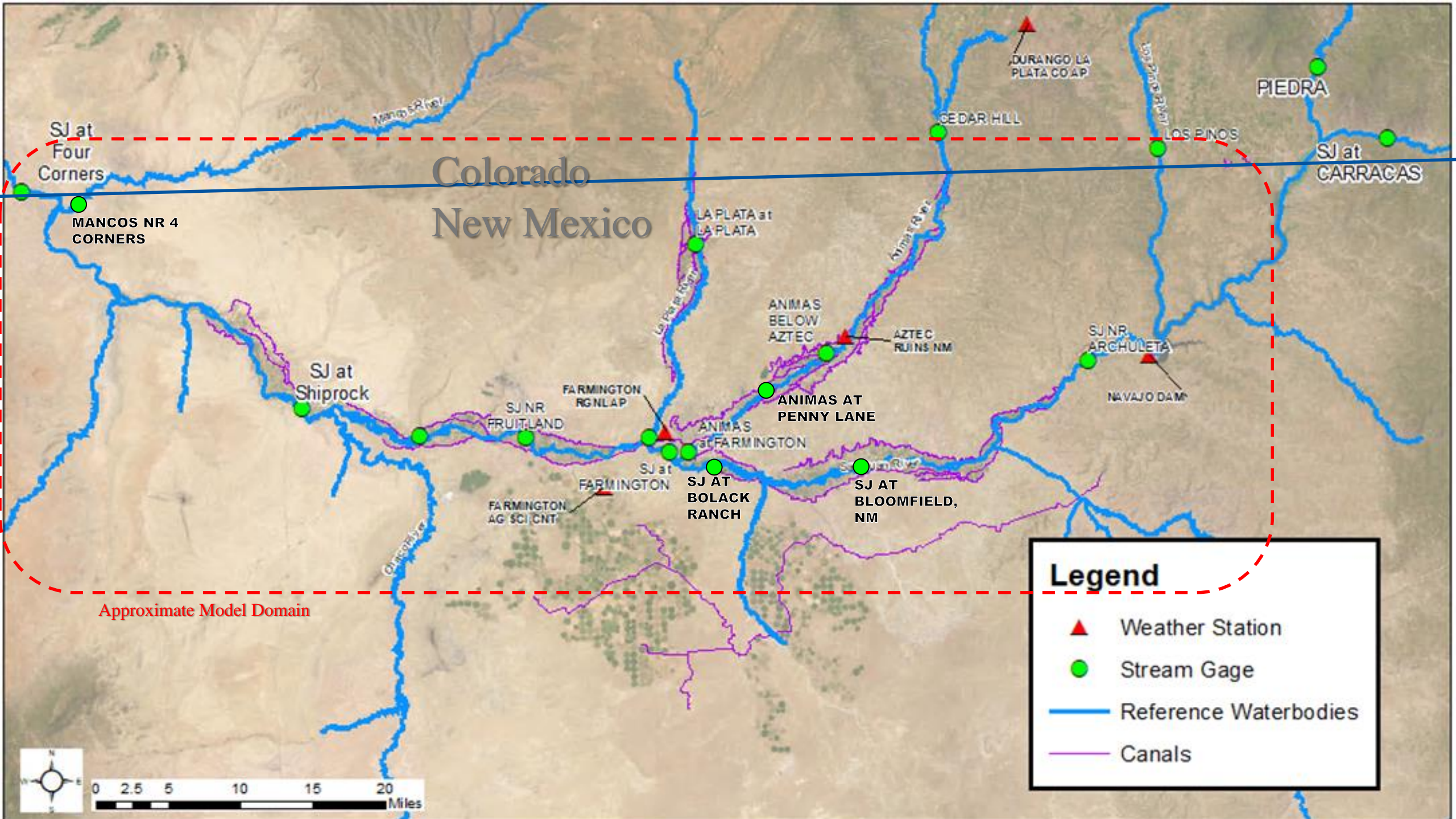
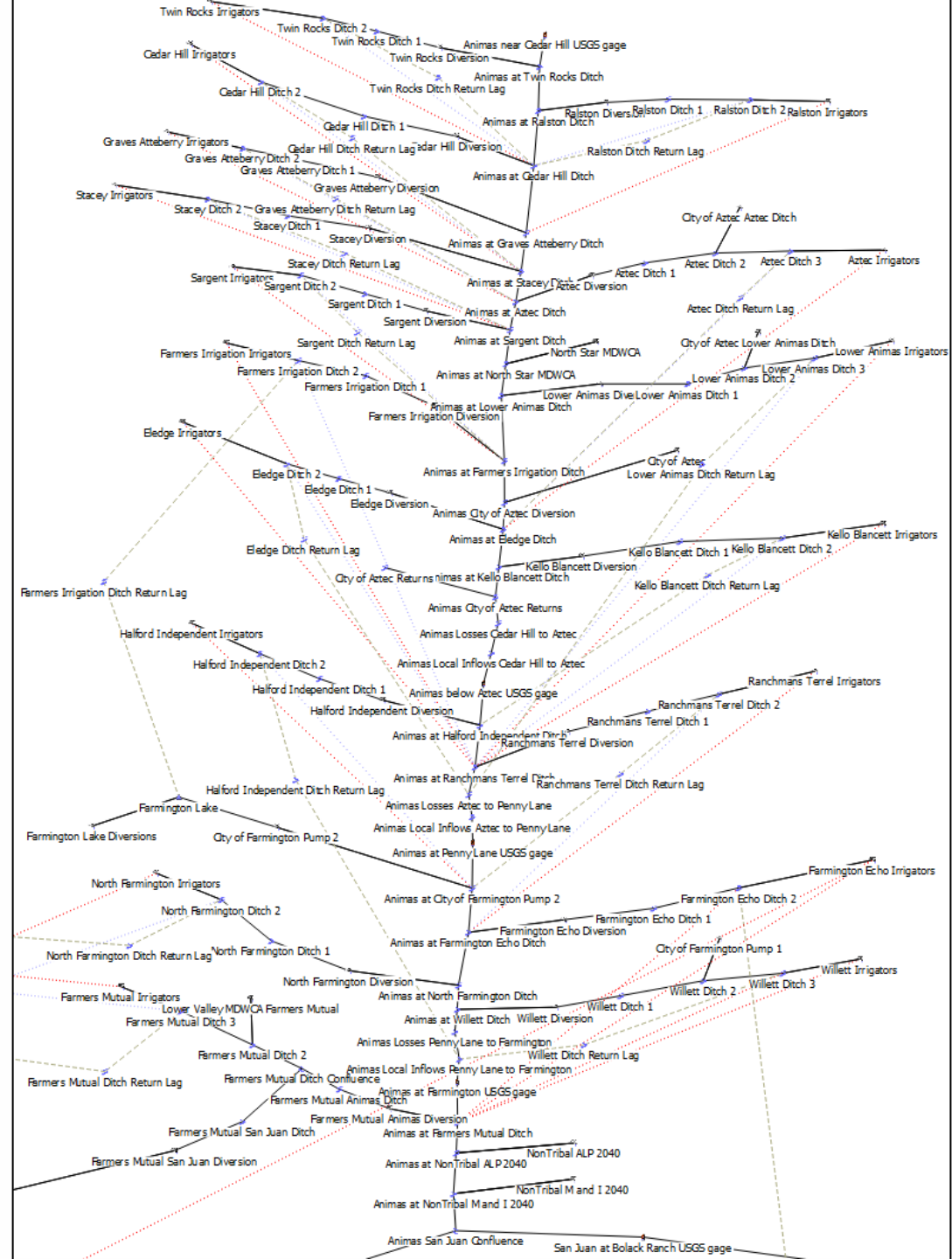


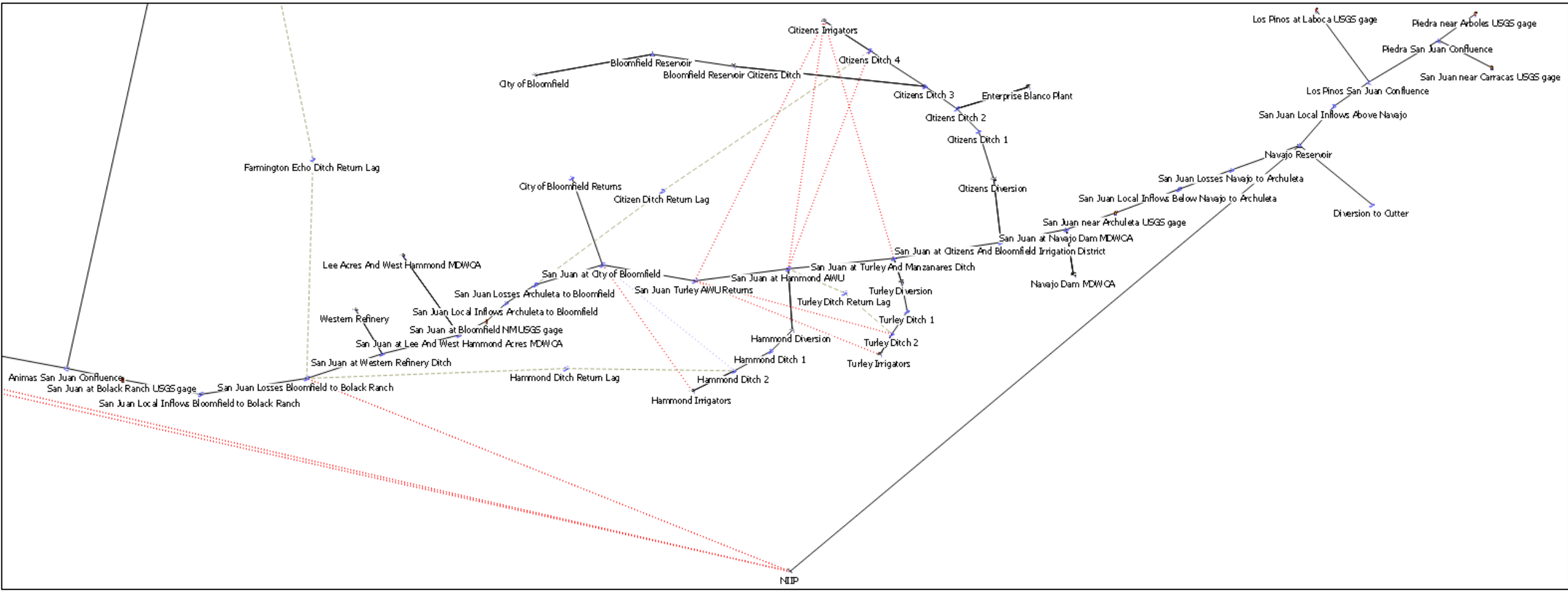


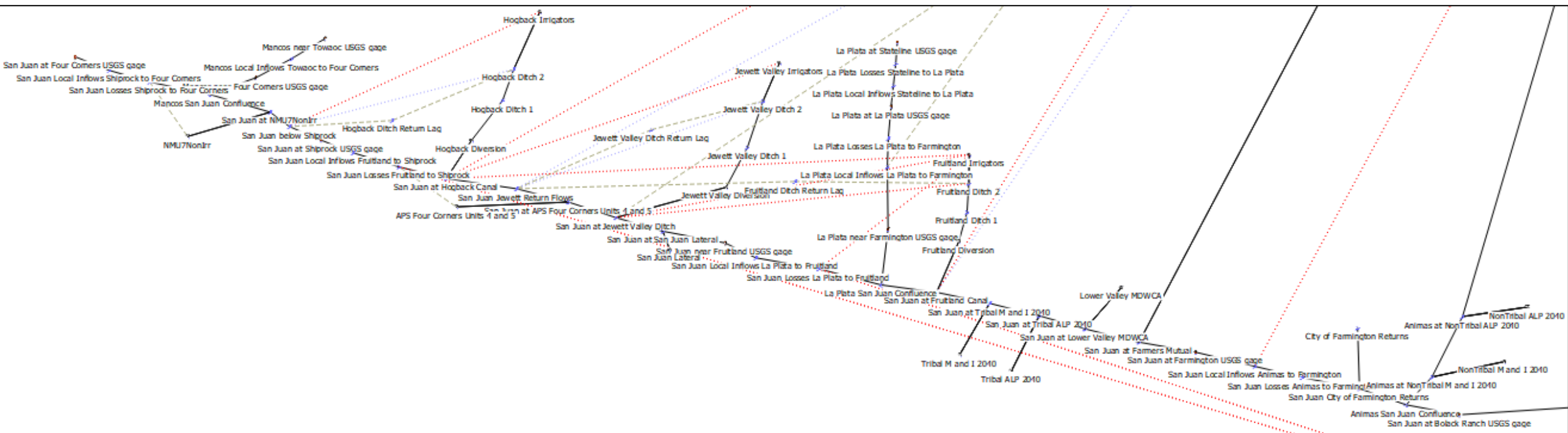
A Daily-Timestep Planning and Administration Model of the San Juan River, New Mexico

Nick Mander, Hydros Consulting, Inc.



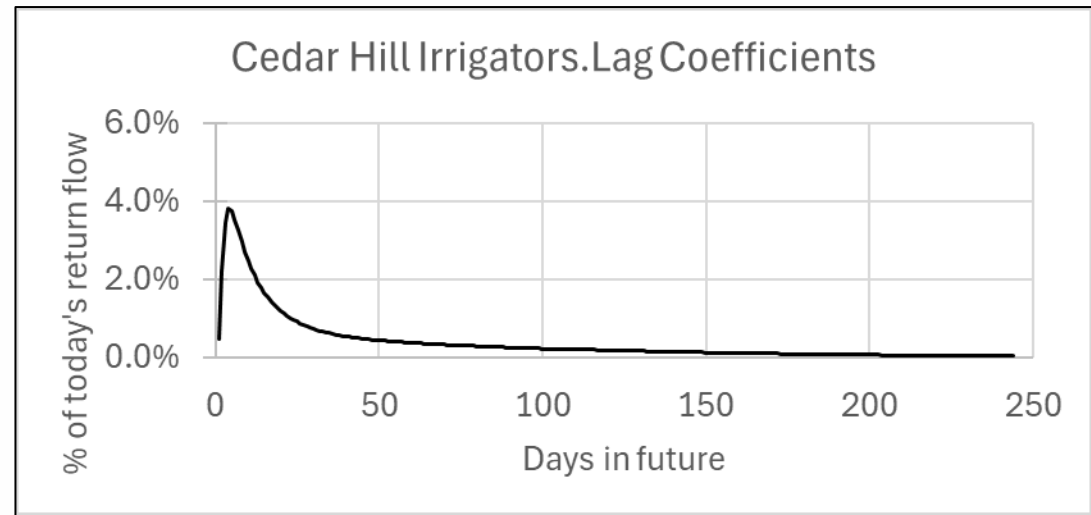
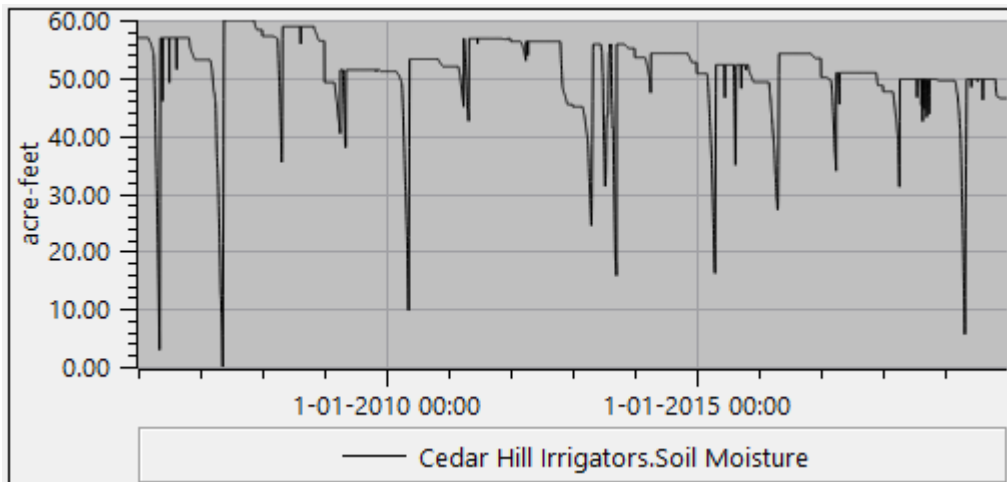
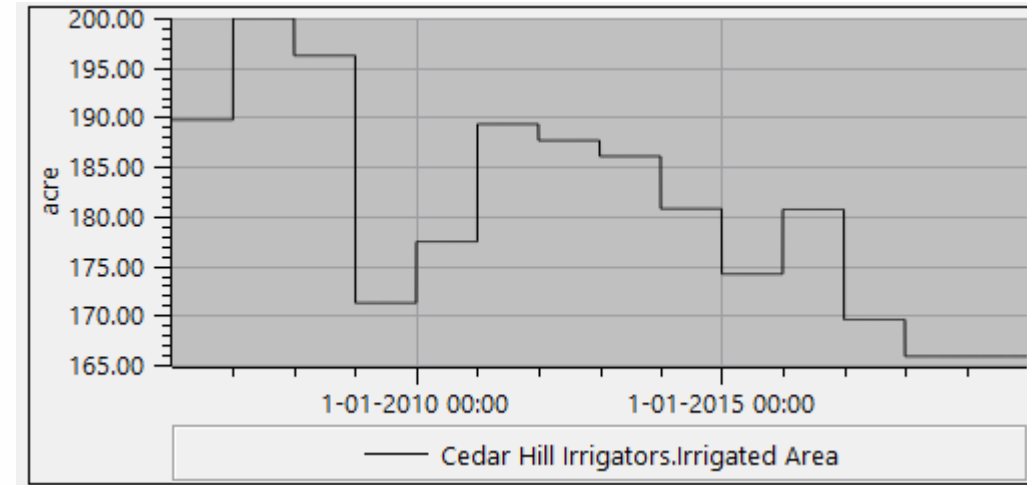
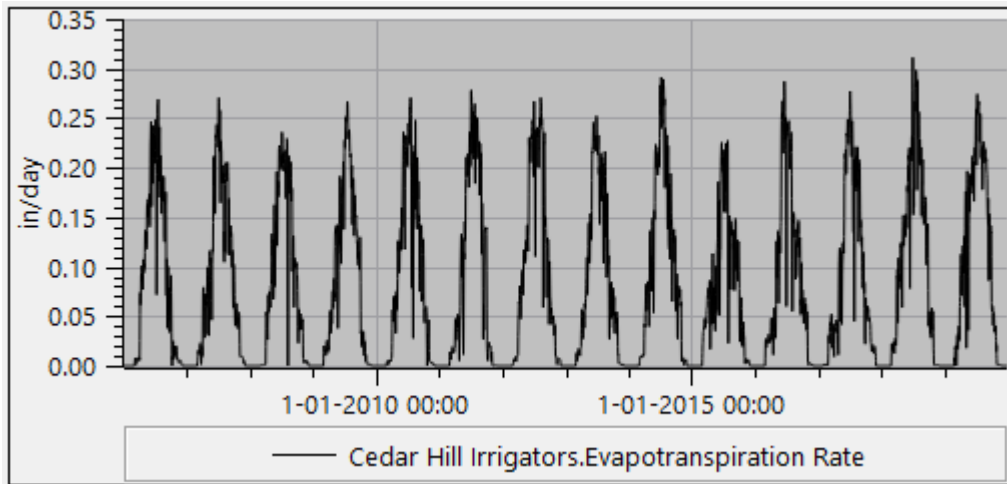






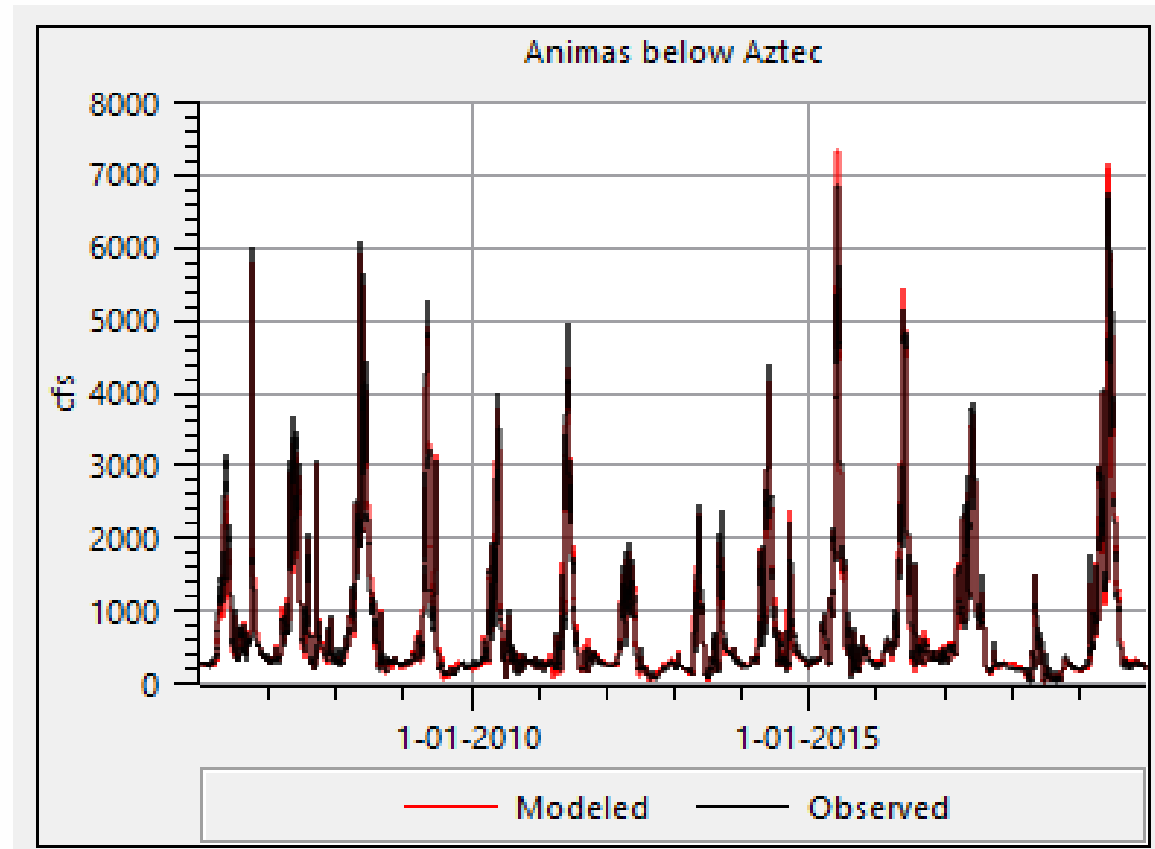
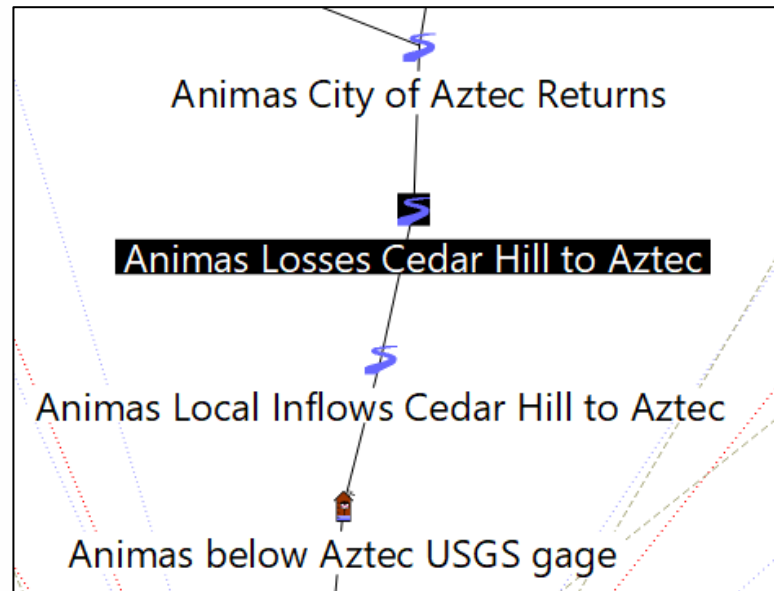
Irrigation Demands and Return Flow

- RiverWare's "Irrigation Requests with Soil Moisture" methods



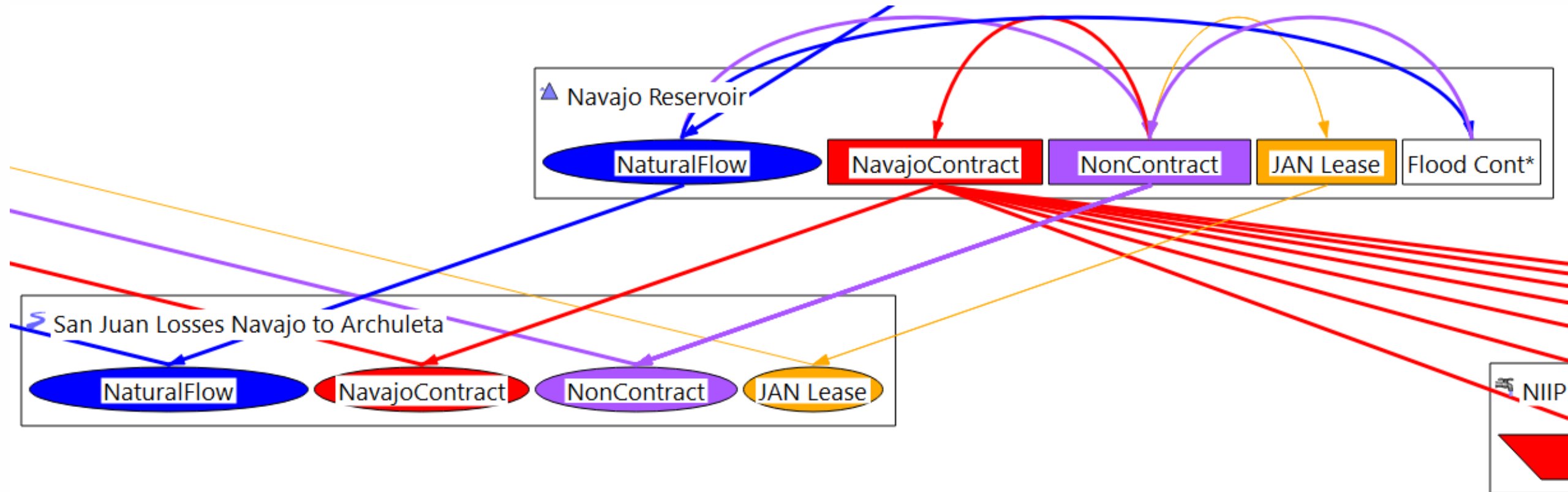
River Losses

Loss rates based on literature, and automatic
Parameter Estimation software (PEST)



Accounting

Different colors of water: Natural flow, or water that was stored under a storage water right, and released for a specific purpose at a later date



Water Rights

Object	Account Name	Type	Water Type	Water Owner	Priority Date
Lower Animas Diversion	D 15	Diversion	NaturalFlow	NONE	Jan. 1, 1908 12:00
Farmers Mutual Animas Diversion	D 16	Diversion	NaturalFlow	NONE	Apr. 7, 1920 00:00
Farmers Irrigation Diversion	D Farmington pre1956	Diversion	NaturalFlow	NONE	Jan. 1, 1925 00:00
City of Farmington Pump 2	D Farmington pre1956	Diversion	NaturalFlow	NONE	Jan. 1, 1925 00:01
Willett Diversion	D Farmington pre1956	Diversion	NaturalFlow	NONE	Jan. 1, 1925 00:02
Lee Acres And West Hammond MDWCA	D Lee Acres and West Hammond pre1956	Diversion	NaturalFlow	NONE	Dec. 31, 1946 12:00
Citizens Diversion	D Enterprise Blanco Plant	Diversion	NaturalFlow	NONE	Aug. 24, 1951 00:00
Aztec Diversion	D City of Aztec 1953	Diversion	NaturalFlow	NONE	Dec. 21, 1953 00:00
Lower Animas Diversion	D City of Aztec 1953	Diversion	NaturalFlow	NONE	Dec. 21, 1953 00:01
City of Aztec	D City of Aztec 1953	Diversion	NaturalFlow	NONE	Dec. 21, 1953 00:02
Hammond Diversion	D 27A	Diversion	NaturalFlow	NONE	Jan. 1, 1955 00:00
APS Four Corners Units 4 and 5	D APS Four Corners Units 4 and 5	Diversion	NaturalFlow	NONE	Feb. 28, 1955 00:02
Farmers Mutual Animas Diversion	D Lower Valley pre1956	Diversion	NaturalFlow	NONE	Apr. 30, 1956 12:00
Lower Valley MDWCA	D Lower Valley pre1956	Diversion	NaturalFlow	NONE	Apr. 30, 1956 12:01
Western Refinery	D Western Refinery	Diversion	NaturalFlow	NONE	Apr. 30, 1956 22:00
Navajo Dam MDWCA	D Navajo Dam MDWCA	Diversion	NaturalFlow	NONE	Apr. 30, 1956 23:00
Navajo Reservoir	S NonContract	Storage	NaturalFlow	NONE	Apr. 30, 1956 23:59
Farmers Irrigation Diversion	D Farmington ALP	Diversion	NaturalFlow	NONE	May. 1, 1956 00:00
North Star MDWCA	D North Star ALP	Diversion	NaturalFlow	NONE	May. 1, 1956 00:05

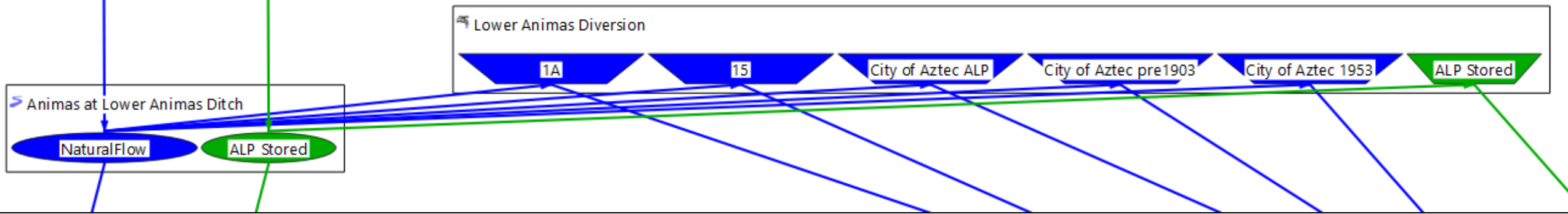
Water Rights.Flow Rates

File Edit Row Column

Flow Rates

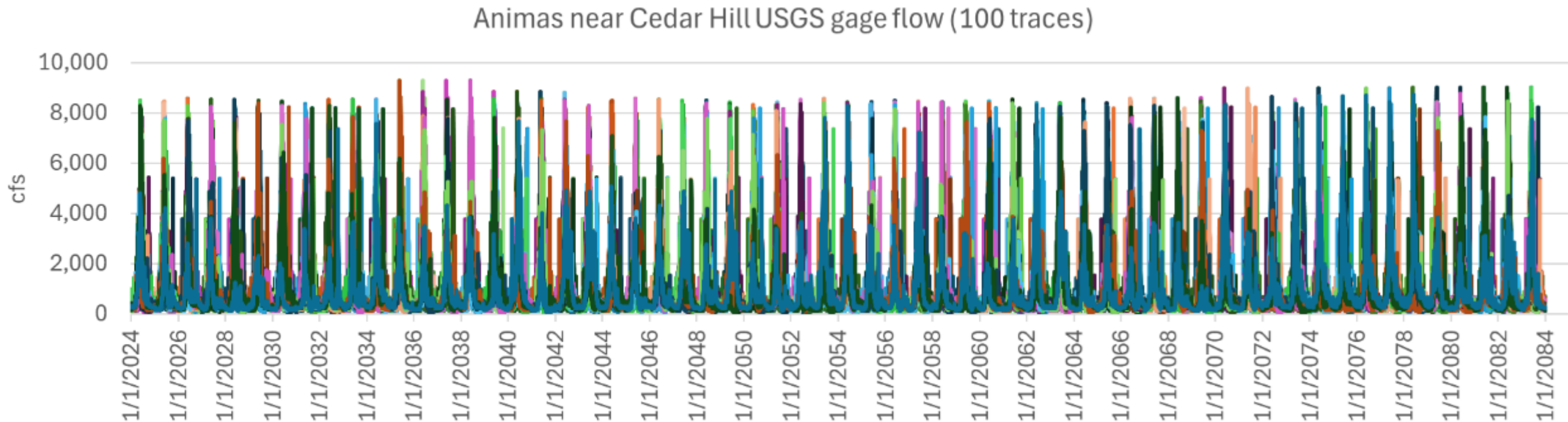
Value: 16.05

	cfs
6: 11	10.00
7: 12	16.08
8: 14	5.26
9: 15	16.05
10: 16	104.53
11: 20	100.00



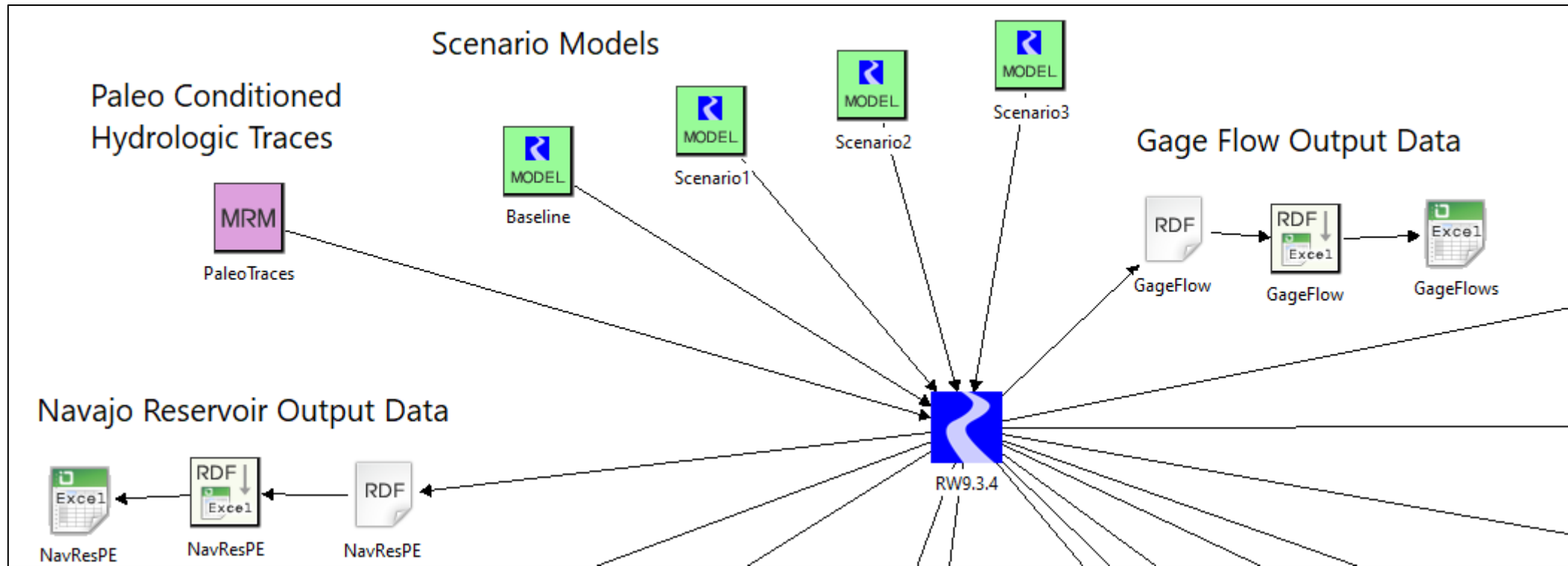
Planning Models: Hydrology

- 100 traces of Paleo-conditioned flows (tree-ring data)
- 60 years into the future
- Modified from Reclamation's CRSS paleo ensembles

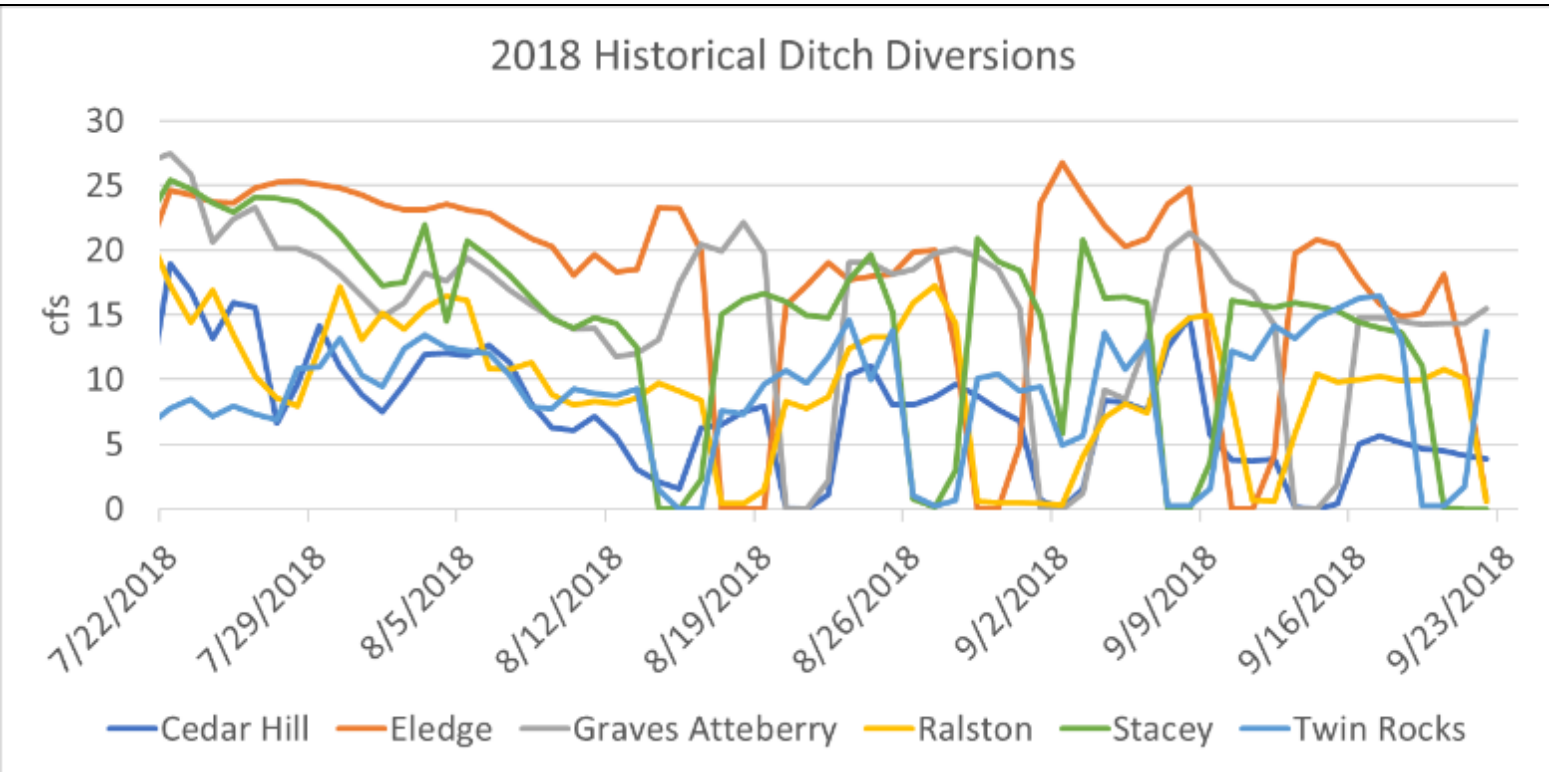


Planning Models

- Ran Scenarios using RiverSMART, including:
 - Tribes developing their water rights
 - Voluntary ditch rotations on the Animas River
- Use RiverWare Distributed MRM feature



Animas Ditch Rotations



Rotation Schedule Name	Total Annual Crop Shortage when Ditches Shutoff
Schedule0-ABCD	283
Schedule1-ABCD	225
Schedule1-DABC	193
Schedule1-CDAB	168
Schedule1-BCDA	164
Schedule2-CDAB	138
Schedule2-BCDA	158
Schedule2-ABCD	166
Schedule2-DABC	180
Schedule3-CABD	178
Schedule3-DCAB	206
Schedule3-BDCA	152
Schedule3-ABDC	168
Schedule4-CABD	223
Schedule4-DCAB	159
Schedule4-BDCA	279
Schedule4-ABDC	202
Schedule5-BDAC	169
Schedule5-CBDA	160
Schedule5-ACBD	153
Schedule5-DACB	195

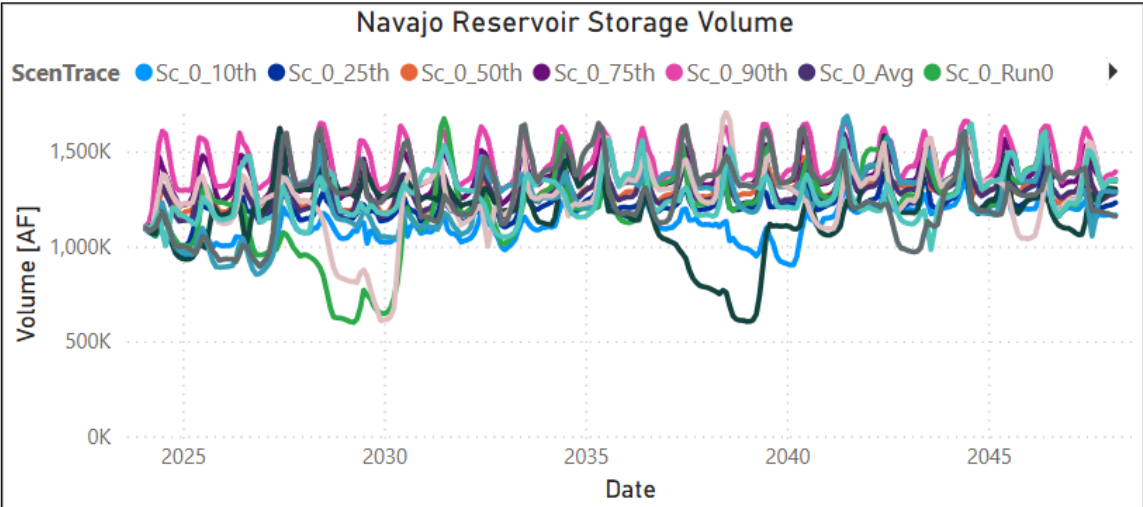
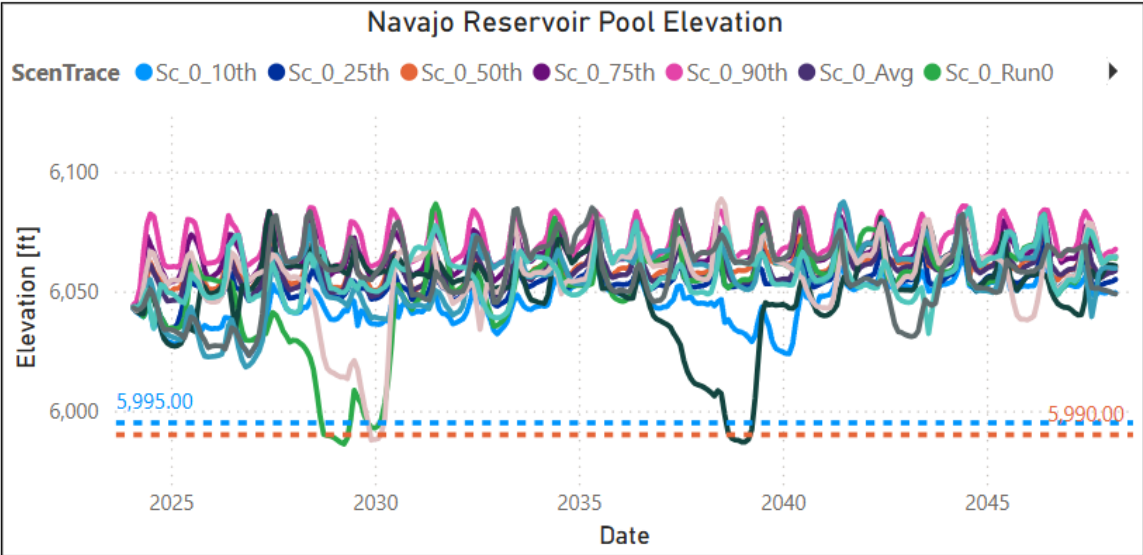
Power BI Model Dashboard

Scenario

- Sc_0_Baseline
- Sc_1_2050_Buildout
- Sc_2_Anms_Rotation
- Sc_3_ALPN_Rel

Trace

- Run0
- Run1
- Run10
- Run11
- Run12
- Run13
- Run14
- Run15
- Run16
- Run17
- Run18
- Run19
- Run2
- Run20



Count of Days at/below Elevation:

Scenario	Below 5990	Below 5995
Sc_0_Baseline		
Run0	224	372
Run1	198	243
Run10	0	0
Run11	104	147
Run12	0	0
Run13	0	0
Run14	0	0

Date

1/31/2024 3/28/2048

Notes:

- Traces are ordered driest (Run0) to wettest (Run99).
- The top plot shows traces of Navajo Reservoir Pool Elevations (monthly average)
- The bottom plot shows Navajo Reservoir Storage Volume (monthly average)
- The data table shows the count of days equal to or below the specified threshold (5990 or 5995) based on daily results. Note that the "Count of Days.." table reflects the entire simulation and does NOT update with the time slicer.

Power BI Model Dashboard (continued)

Landing	Description	Notes	Example	MapView	Ensem_Slot	Ensem_Object	MetricSummary	Navajo	NavajoAccounts	Navajo_Summary	Navajo_Heat	Trace_Slot	Trace_Object	GageViewer	Trace_Inflows
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San Juan Animas RiverWare Model Diversions, Water User, and Gage Locations

● Diversion ● Gage ● Irrigator Water User



[View Selection](#)

[View Selected Gage](#)

Locations are approximate.
Use map to select a Diversion, Irrigator, or Stream Flow Gage.
While an object on the map is selected,
click the appropriate "View Data" button to view the selected data.

Collaboration



- NMISC
- NMOSE
- Bureau of Reclamation
- San Juan Water Commission
- Navajo Nation

Navajo
Reservoir,
Nick
Mander

Questions?

Confluence of Animas
and San Juan Rivers,
Farmington NM, Nick
Mander

Mander@HydrosConsulting.com