Sand Hollow Reservoir Managed Aquifer Recharge updated through 2022

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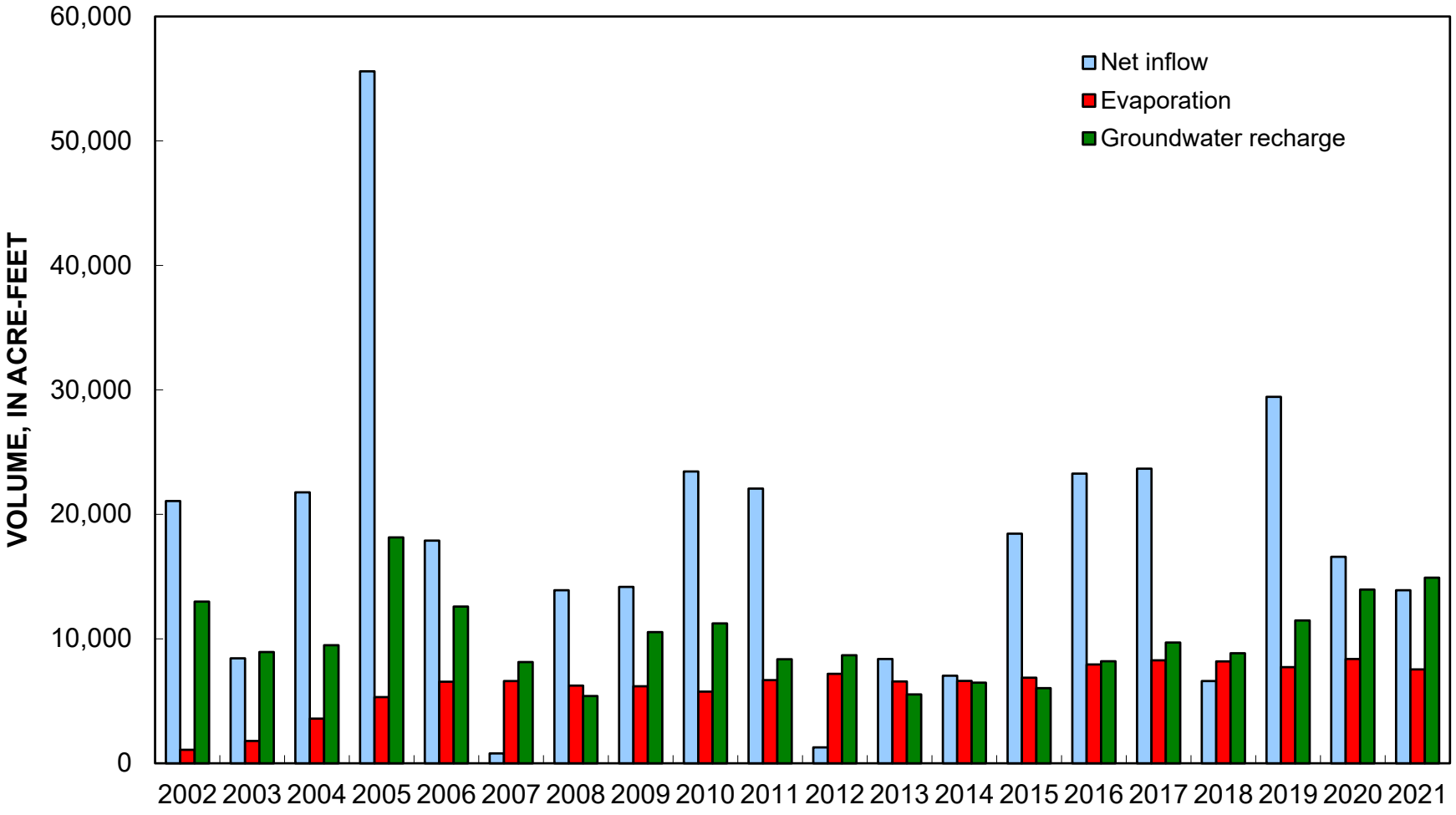
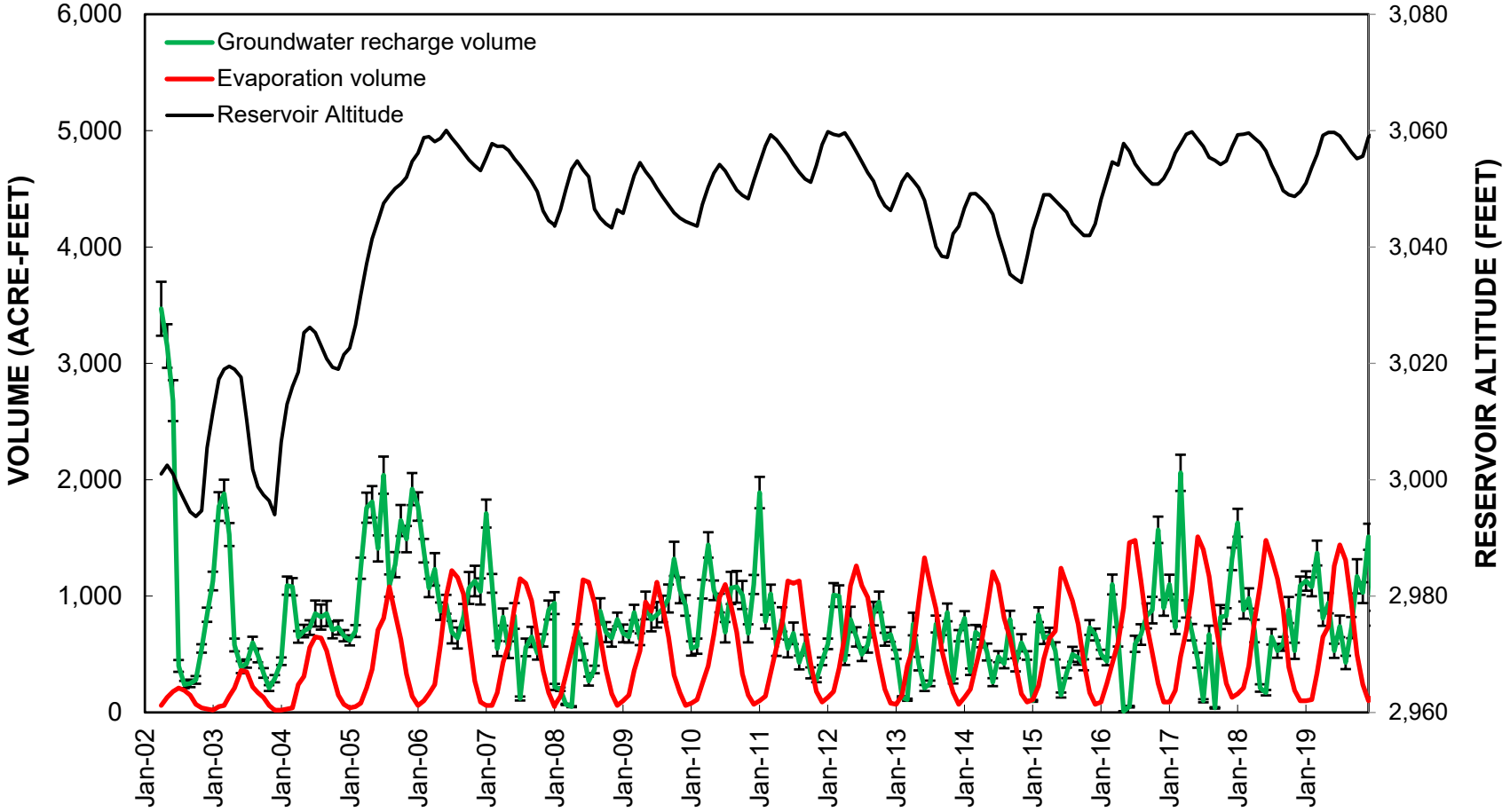
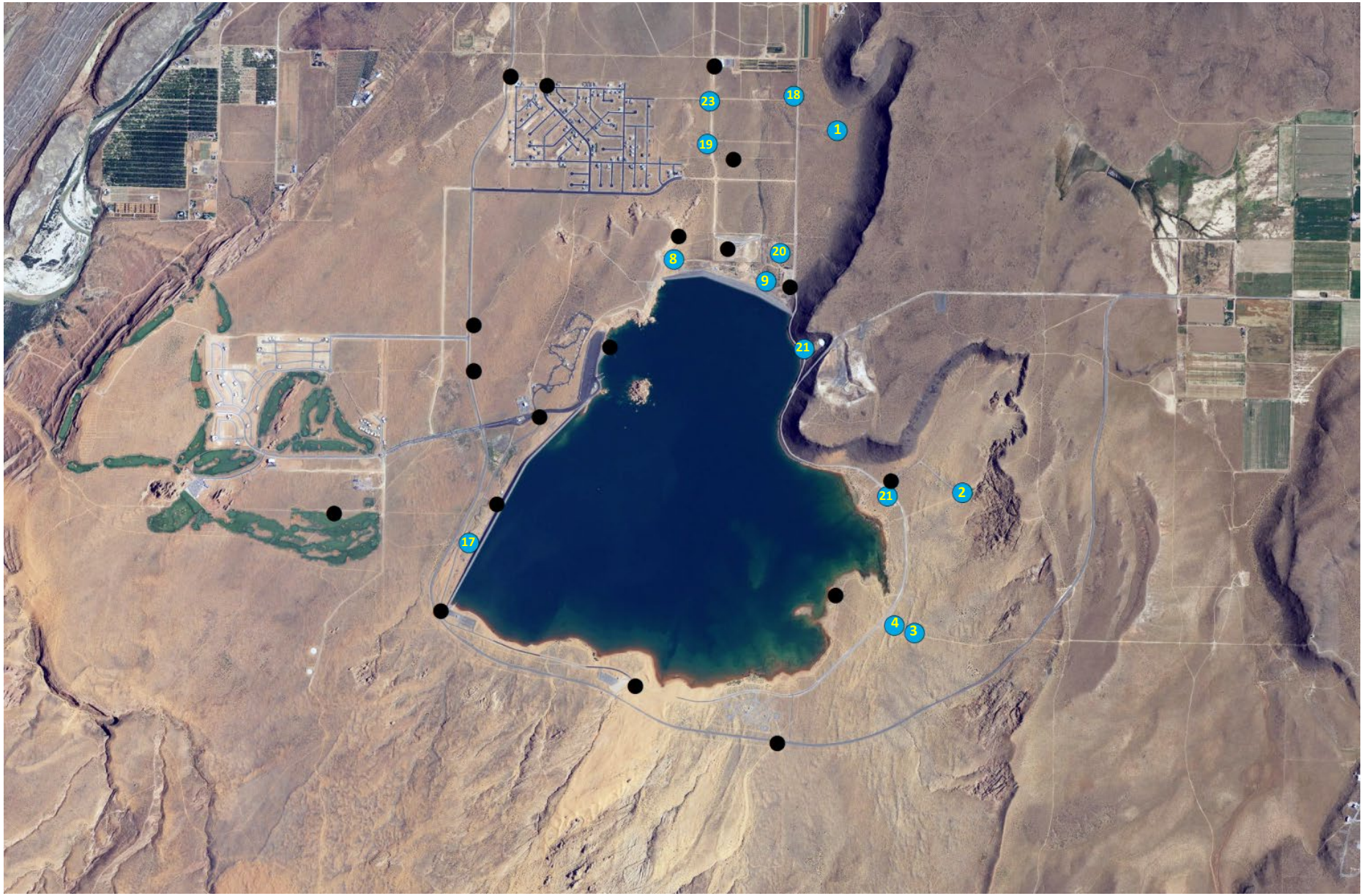
Sand Hollow MAR – Budget Components

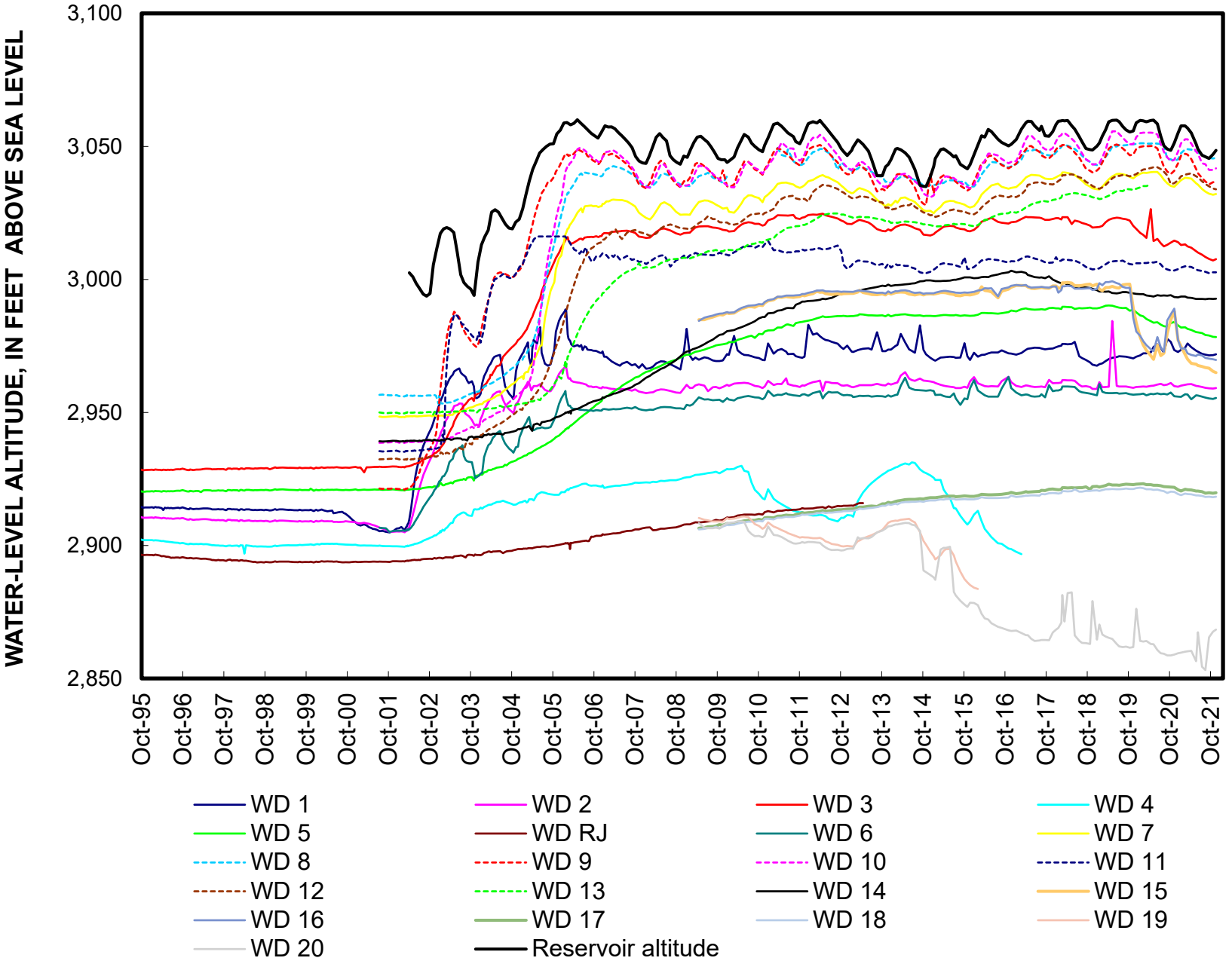


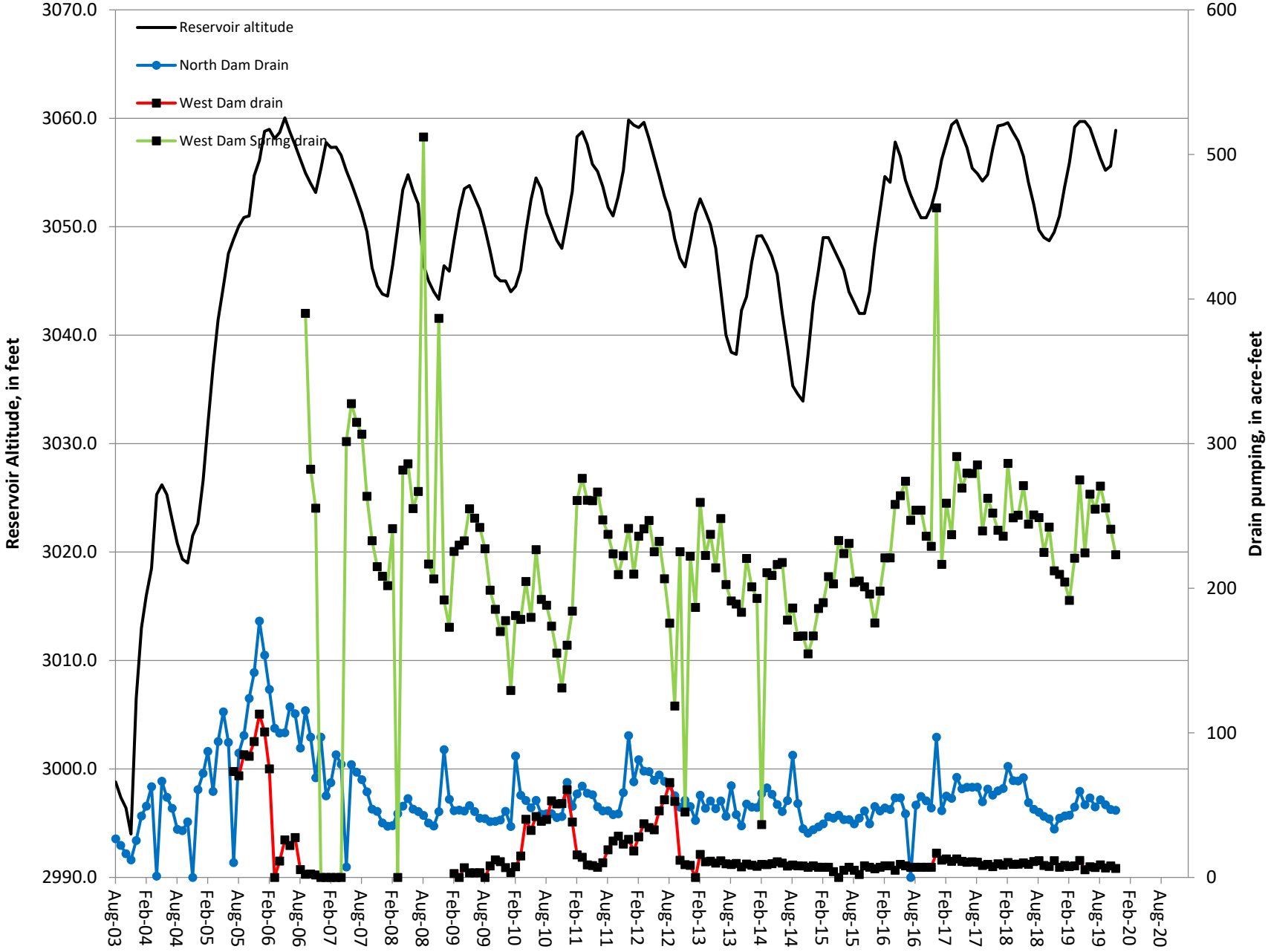
Sand Hollow MAR – Monthly Volumes



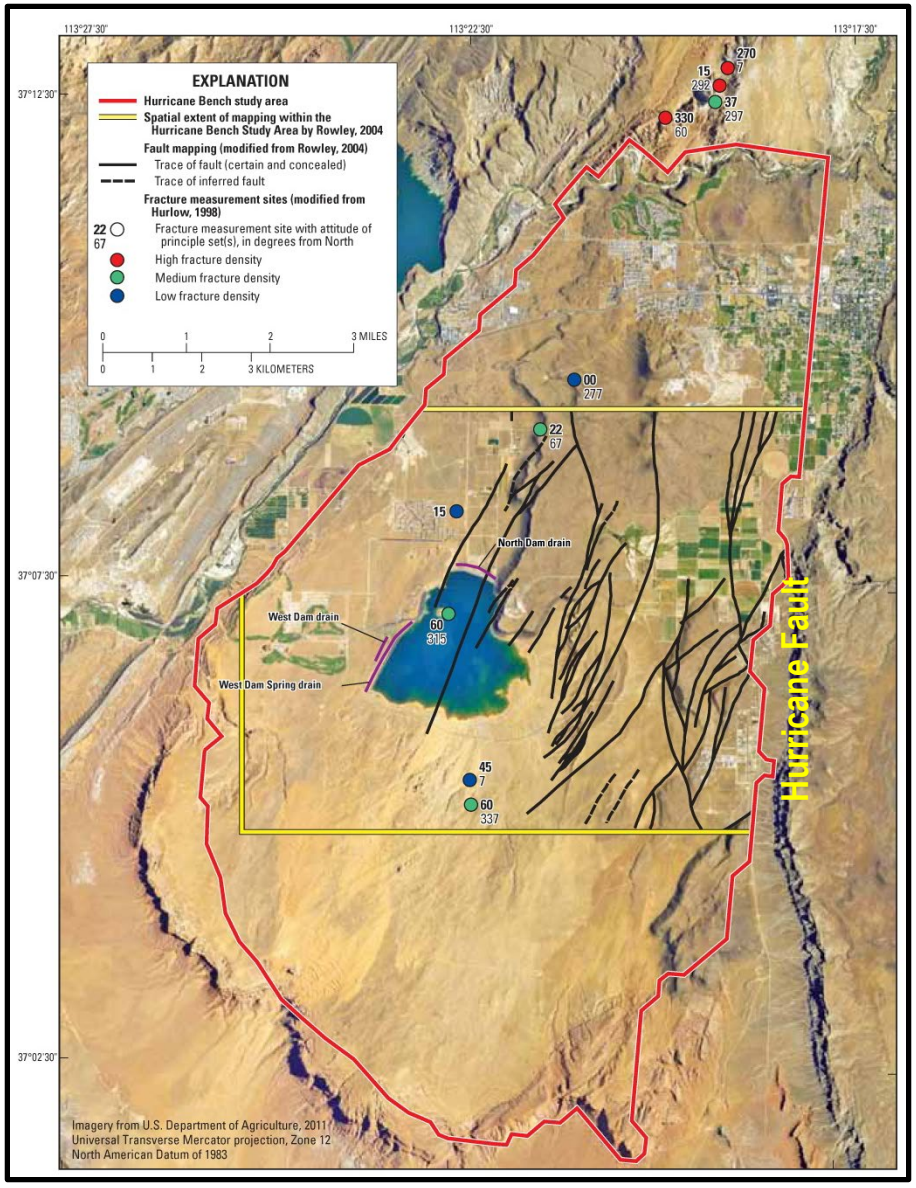
Monitoring and Pumping Network

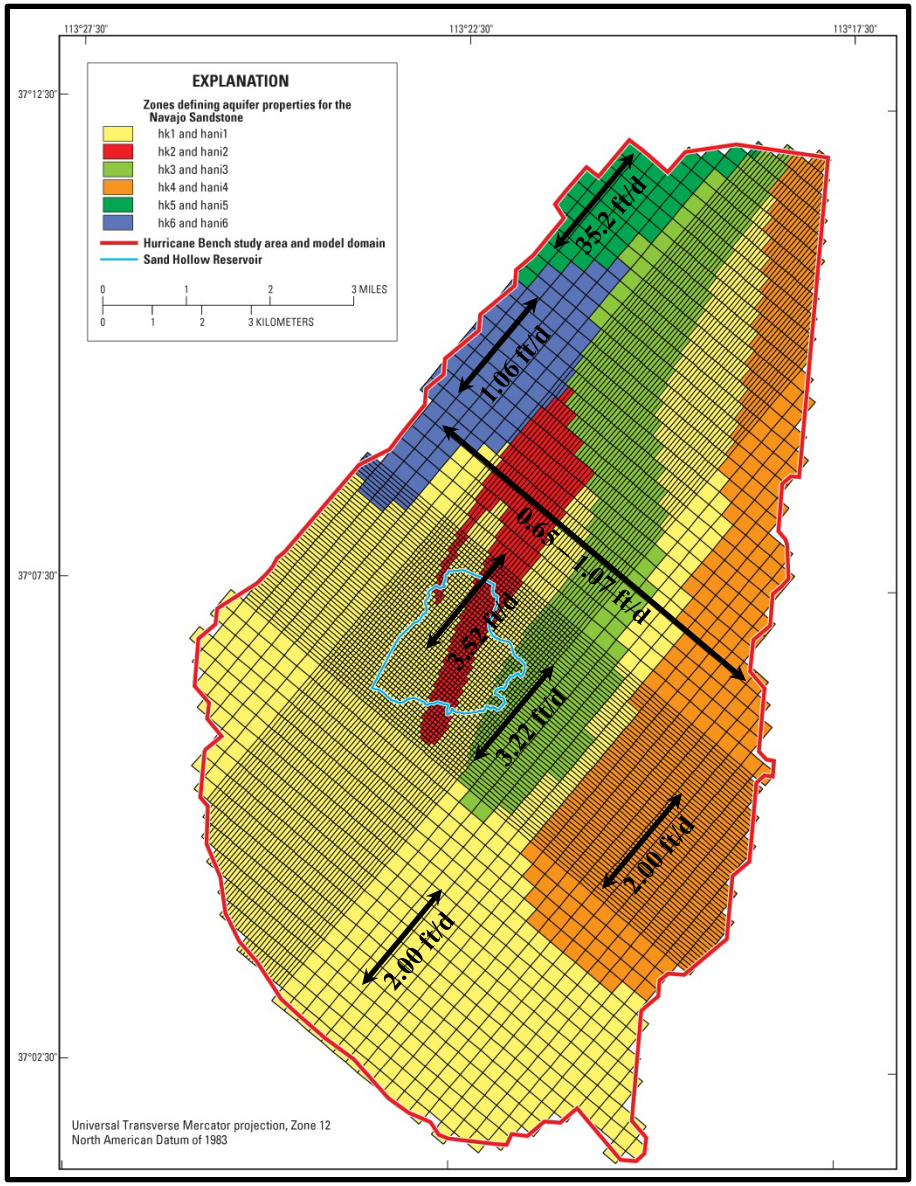



WATER-LEVEL ALTITUDE, IN FEET ABOVE SEA LEVEL
3,100
3,050
3,000
2,950
2,900
2,850
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13
Oct-14
Oct-15
Oct-16
Oct-17
Oct-18
Oct-19
Oct-20
Oct-21
WD 1
WD 2
WD 3
WD 4
WD 5
WD RJ
WD 6
WD 7
WD 8
WD 9
WD 10
WD 11
WD 12
WD 13
WD 14
WD 15
WD 16
WD 17
WD 18
WD 19
WD 20
Reservoir altitude

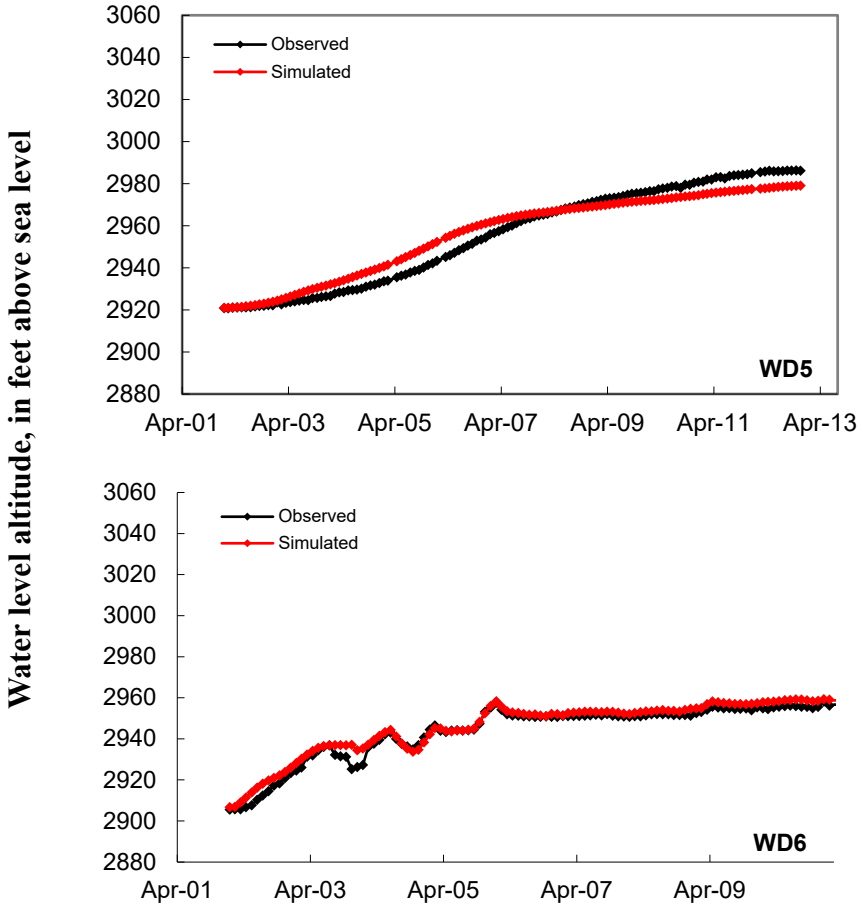

Reservoir altitude
North Dam Drain
West Dam drain
West Dam Spring drain
Reservoir Altitude, in feet
Drain pumping, in acre-feet
3070.0
3060.0
3050.0
3040.0
3030.0
3020.0
3010.0
3000.0
2990.0
600
500
400
300
200
100
0
Aug-03
Feb-04
Aug-04
Feb-05
Aug-05
Feb-06
Aug-06
Feb-07
Aug-07
Feb-08
Aug-08
Feb-09
Aug-09
Feb-10
Aug-10
Feb-11
Aug-11
Feb-12
Aug-12
Feb-13
Aug-13
Feb-14
Aug-14
Feb-15
Aug-15
Feb-16
Aug-16
Feb-17
Aug-17
Feb-18
Aug-18
Feb-19
Aug-19
Feb-20
Aug-20

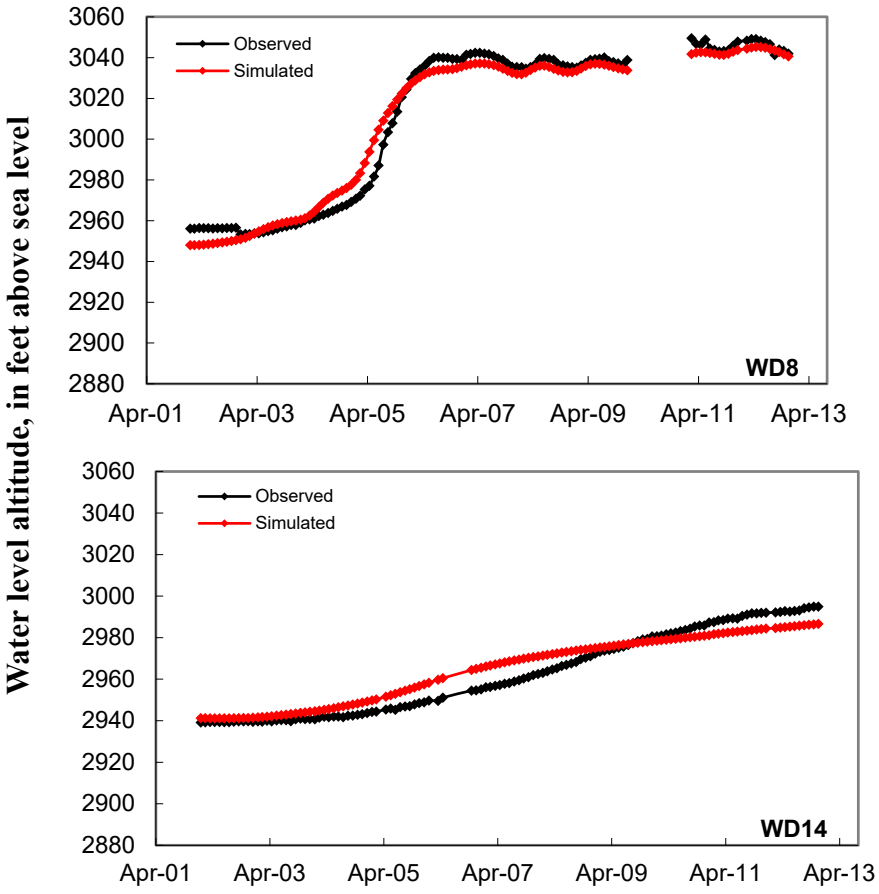
MODFLOW Model





Water Level Calibration





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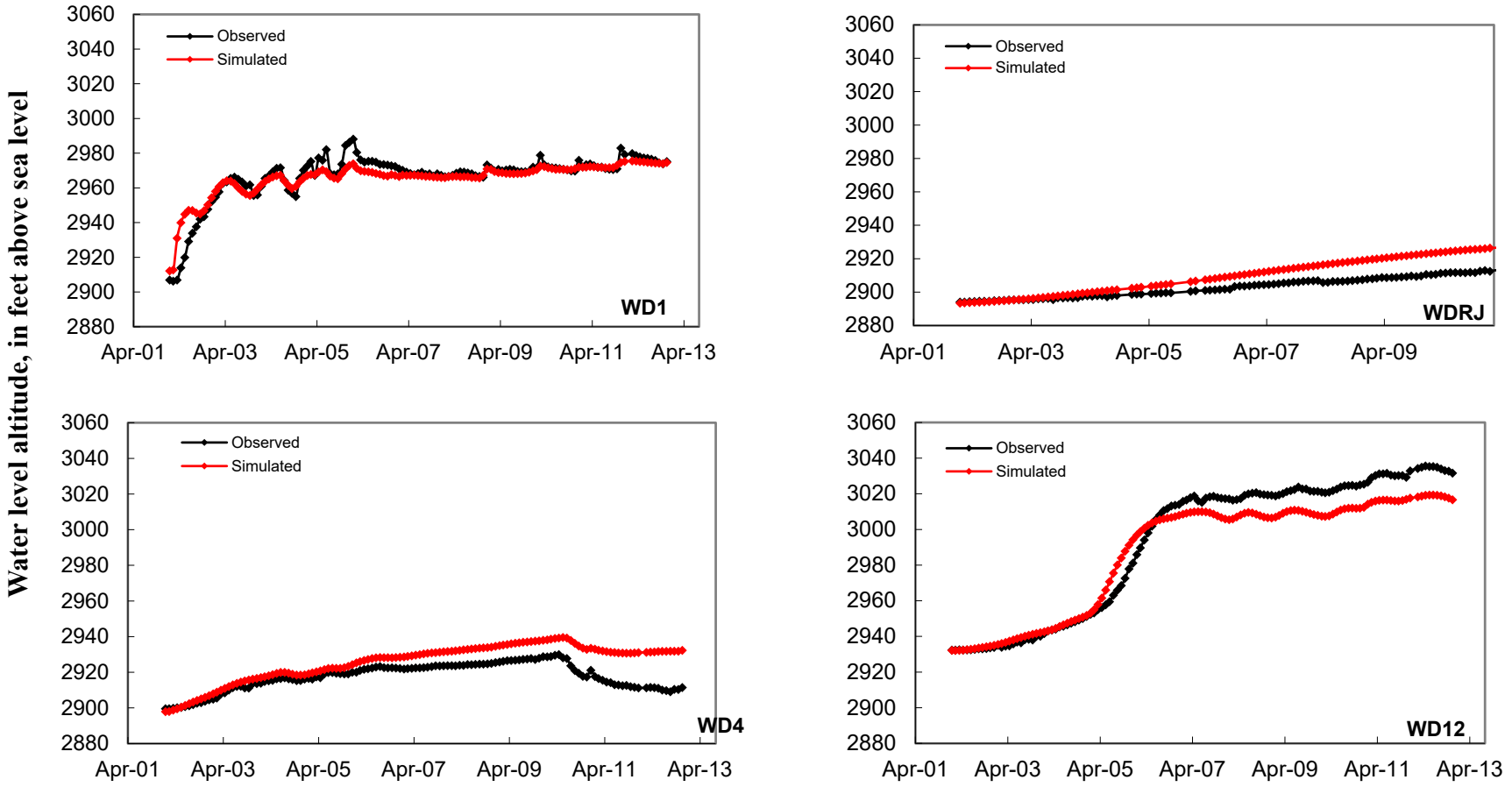
Water Level Calibration



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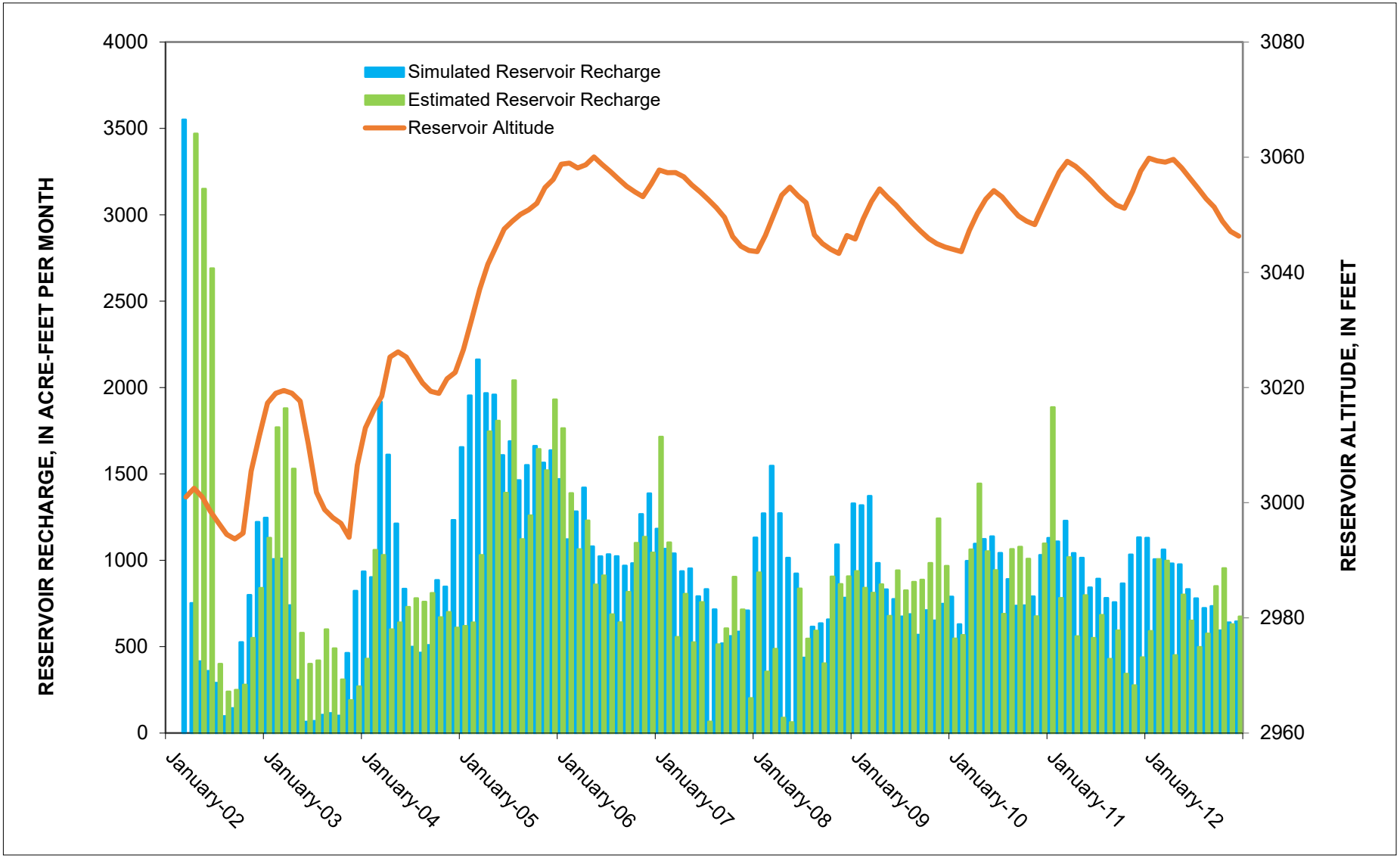
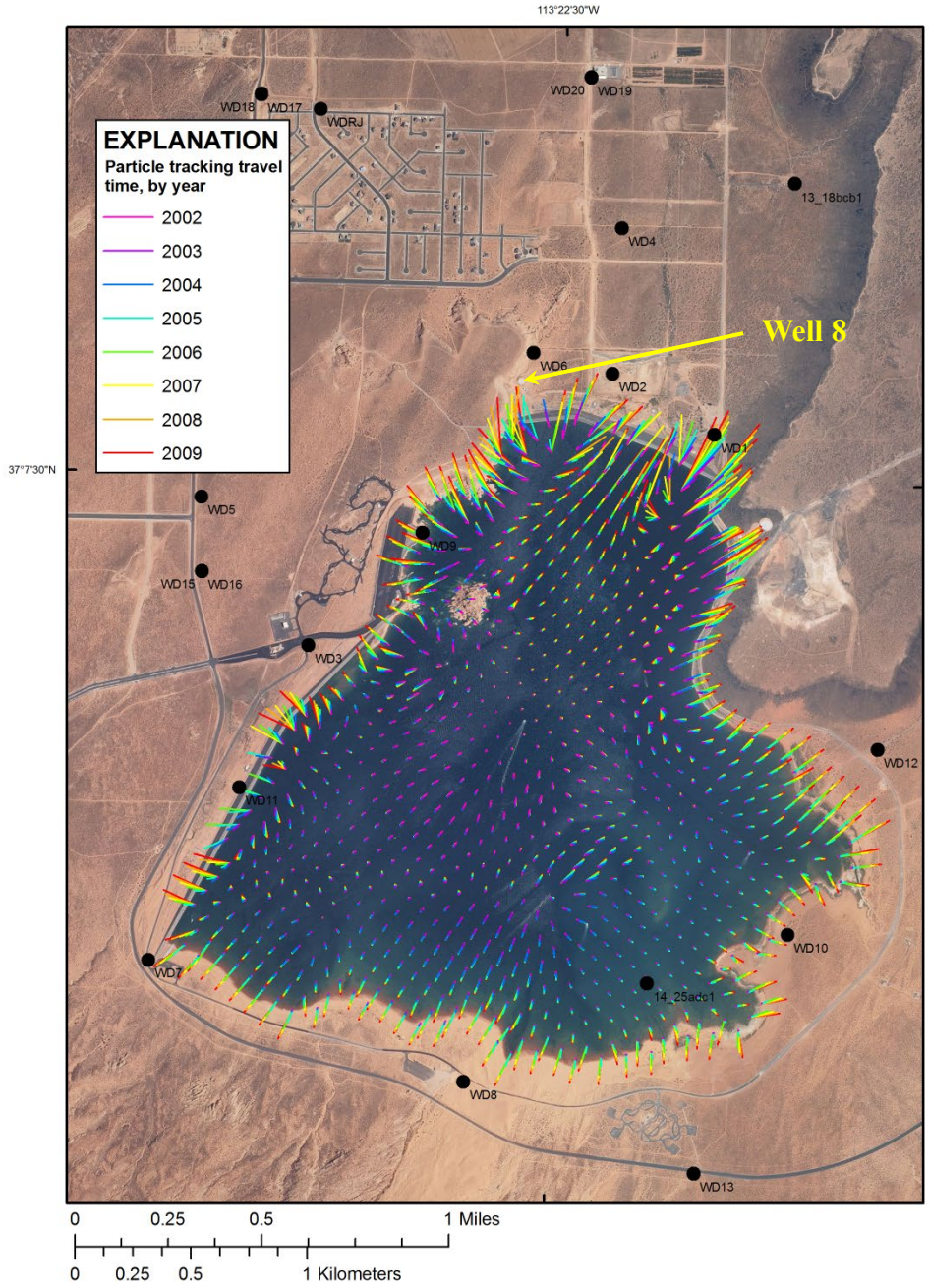
Reservoir Recharge and Stage



MODPATH Particle Tracking

- MODPATH particle transit time results match well for collected tracer data for observation wells North Dam 3A, WD 9, and WD 11
- Pumping and/or anisotropy may inhibit particle travel to WD 6



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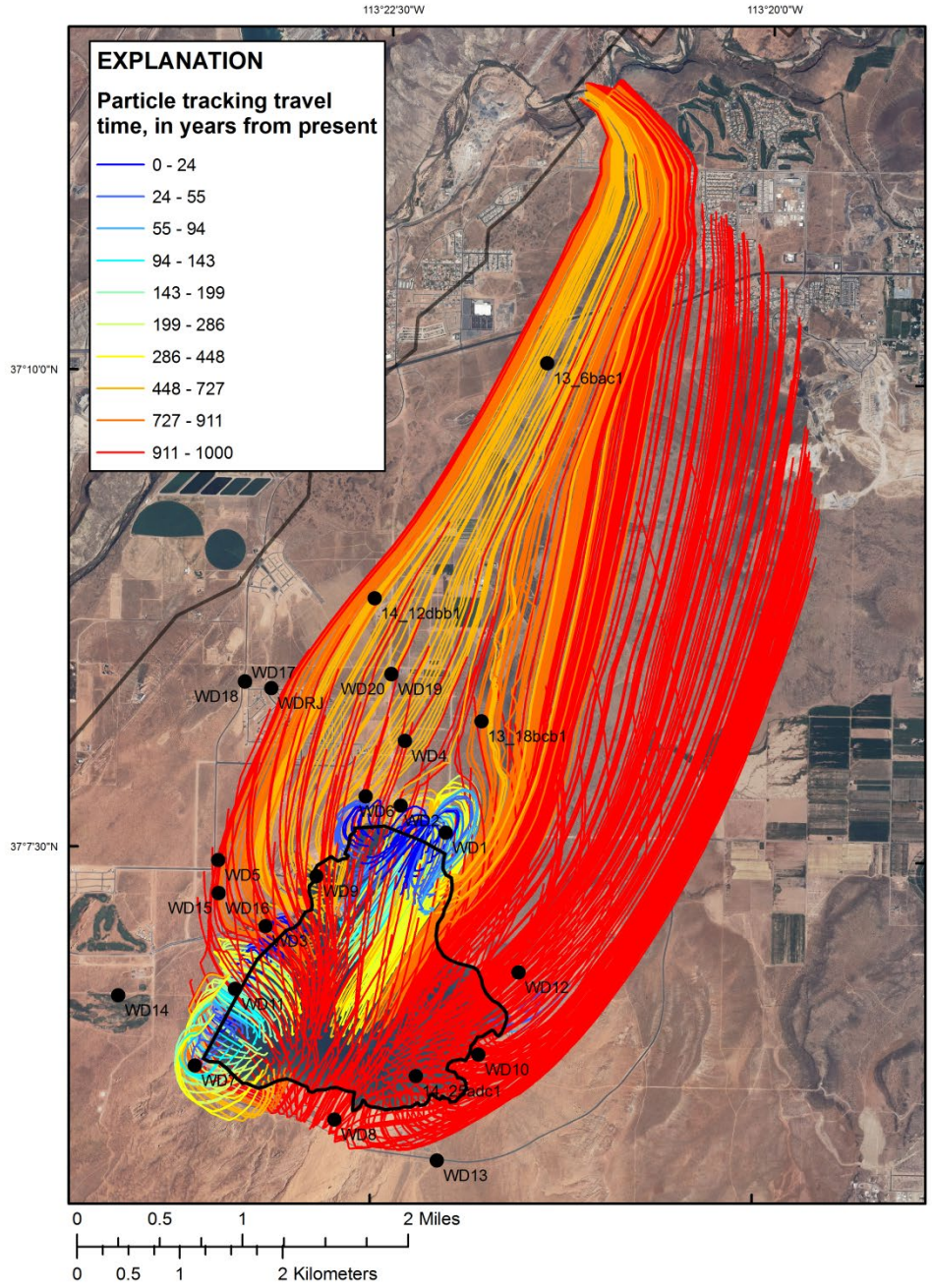
MODPATH Particle Tracking

- Minimum travel time from Sand Hollow Reservoir to the Virgin River is **500** years
- Average travel time is **800** years



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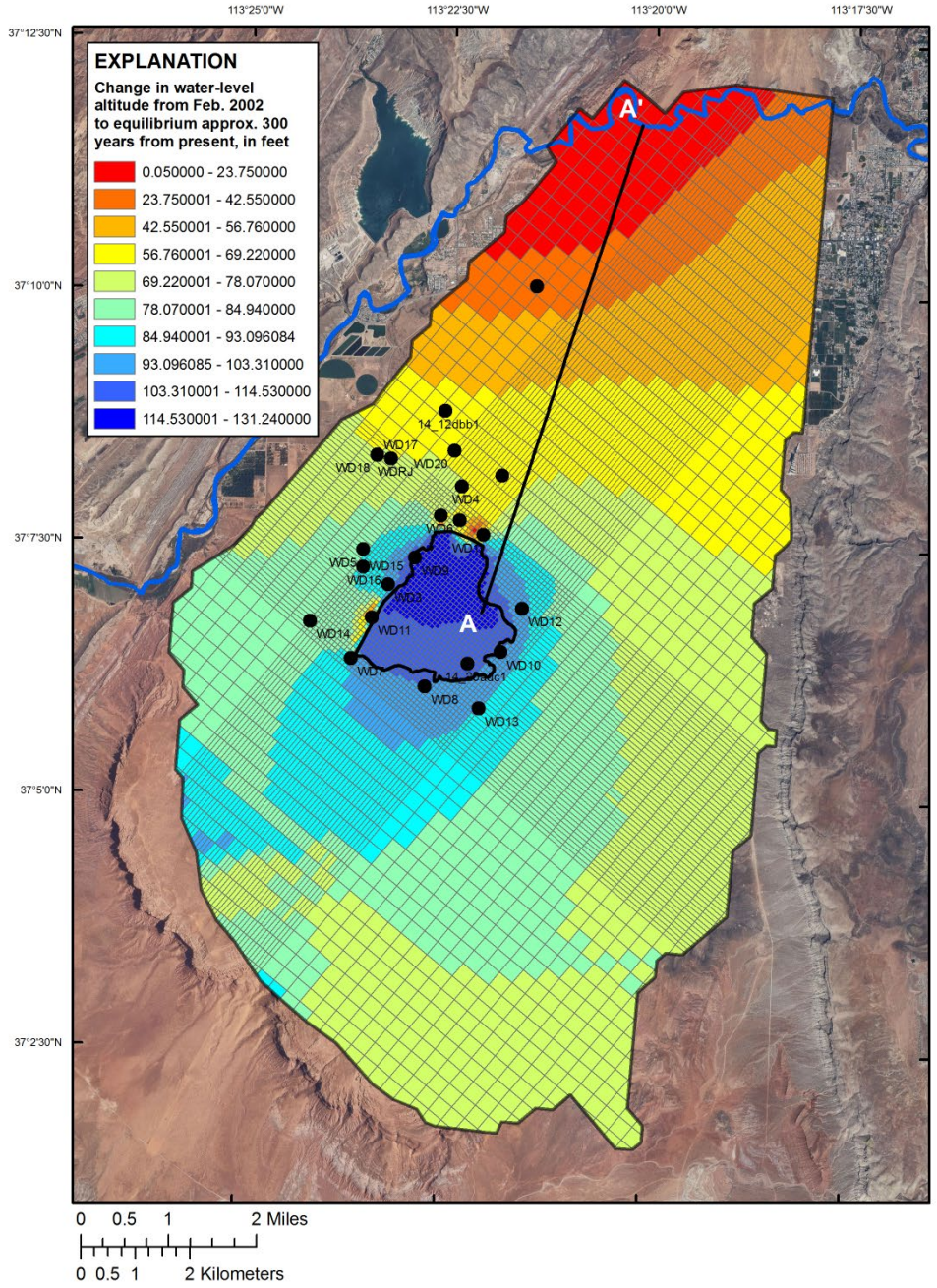
Total Groundwater Storage Potential

- Utilizing an effective porosity of **12%**, equal to specific yield in the model, yields **316,400** acre-feet storage

- Evaluating storage with published values of **17%** for effective porosity yields **448,250** acre-feet



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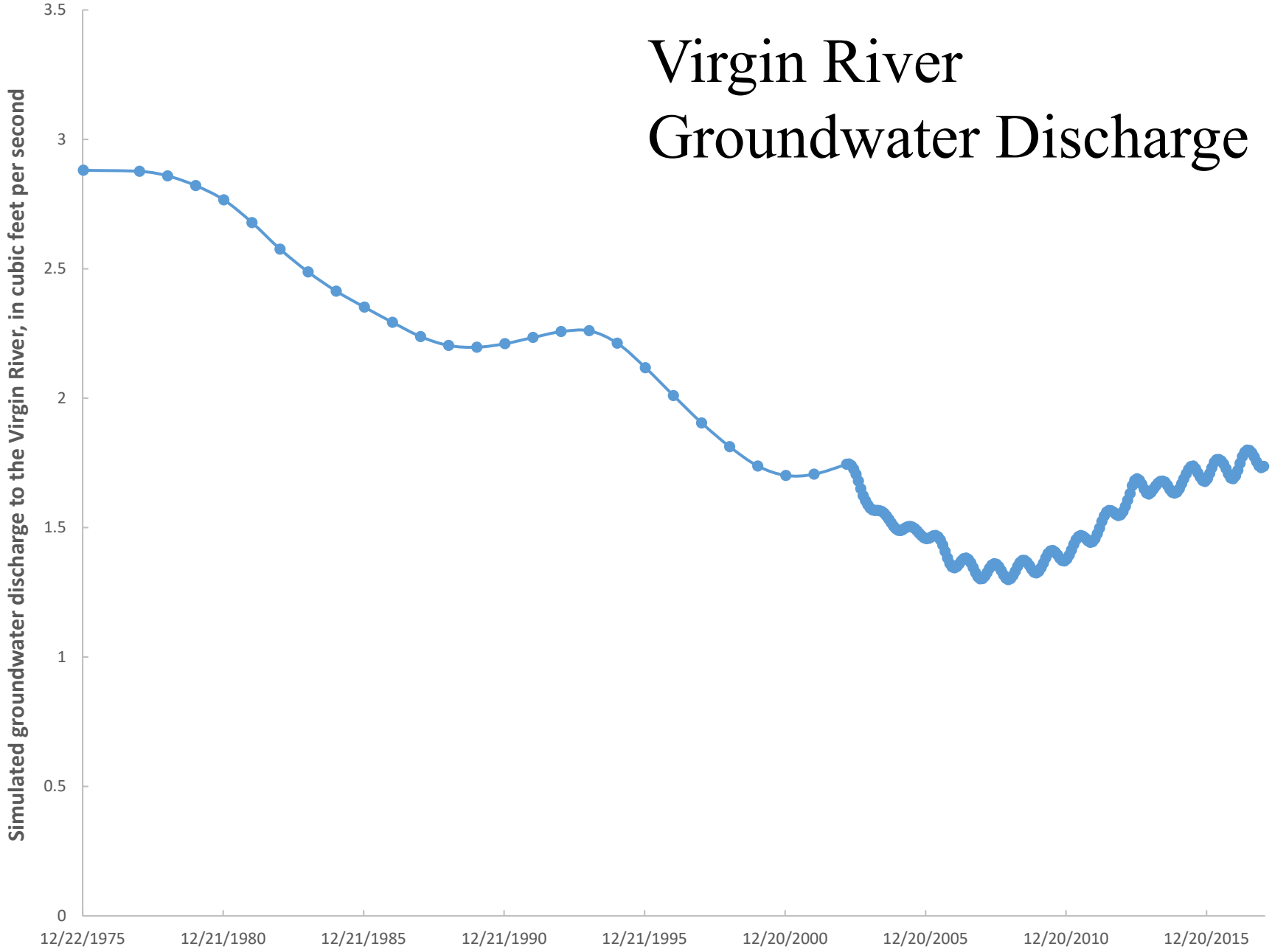
Virgin River
Groundwater Discharge
Simulated groundwater discharge to the Virgin River, in cubic feet per second
3.5
3
2.5
2
1.5
1
0.5
0
12/22/1975
12/21/1980
12/21/1985
12/21/1990
12/21/1995
12/20/2000
12/20/2005
12/20/2010
12/20/2015

Conclusions

- Residence time for recharged water is longer than initially expected
- Current storage use in Sand Hollow Basin is approximately 40% of capacity
- Pumping north of Sand Hollow Reservoir will impact groundwater discharge to Virgin River induced by pressure response