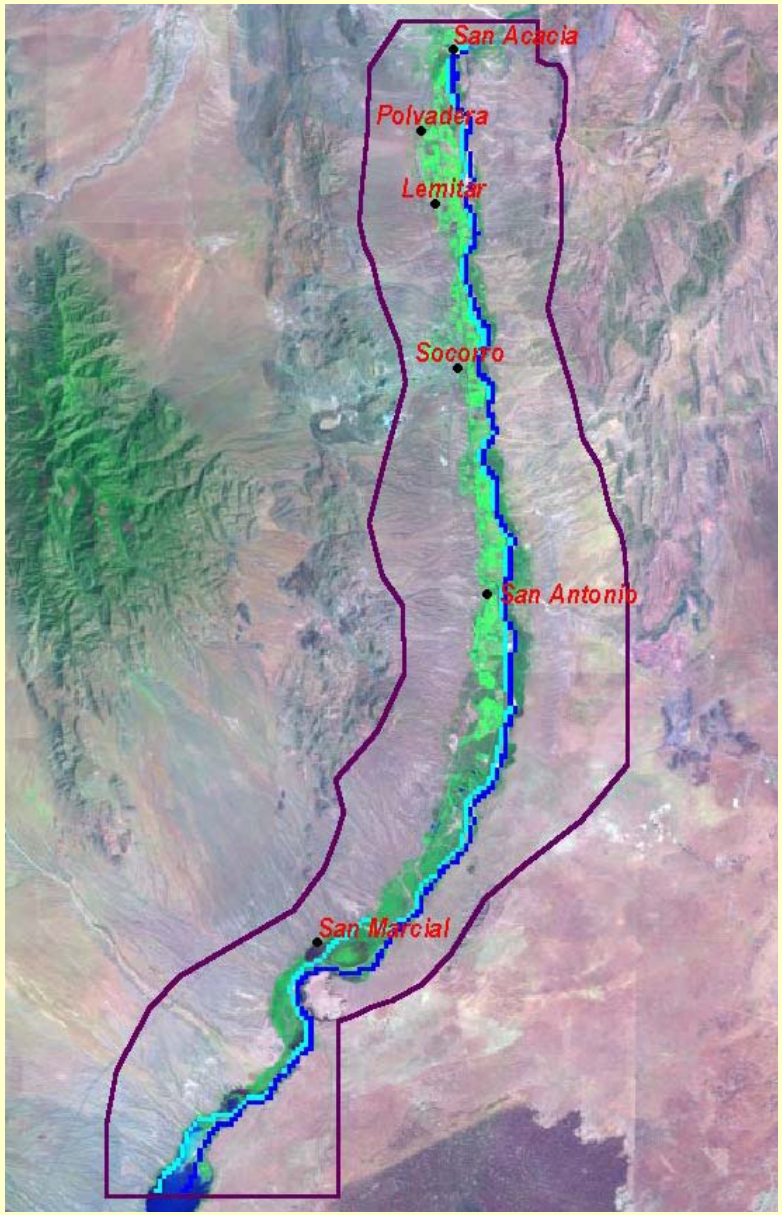
Model Cross Section



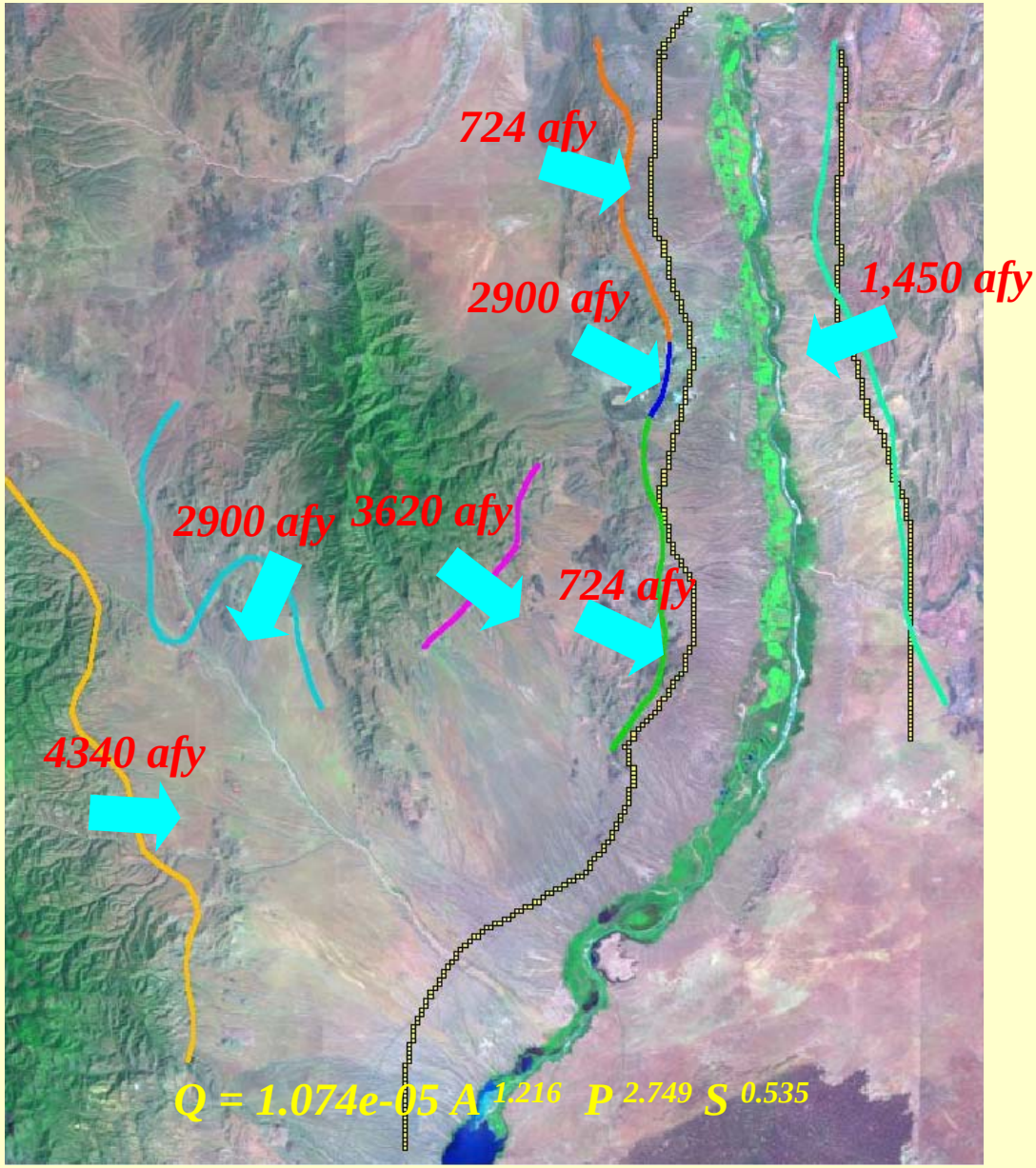


Rio Grande and LFCC



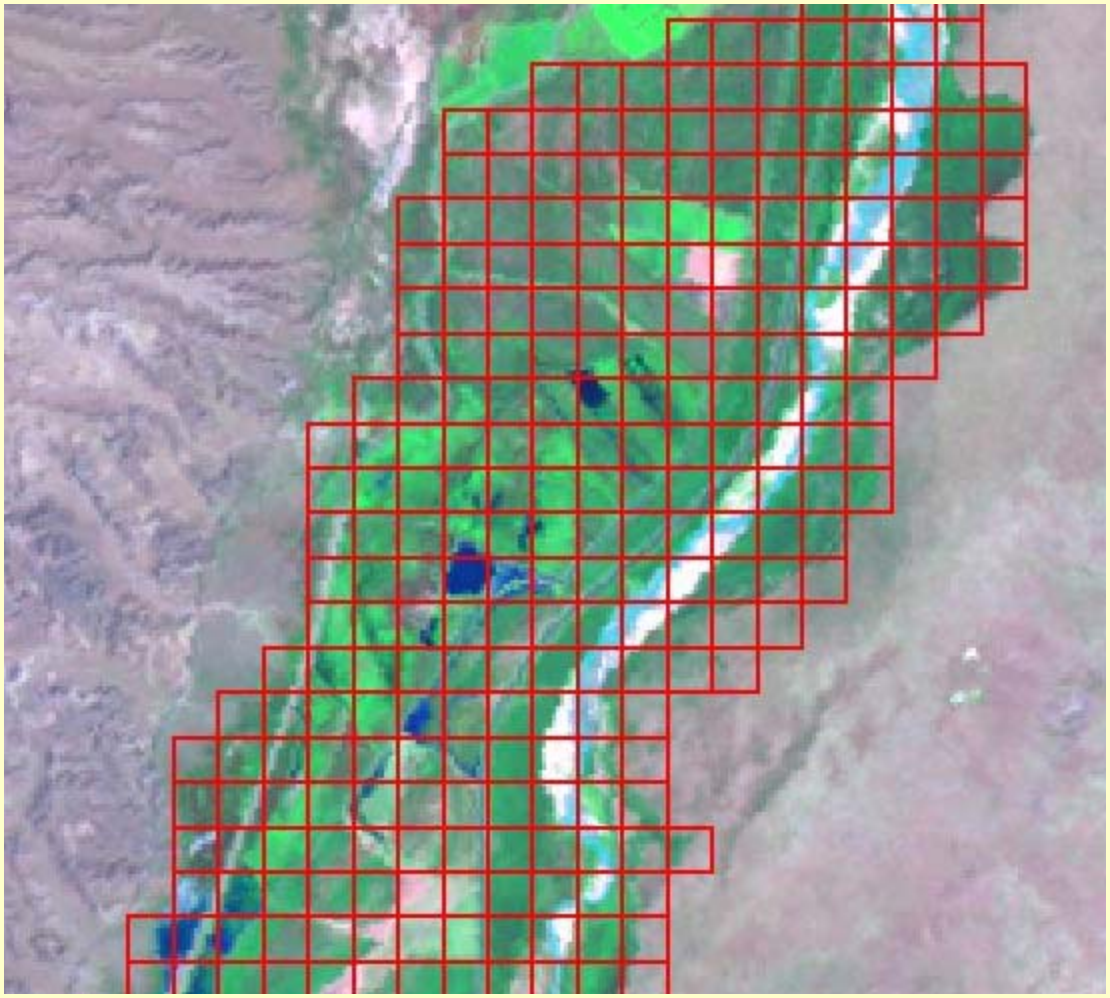


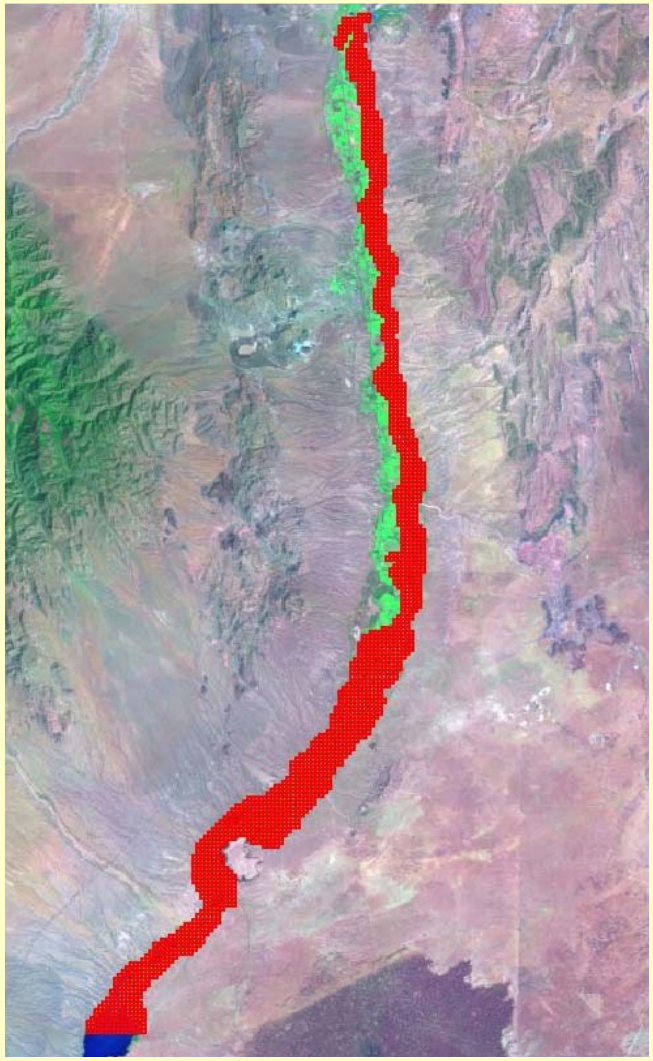
Mountain Front Recharge



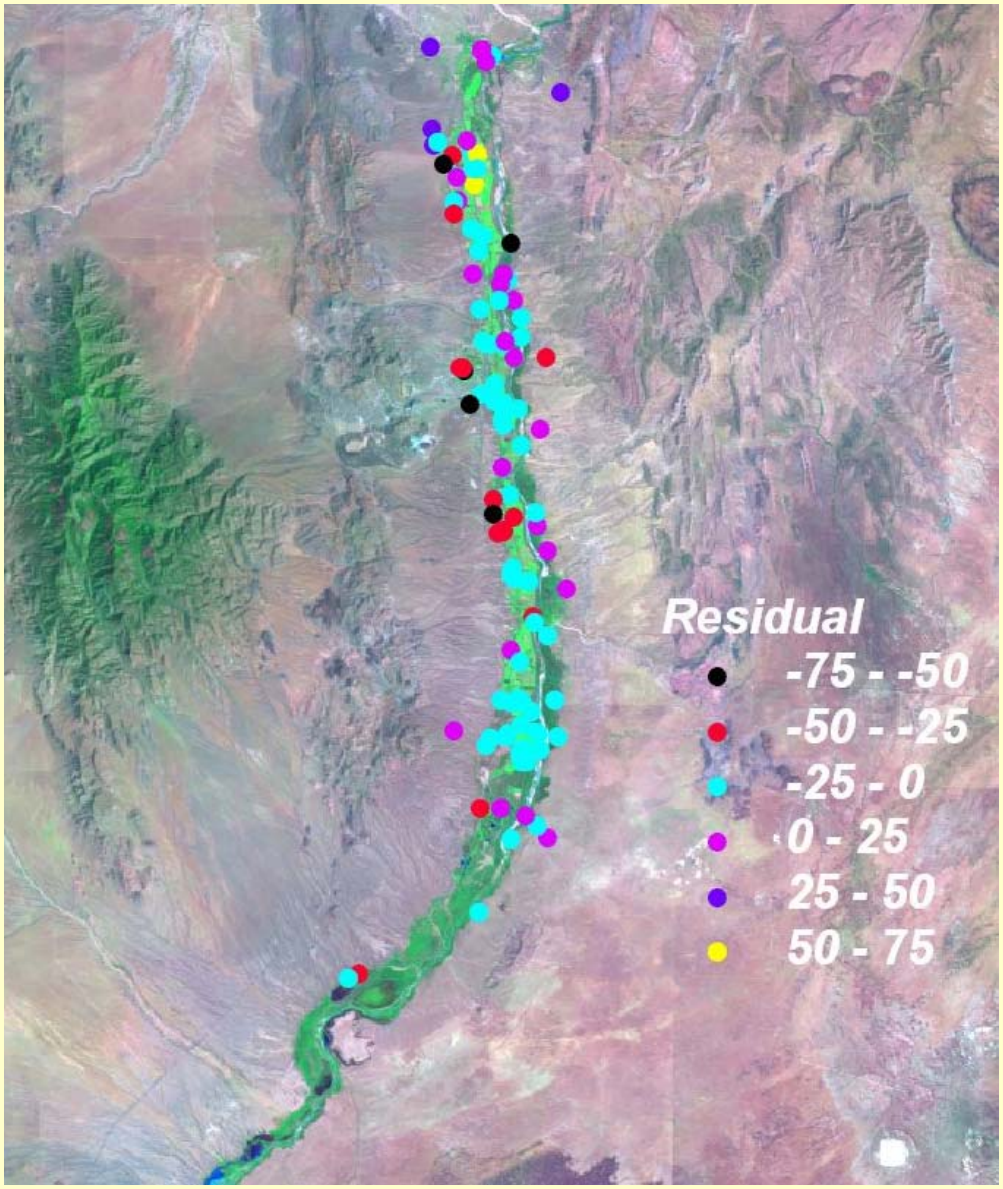
After Roybal, 1989)

Riparian Area

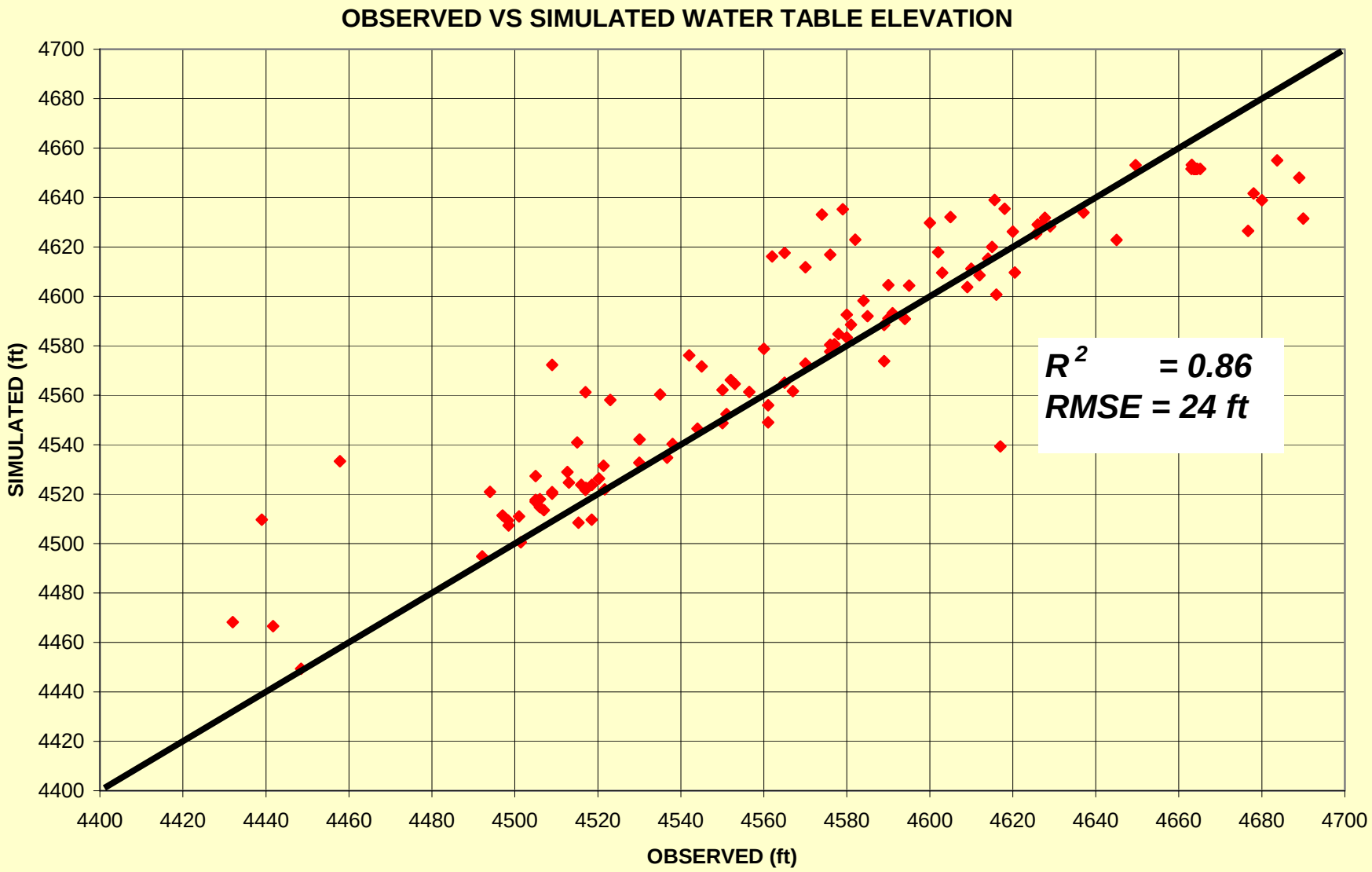




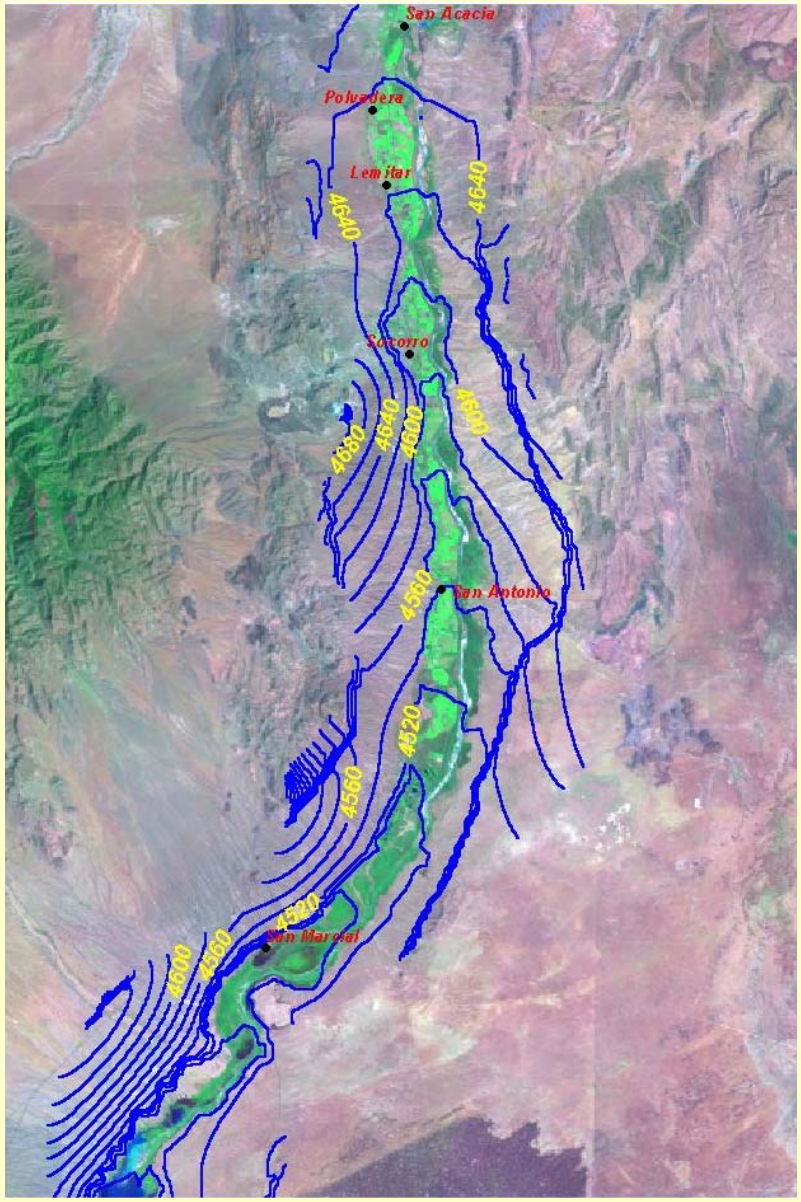
Residual



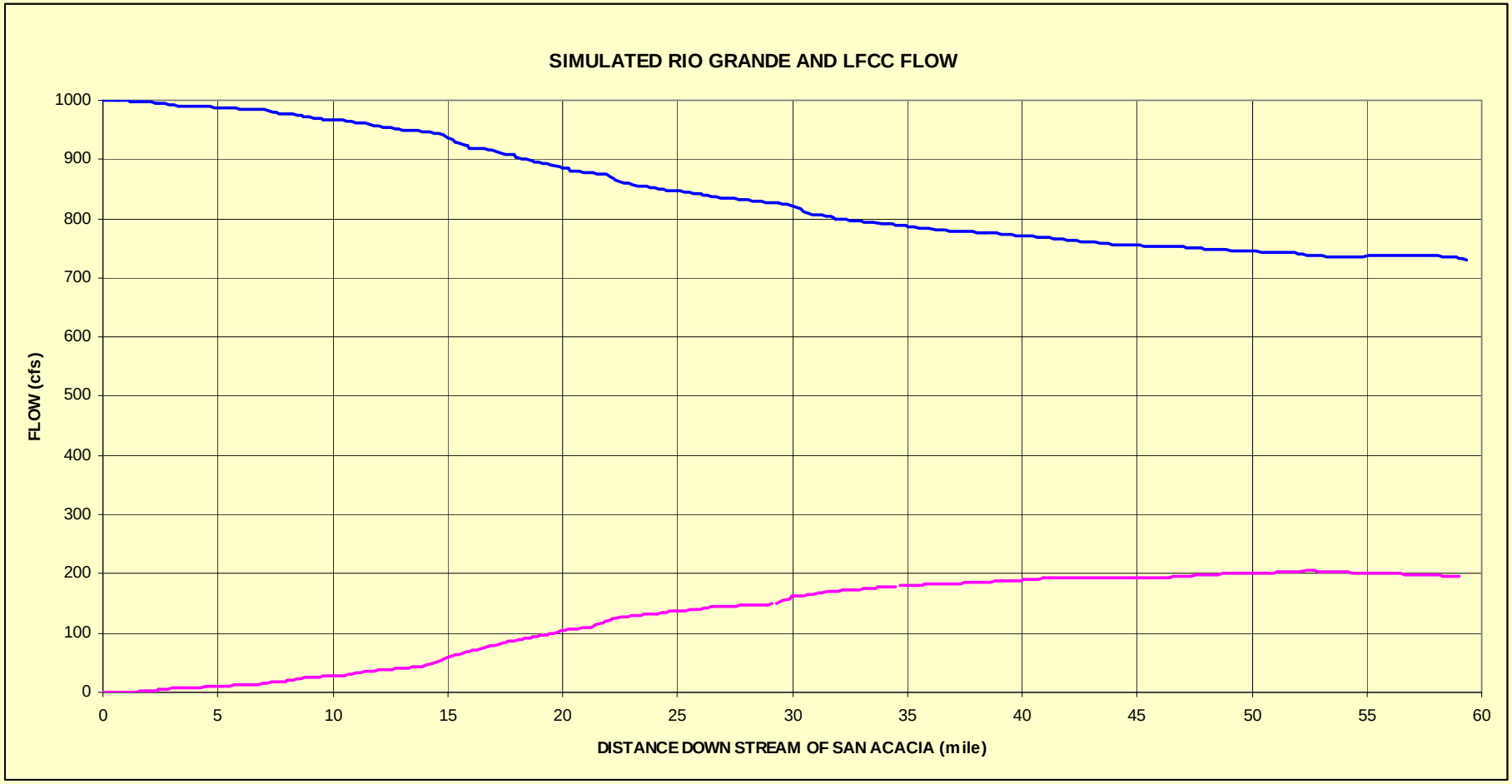
Simulated VS Observed Water Elevation



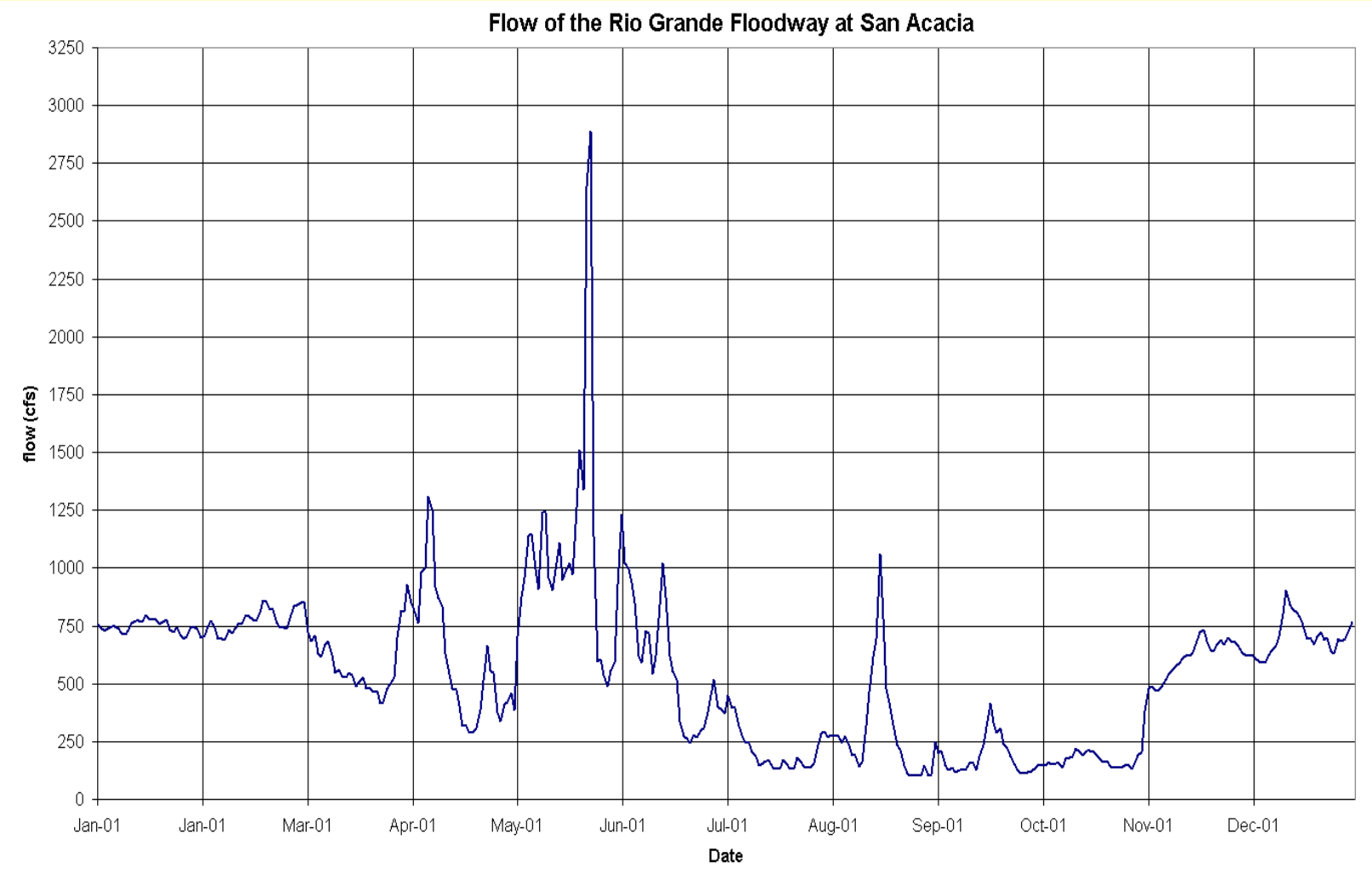
Simulated Water Table Map (Steady State)



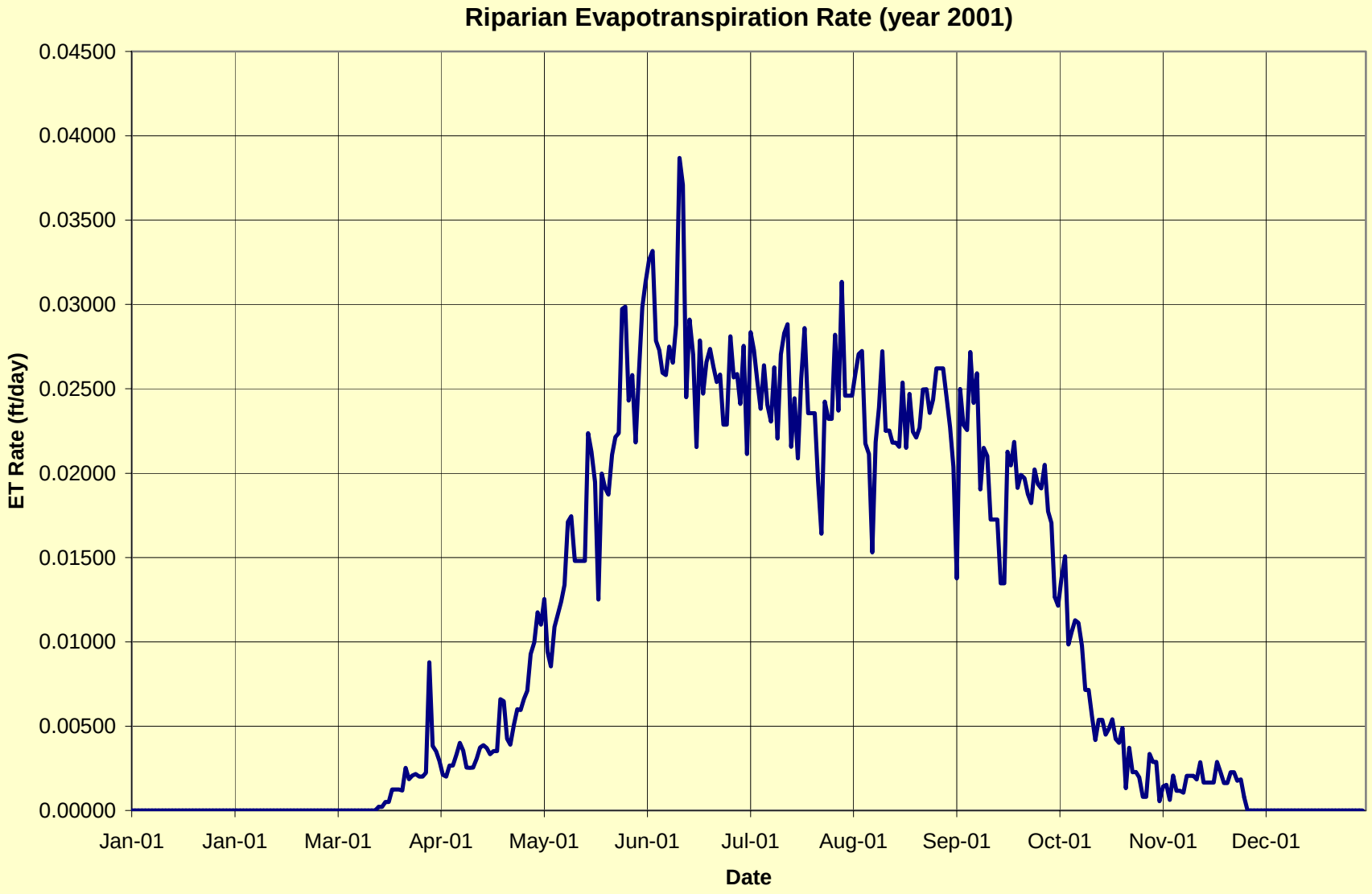
Rio Grande and LFCC Loss/Gain (Steady State)



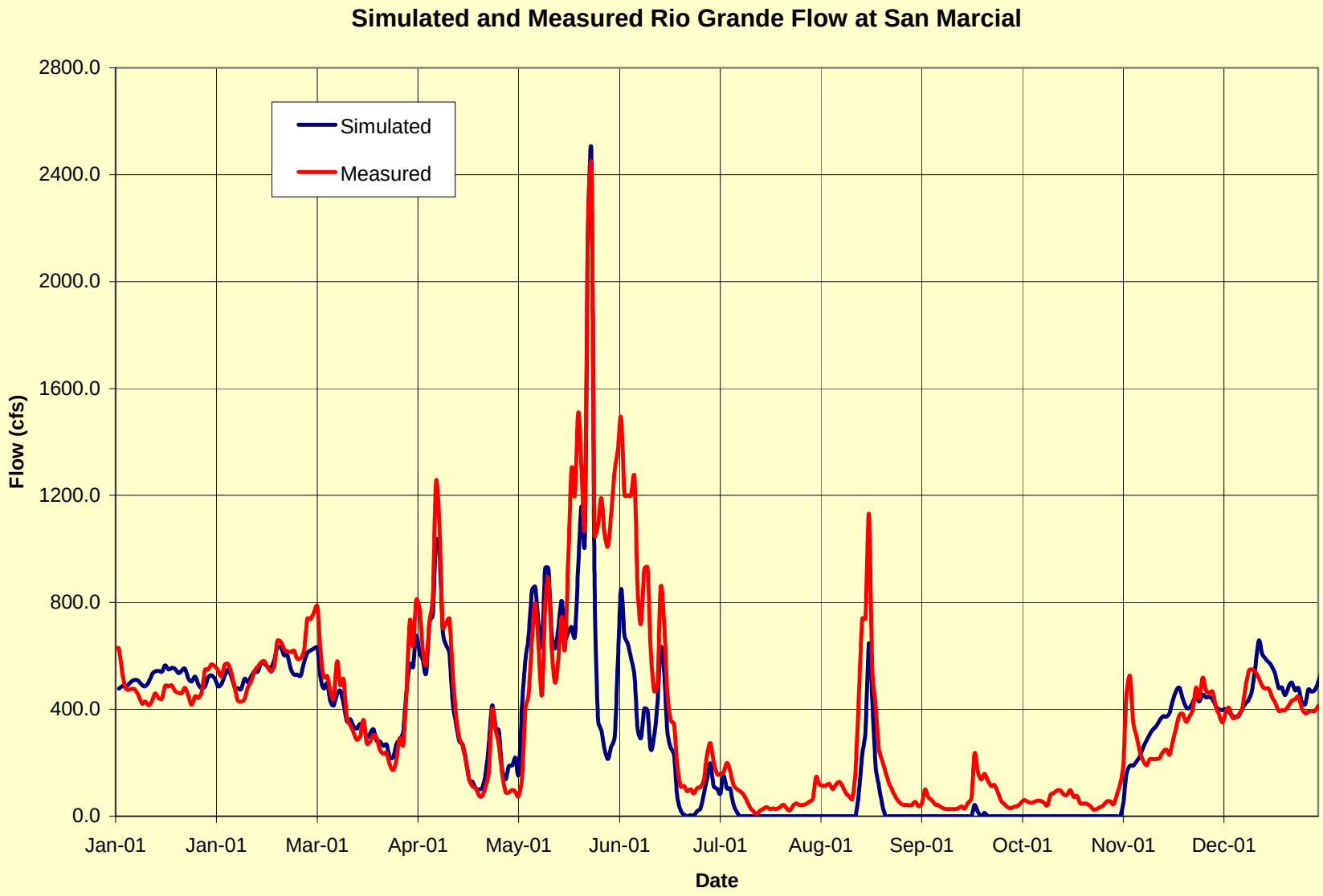
Inflow at San Acacia (Transient Run)



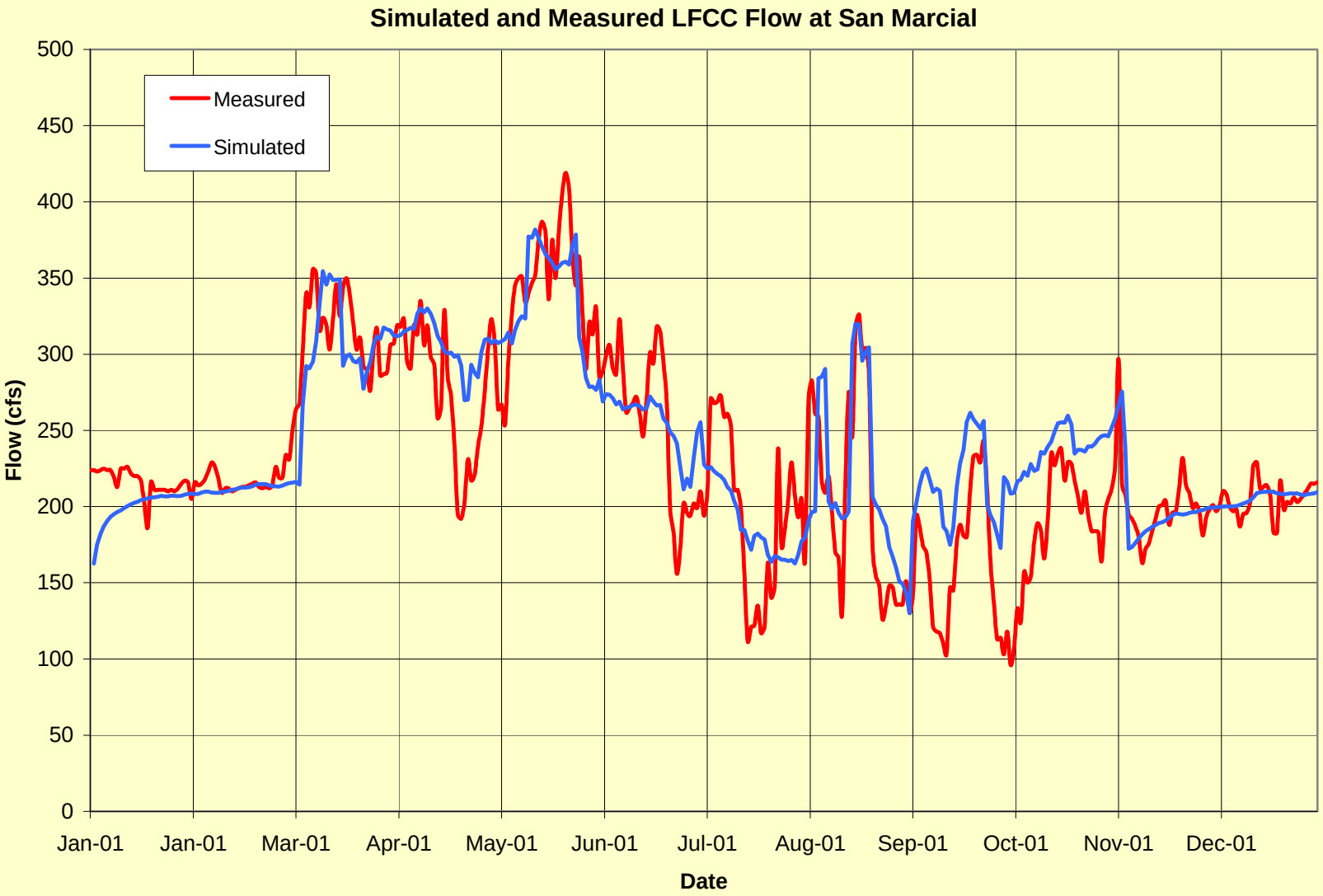
Riparian Evapotranspiration



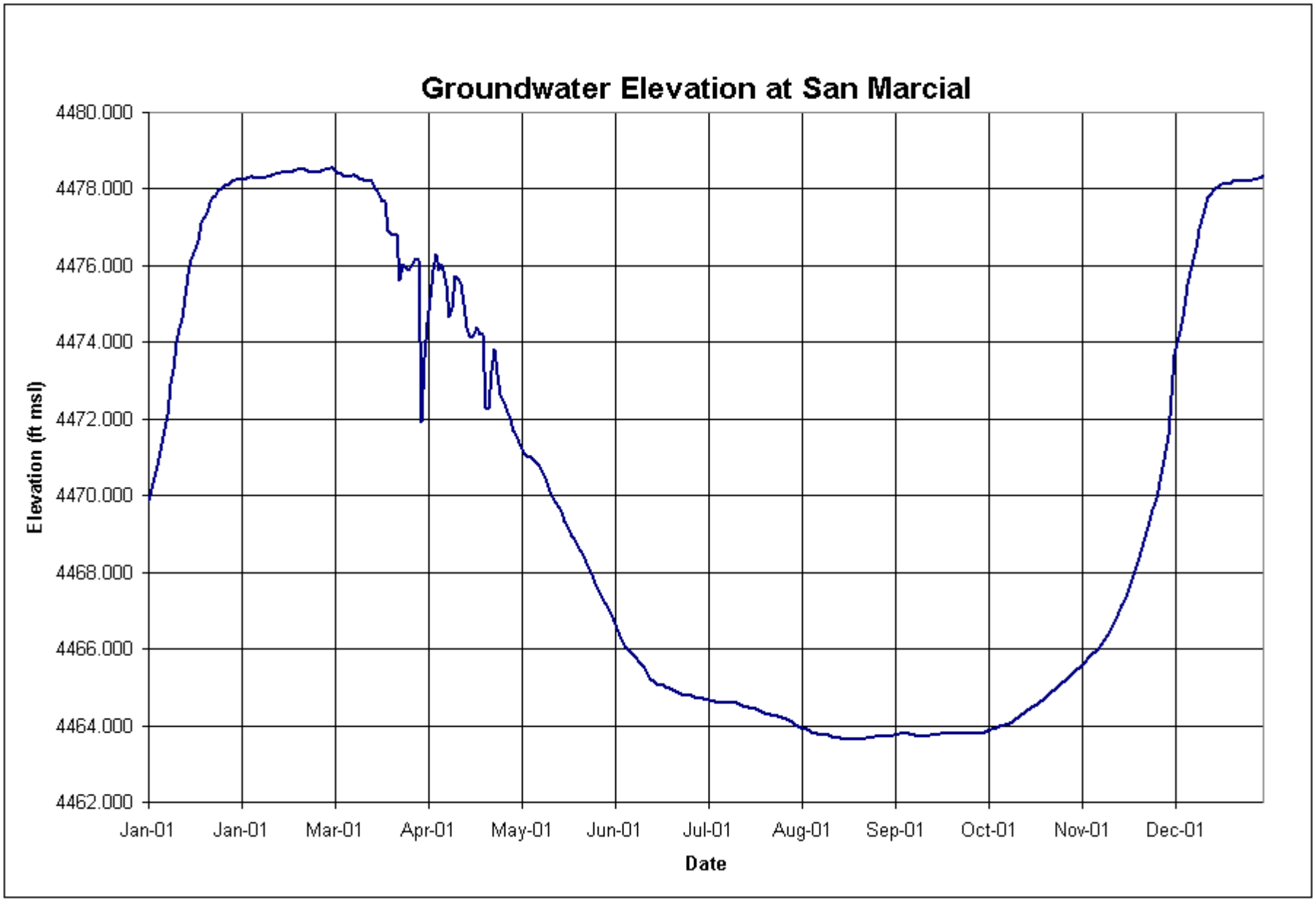
Rio Grande Flow at Sam Marcial



LFC Channel flow at San Marcial



Groundwater Elevation



Look Up Tables for river flow @ SM

Simulated RG-Flow @ SM (cfs)
(January)

RG-Flow (cfs) @ SA	LFCC-Flow @ SA (cfs)				
	0	250	500	1000	2000
-	-	-	-	-	-
250	60	94	122	171	252
500	286	324	354	404	487
1,000	757	797	828	880	964
2,000	1,718	1,760	1,792	1,845	1,929
4,000	3,666	3,708	3,740	3,792	3,877
8,000	7,590	7,631	7,663	7,715	7,801
12,000	11,530	11,570	11,602	11,654	11,740

Look Up Tables for LFCC Flow @ SM

Simulated LFCC Flow @ SM (cfs)
(January)

RG-Flow (cfs) @ SA	LFCC-Flow @ SA (cfs)				
	0	250	500	1000	2000
-	70				
250	175	369	576	1,007	1,898
500	190	382	588	1,018	1,909
1,000	208	399	605	1,034	1,925
2,000	233	423	629	1,058	1,949
4,000	267	458	665	1,095	1,987
8,000	318	512	720	1,151	2,045
12,000	360	556	765	1,197	2,092

Look Up Tables for river flow @ SM

Simulated RG-Flow @ SM (cfs)
(July)

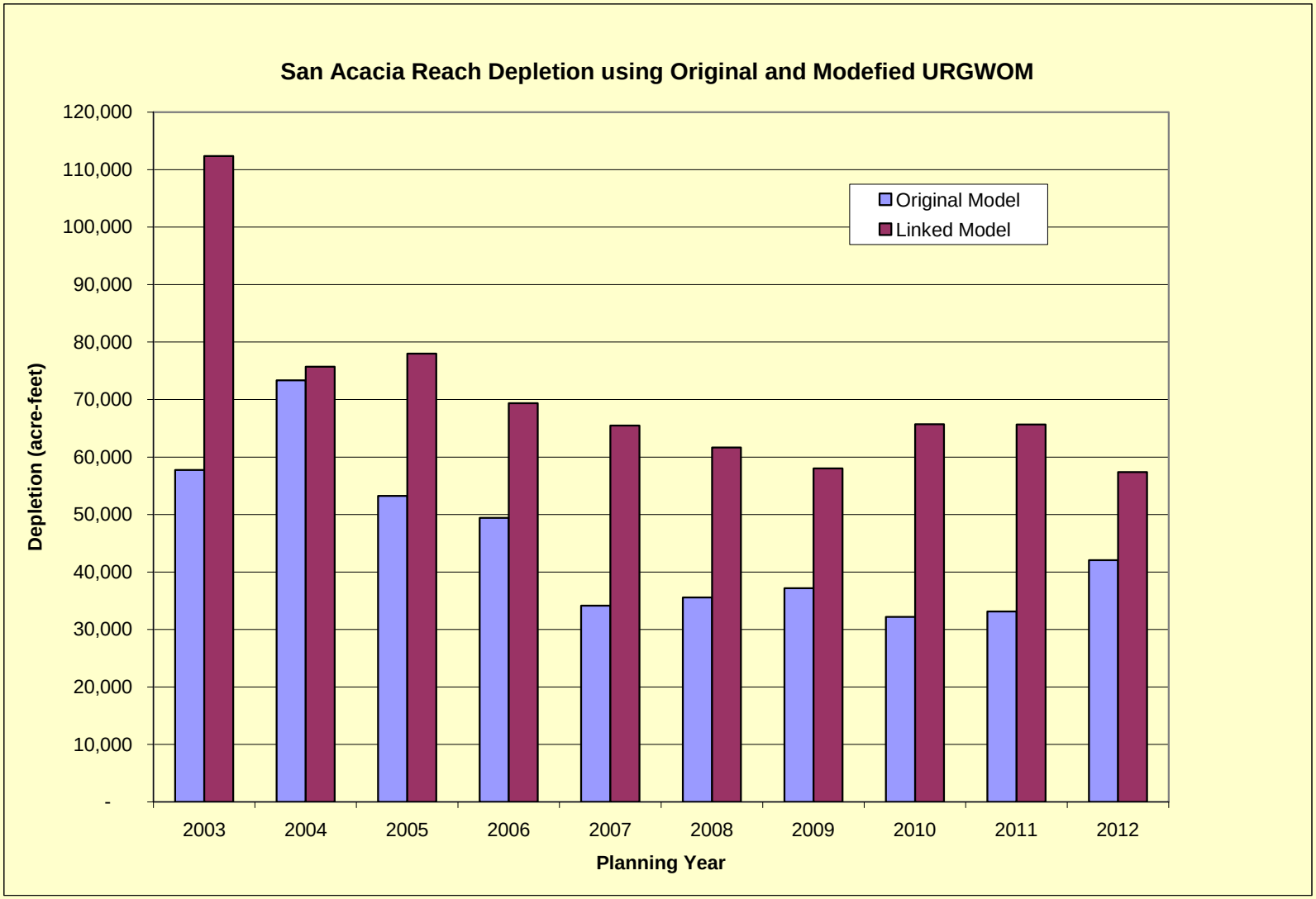
RG-Flow (cfs) @ SA	LFCC-Flow @ SA (cfs)				
	0	250	500	1000	2000
-	-	-	-	-	-
250	-	11	35	82	163
500	197	235	264	314	397
1,000	665	706	737	789	873
2,000	1,625	1,668	1,700	1,753	1,839
4,000	3,573	3,616	3,648	3,701	3,787
8,000	7,499	7,541	7,573	7,626	7,713
12,000	11,441	11,482	11,514	11,567	11,654

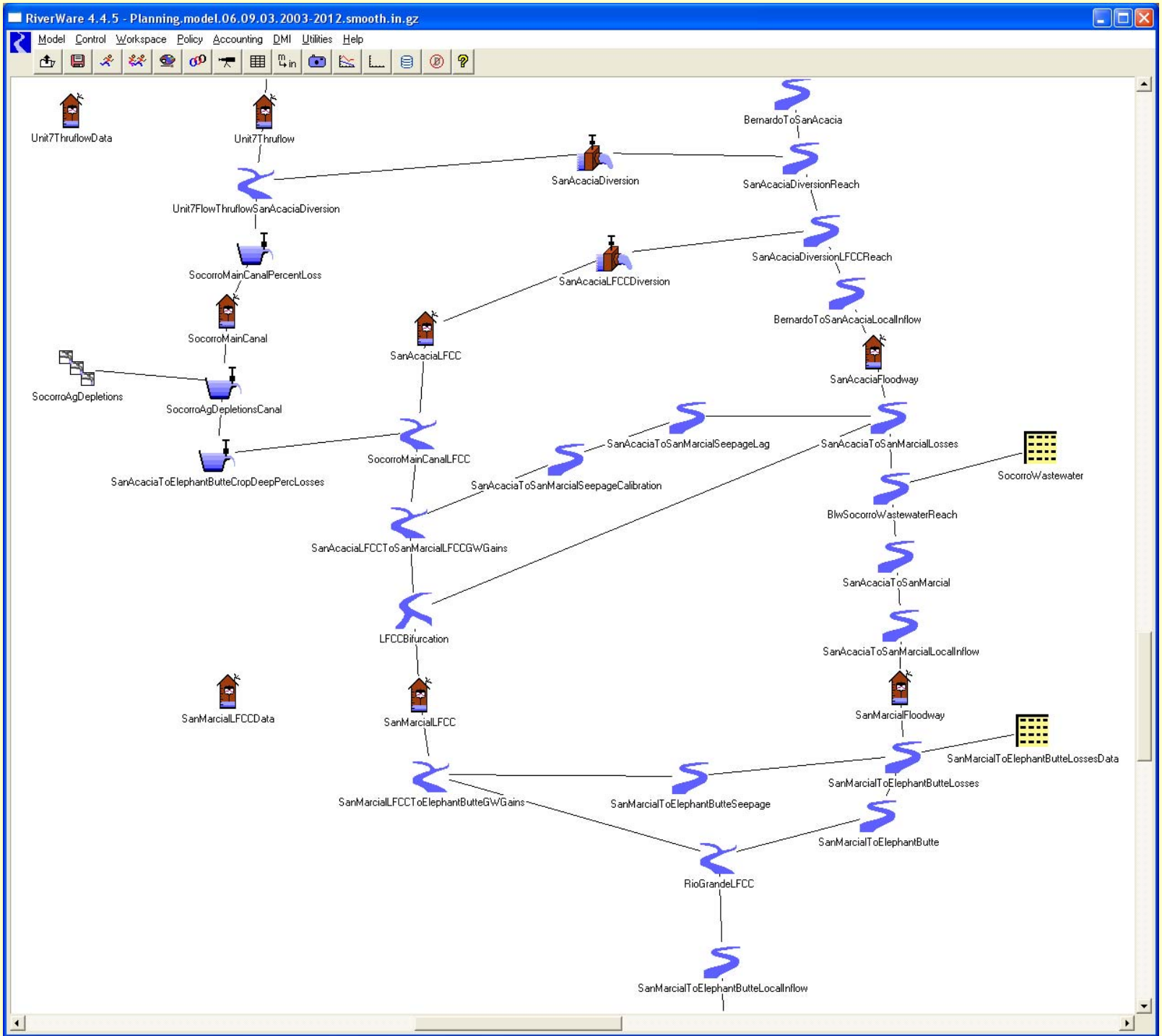
Look Up Tables for LFCC Flow @ SM

Simulated LFCC Flow @ SM (cfs)
(July)

RG-Flow (cfs) @ SA	LFCC-Flow @ SA (cfs)				
	0	250	500	1000	2000
-	-				
250	129	330	541	974	1,867
500	152	347	555	986	1,878
1,000	173	366	573	1,002	1,894
2,000	199	391	597	1,027	1,919
4,000	234	427	633	1,064	1,957
8,000	286	481	688	1,120	2,015
12,000	328	525	734	1,167	2,063

SA to SM Depletion before and after changes

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Unit7Thruflow
BernardoToSanAcacia
SanAcaciaDiversion
SanAcaciaDiversionReach
Unit7FlowThruflowSanAcaciaDiversion
SanAcaciaDiversionLFCCReach
SocorroMainCanalPercentLoss
SanAcaciaLFCCDiversion
BernardoToSanAcaciaLocalInflow
SocorroMainCanal
SanAcaciaLFCC
SanAcaciaFloodway
SocorroAgDepletions
SocorroAgDepletionsCanal
SanAcaciaToSanMarcialSeepageLag
SanAcaciaToSanMarcialLosses
SocorroMainCanalLFCC
SocorroWastewater
SanAcaciaToElephantButteCropDeepPercLosses
SanAcaciaToSanMarcialSeepageCalibration
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SanAcaciaToSanMarcial
LFCCBifurcation
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SanMarcialLFCCData
SanMarcialLFCC
SanMarcialFloodway
SanMarcialToElephantButteLossesData
SanMarcialToElephantButteLosses
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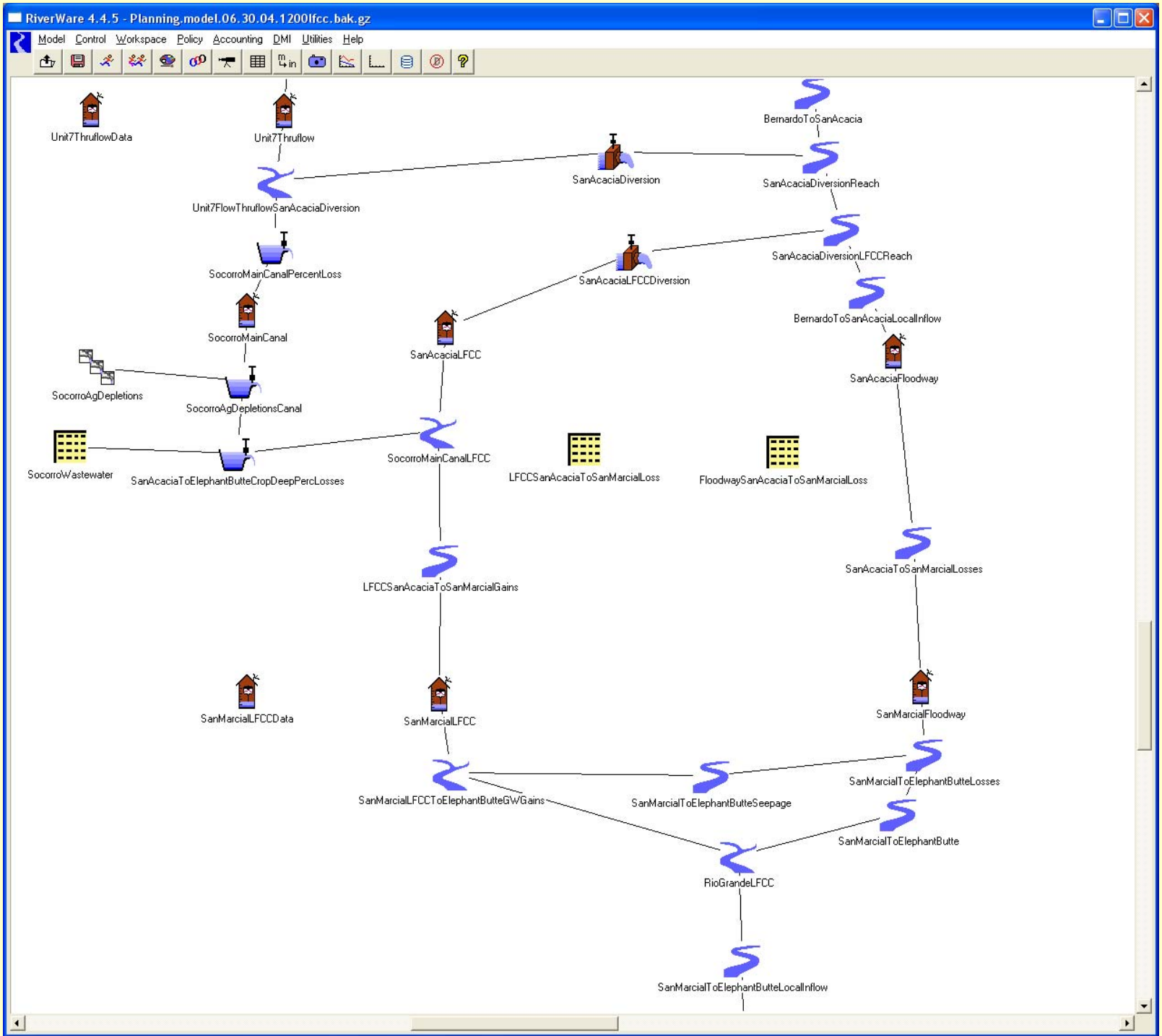
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SanMarcialFloodway
SanMarcialToElephantButteLosses
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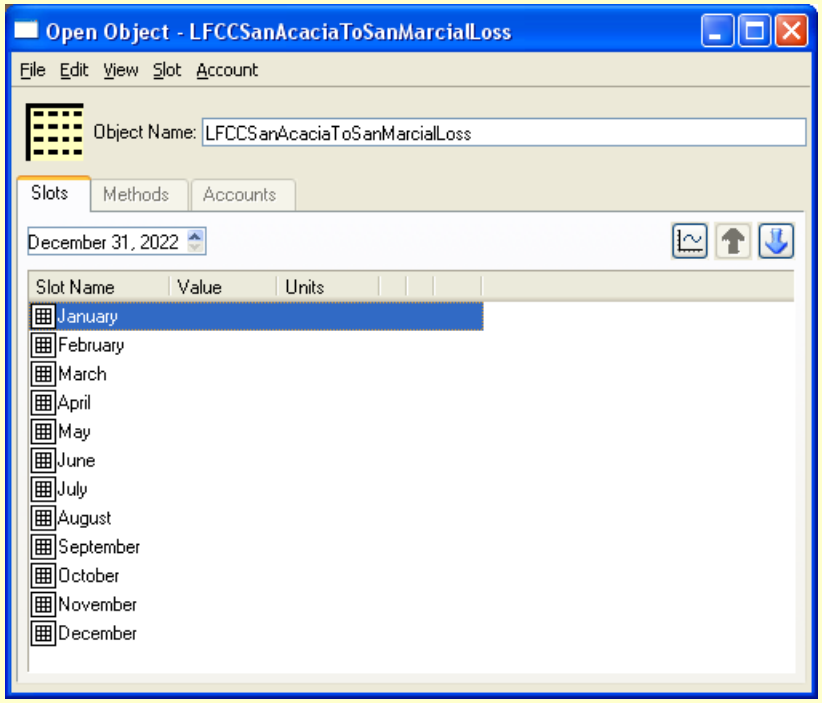
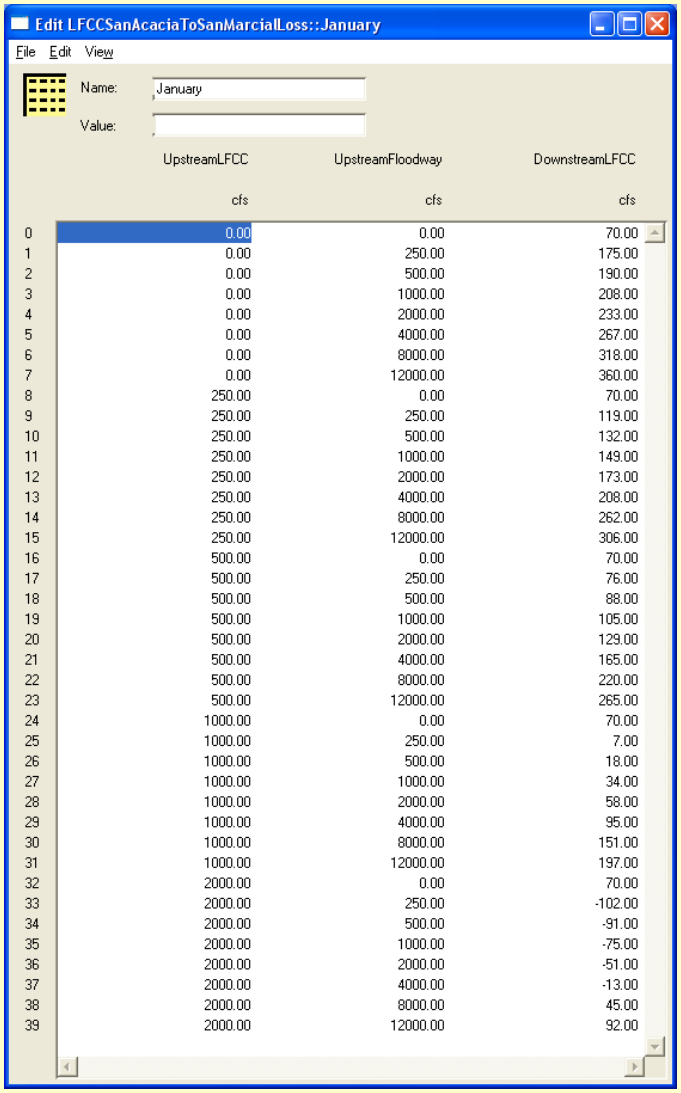
RioGrandeLFCC
SanMarcialToElephantButteLocalInflow





	UpstreamLFCC	UpstreamFloodway	DownstreamLFCC
	cfs	cfs	cfs
0	0.00	0.00	70.00
1	0.00	250.00	175.00
2	0.00	500.00	190.00
3	0.00	1000.00	208.00
4	0.00	2000.00	233.00
5	0.00	4000.00	267.00
6	0.00	8000.00	318.00
7	0.00	12000.00	360.00
8	250.00	0.00	70.00
9	250.00	250.00	119.00
10	250.00	500.00	132.00
11	250.00	1000.00	149.00
12	250.00	2000.00	173.00
13	250.00	4000.00	208.00
14	250.00	8000.00	262.00
15	250.00	12000.00	306.00
16	500.00	0.00	70.00
17	500.00	250.00	76.00
18	500.00	500.00	88.00
19	500.00	1000.00	105.00
20	500.00	2000.00	129.00
21	500.00	4000.00	165.00
22	500.00	8000.00	220.00
23	500.00	12000.00	265.00
24	1000.00	0.00	70.00
25	1000.00	250.00	7.00
26	1000.00	500.00	18.00
27	1000.00	1000.00	34.00
28	1000.00	2000.00	58.00
29	1000.00	4000.00	95.00
30	1000.00	8000.00	151.00
31	1000.00	12000.00	197.00
32	2000.00	0.00	70.00
33	2000.00	250.00	-102.00
34	2000.00	500.00	-91.00
35	2000.00	1000.00	-75.00
36	2000.00	2000.00	-51.00
37	2000.00	4000.00	-13.00
38	2000.00	8000.00	45.00
39	2000.00	12000.00	92.00

Rule Editor - "Planning.ruleset.06.30.04.NoRafting.gz : MiddleValleyLoss : FloodwaySanMarcialToSanMarc...

File Edit Rule RuleSet Not Loaded

Name: FloodwaySanMarcialToSanMarcialLoss1

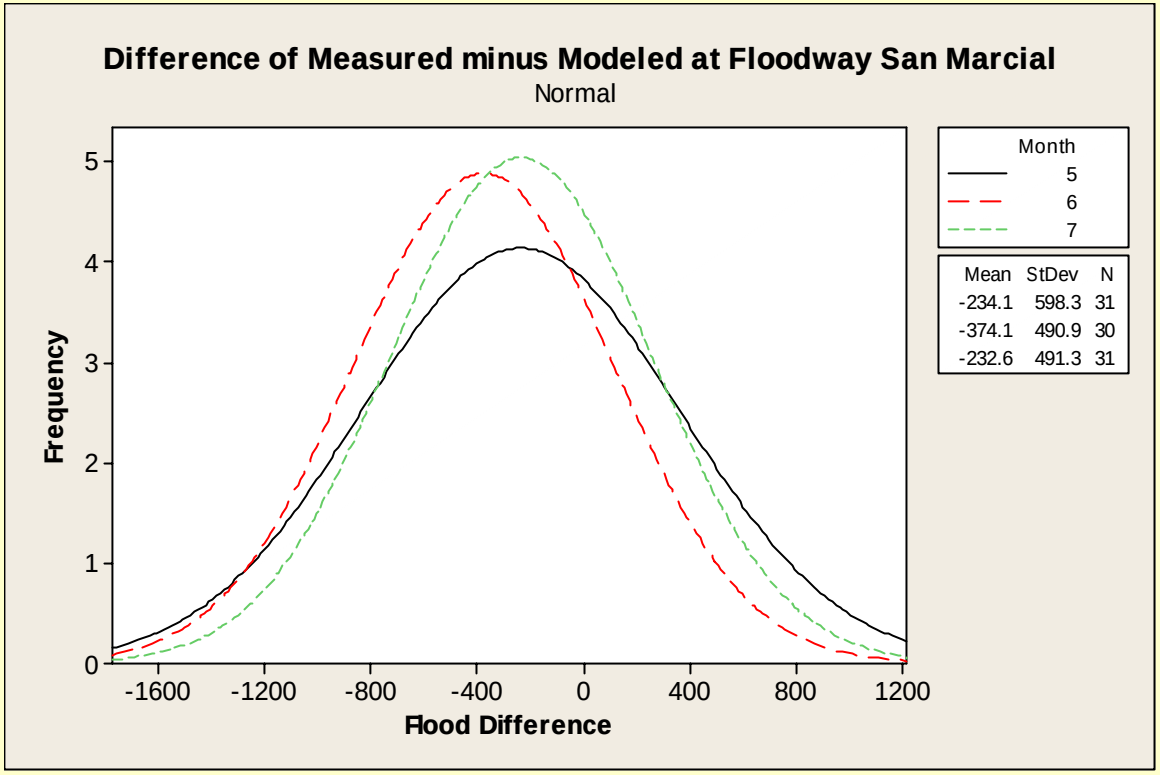
Body:

```
SanAcaciaToSanMarcialLosses.Local Inflow [@"Current Timestep"]
    = TableInterpolation3D
        (% "FloodwaySanAcaciaToSanMarcialLoss" . GetMonthAsString ,
                                                 (@"Previous Timestep")
        0.0000000 ,
        SanAcaciaLFCC.Gage Outflow [@"Previous Timestep"],
        1.0000000 ,
        SanAcaciaFloodway.Gage Inflow [@"Previous Timestep"],
        2.0000000 ,
        @"Previous Timestep"                                  )
RuleFiredSlot ("SanMarcialFloodway") [] = 1.0000000
```

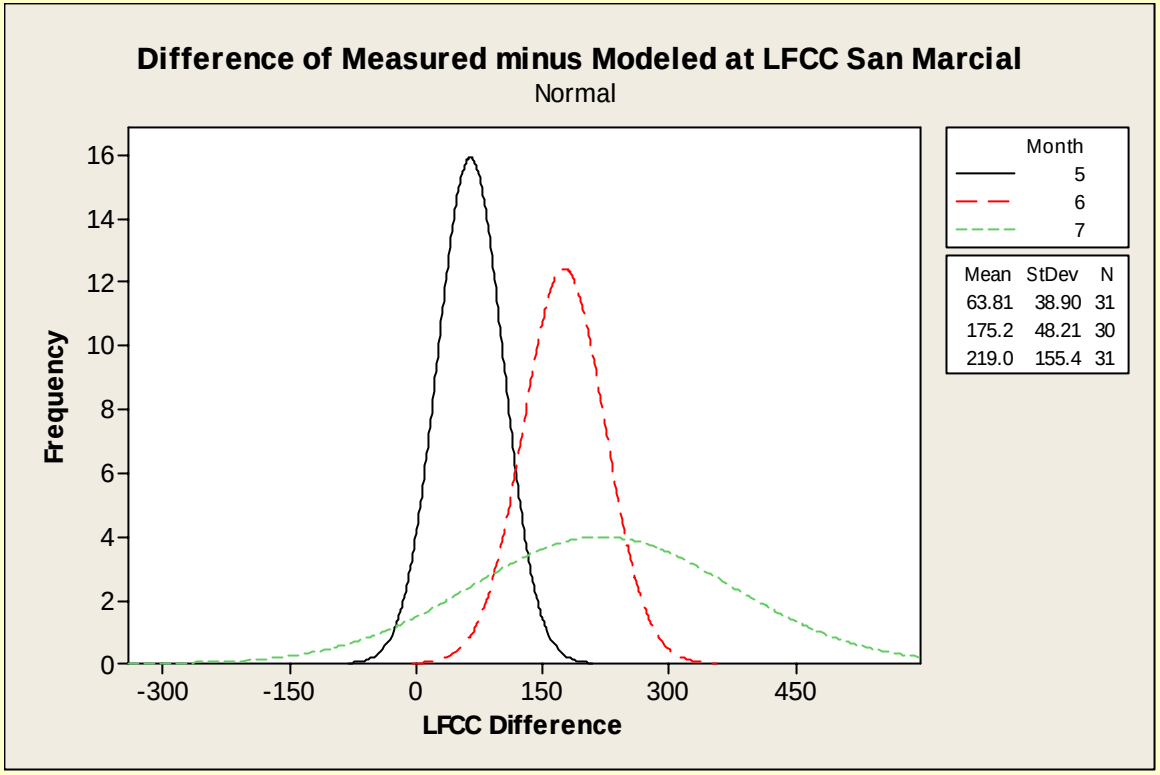
Execute Rule Only When:

```
NOT RuleHasFired ("SanMarcialFloodway")
```

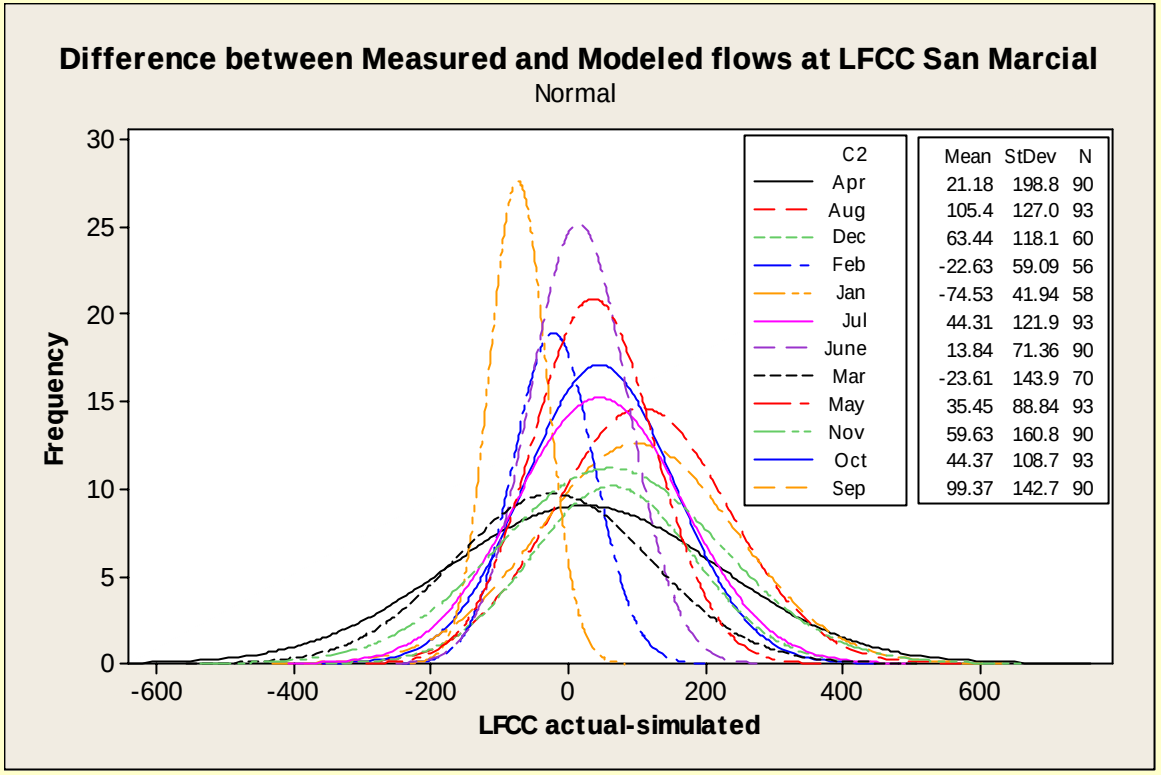
1968 calibration histogram



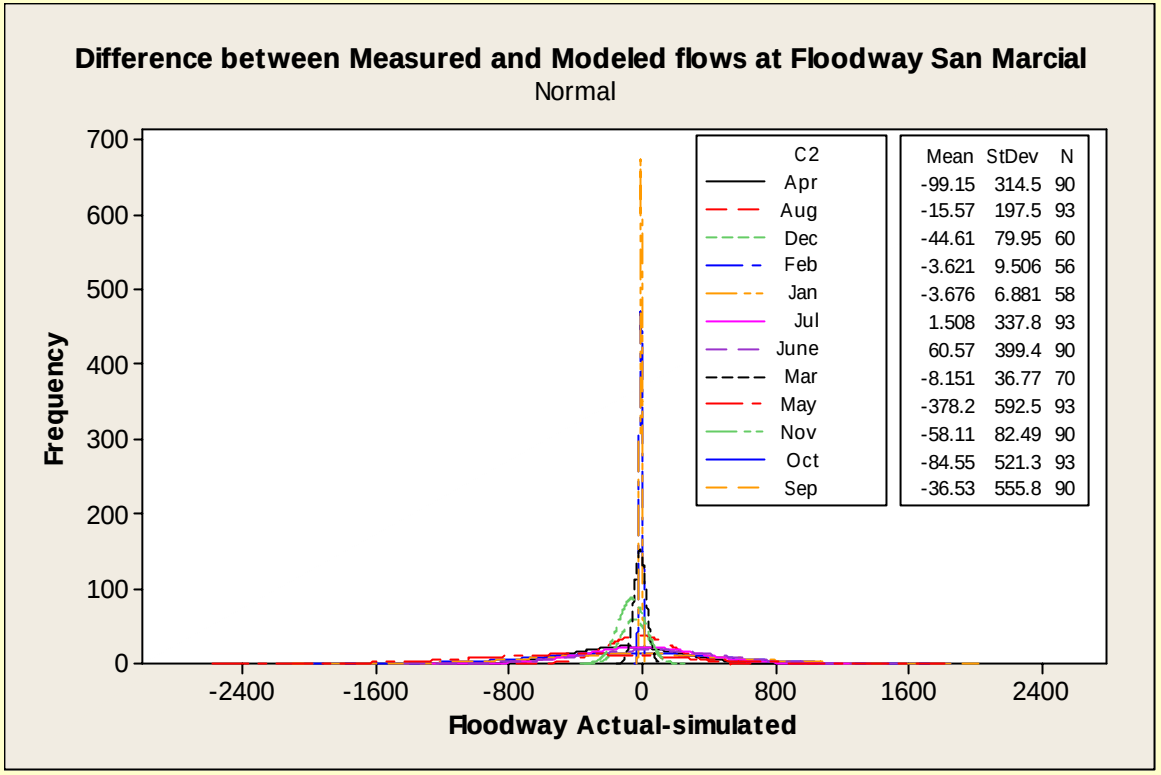
1968 calibration histogram



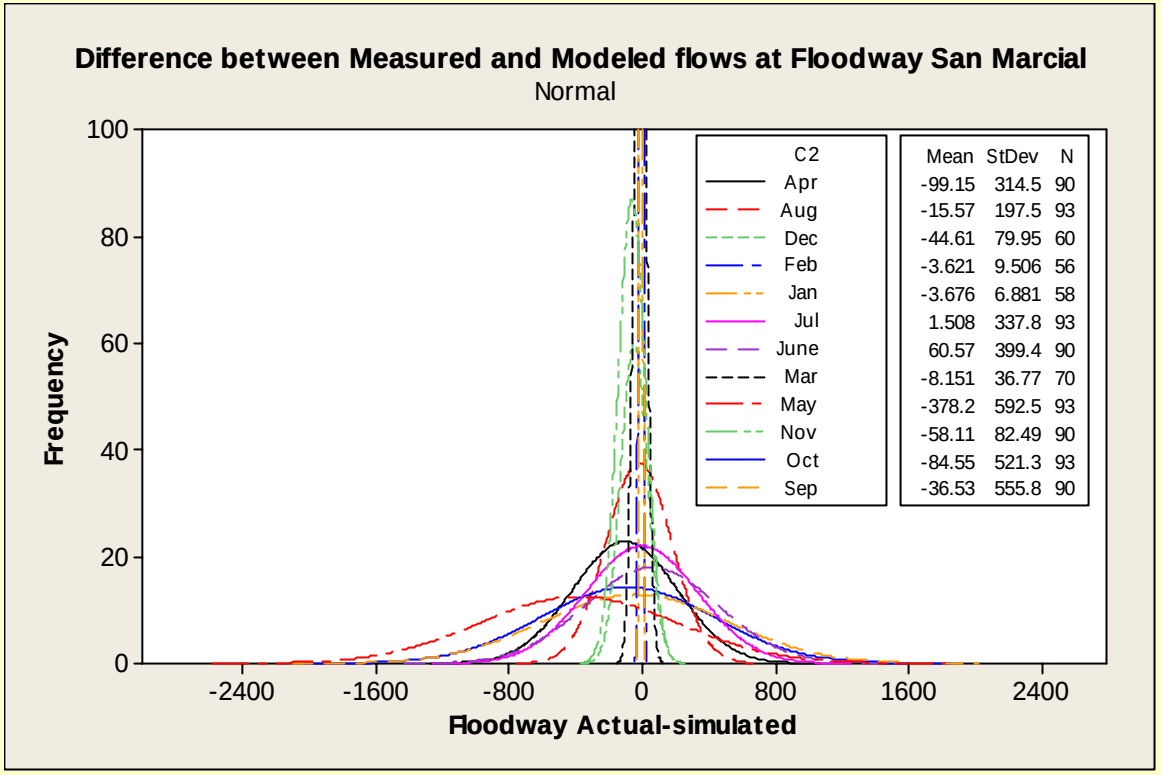
1969, 1973, 1975 Histogram



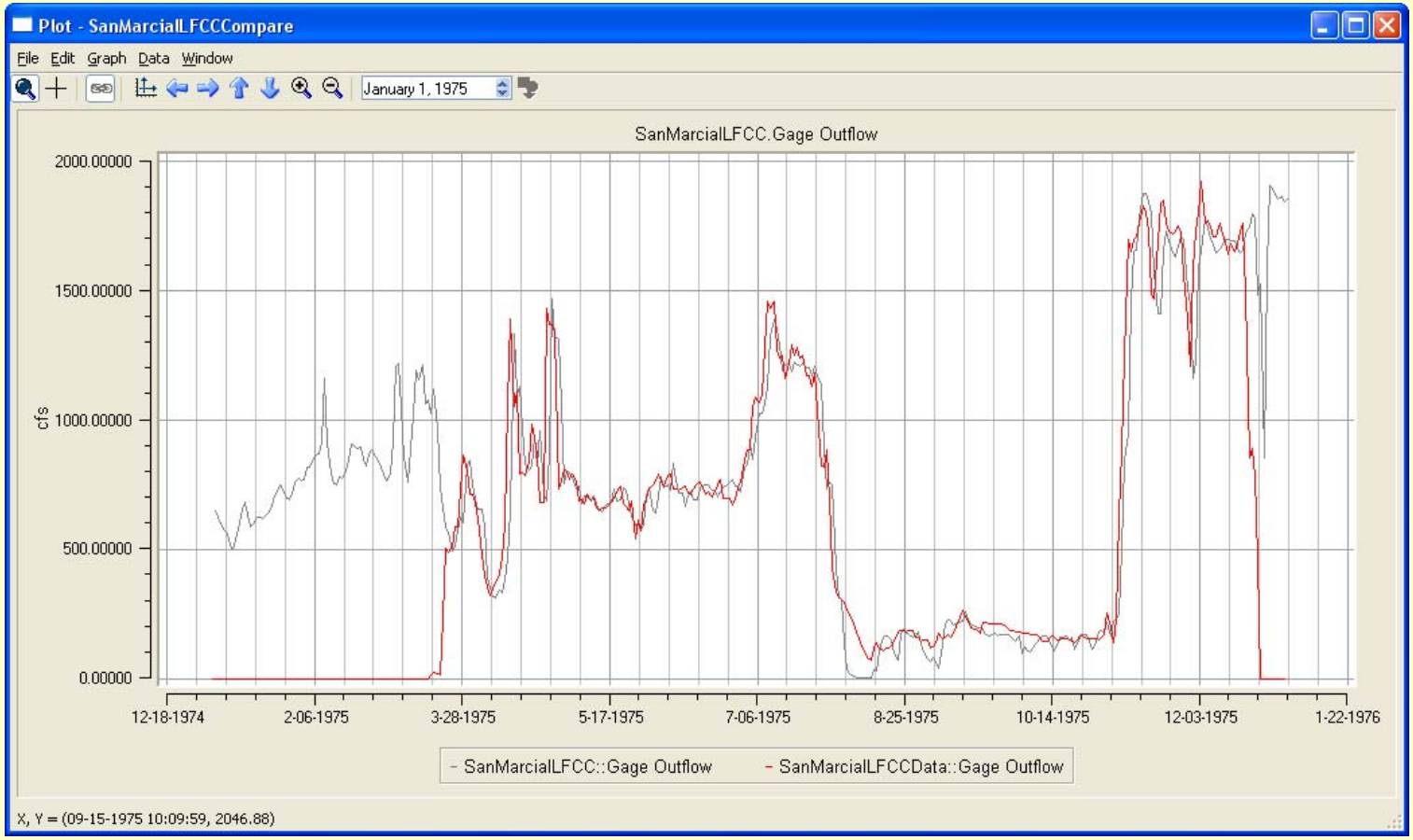
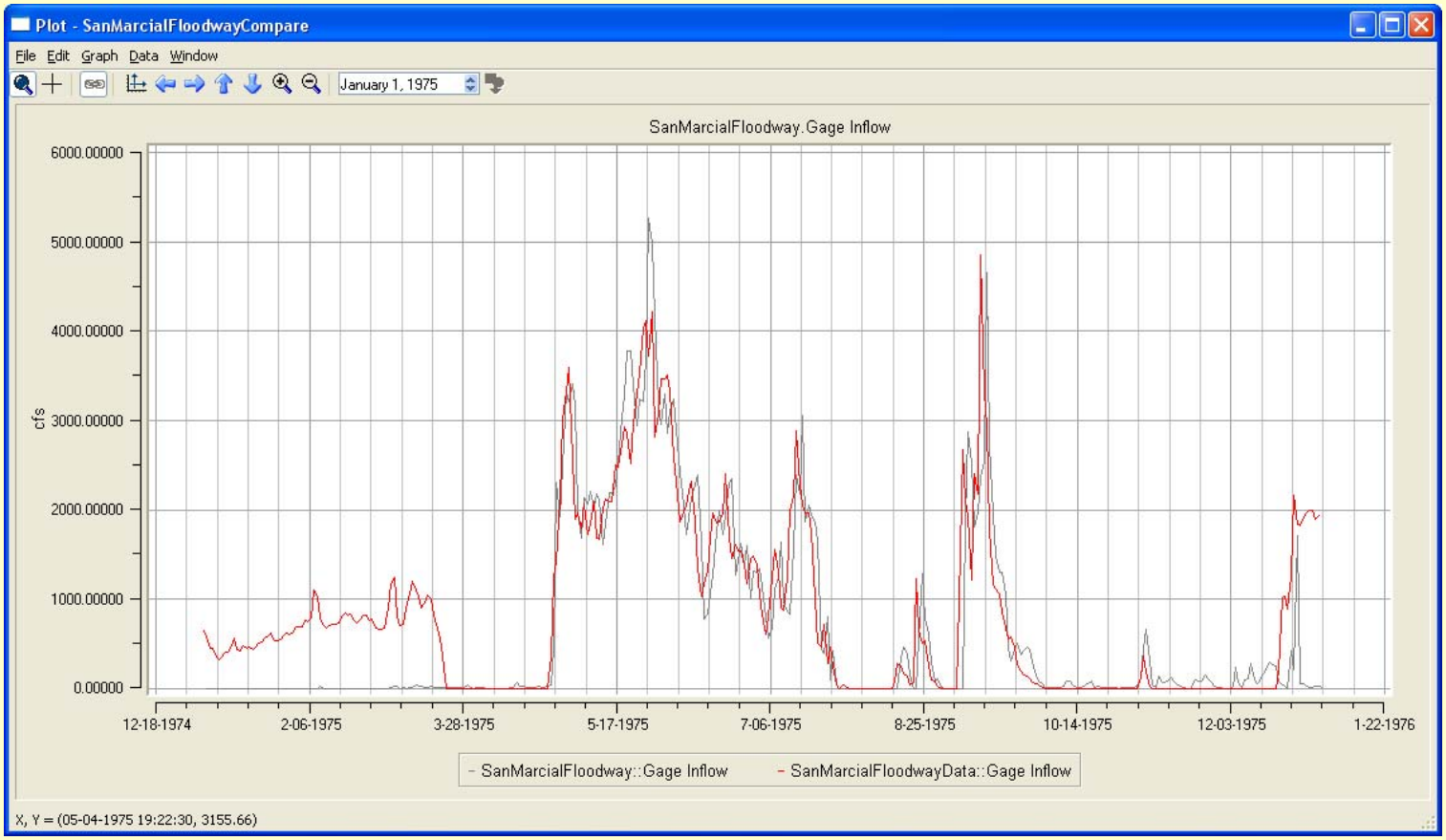
1969, 1973, 1975 Histogram



1969, 1973, 1975 Histogram



1975 Comparison of model output



1975 Comparison of model output