Assessing Hydrological Connectivity of the Upper Teton Alluvial Aquifer; Choteau, Montana

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Acknowledgements

- DNRC Water Sciences Bureau
- Mike Maples –
  City of Choteau Public Works
- Teton Conservation District
- Local Landowners

Project Background

- MBMG, DNRC studies

- Teton River Distribution Project (2018)

Priority date

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Flow

↙ ↘

Spring Creek Teton River

Objectives:

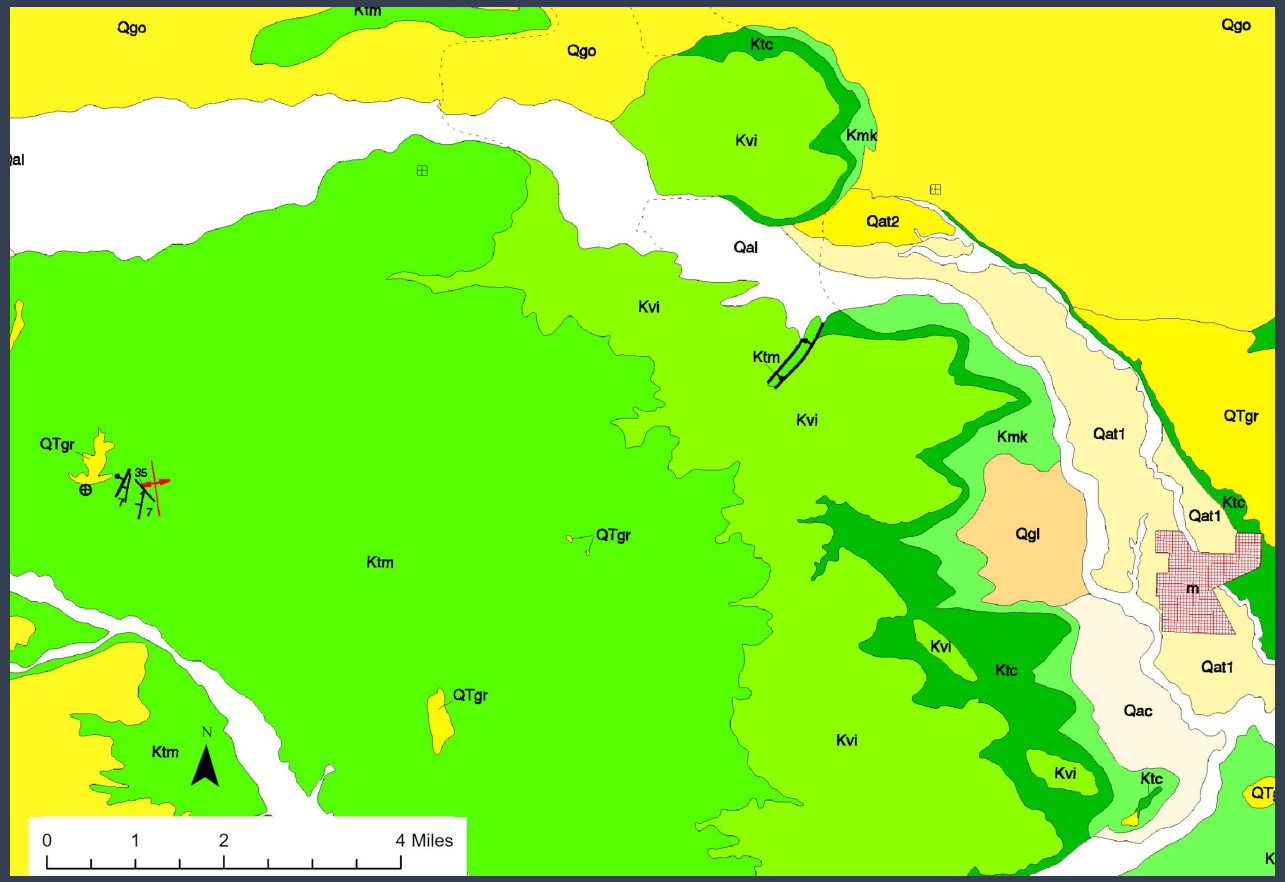
1) define the groundwater and surface water connections of the **alluvial aquifer**

2) investigate the source, volume, and timing of discharge to **spring creeks**

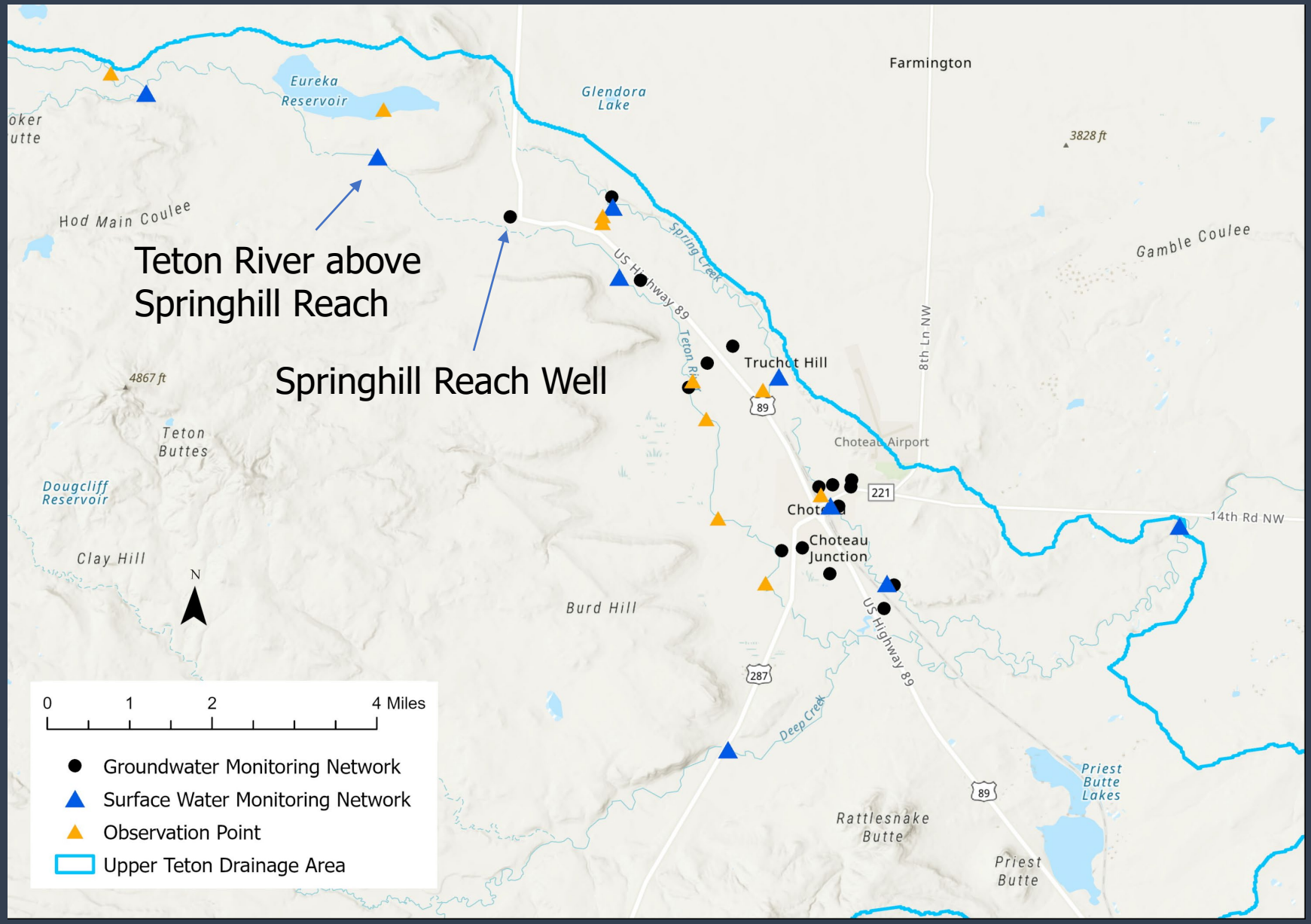
3) estimate increased recharge and shallow aquifer interactions of the **Teton River**

Hydrogeologic Setting

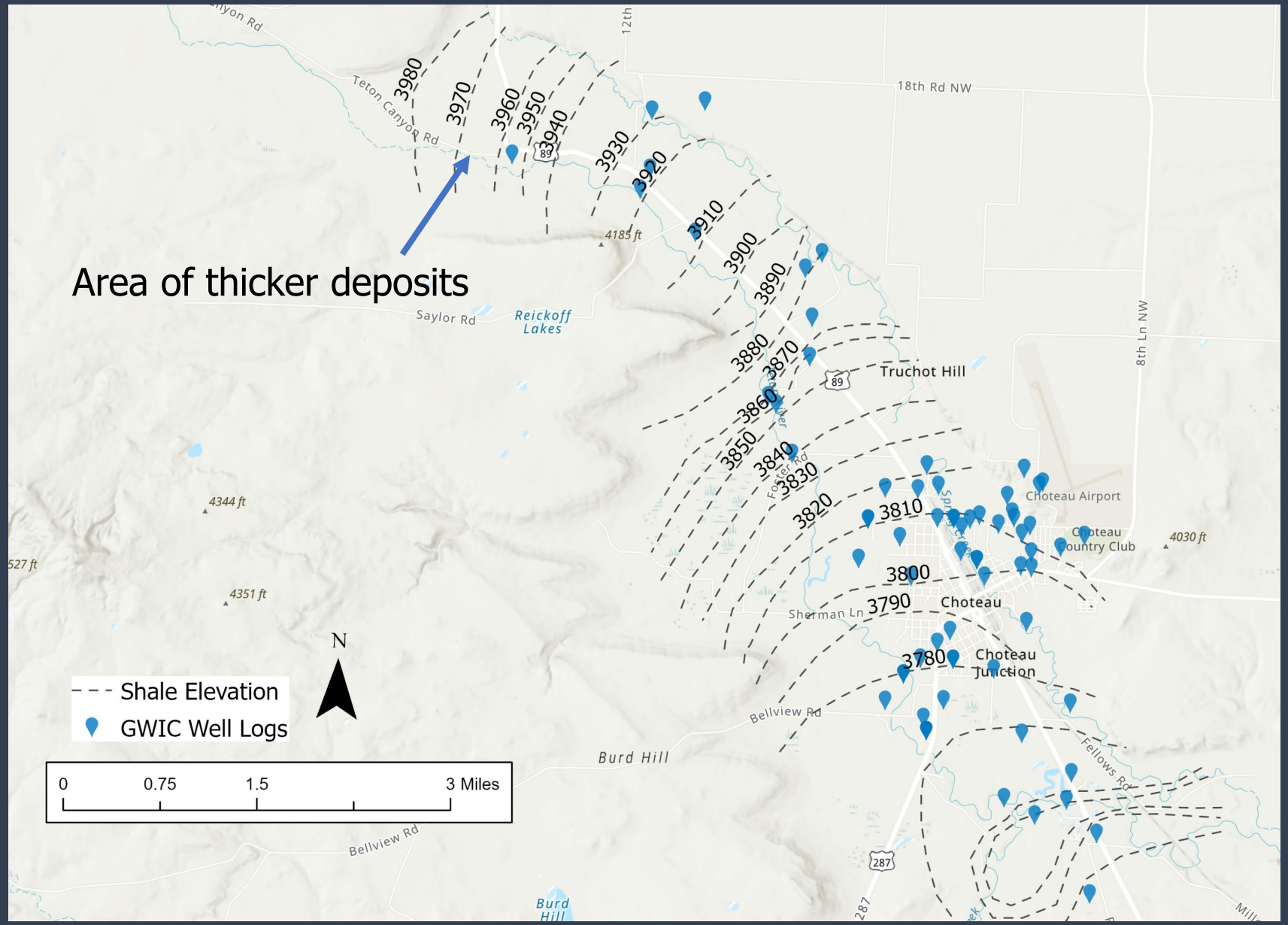
- Cretaceous sedimentary bedrock
- Glacial till, lake and outwash deposits (Patton, 1991)



Monitoring Network



Bedrock Elevations – Study Area



Teton River Alluvium

- Surface area: 42.5 square miles
- Porosity: 0.09 (Patton, 1991)
- Saturated thickness: 16 feet (well logs)
- Est. Storage: 39,000 acre-feet

-Total reservoir capacities ~ 100,000 acre-feet

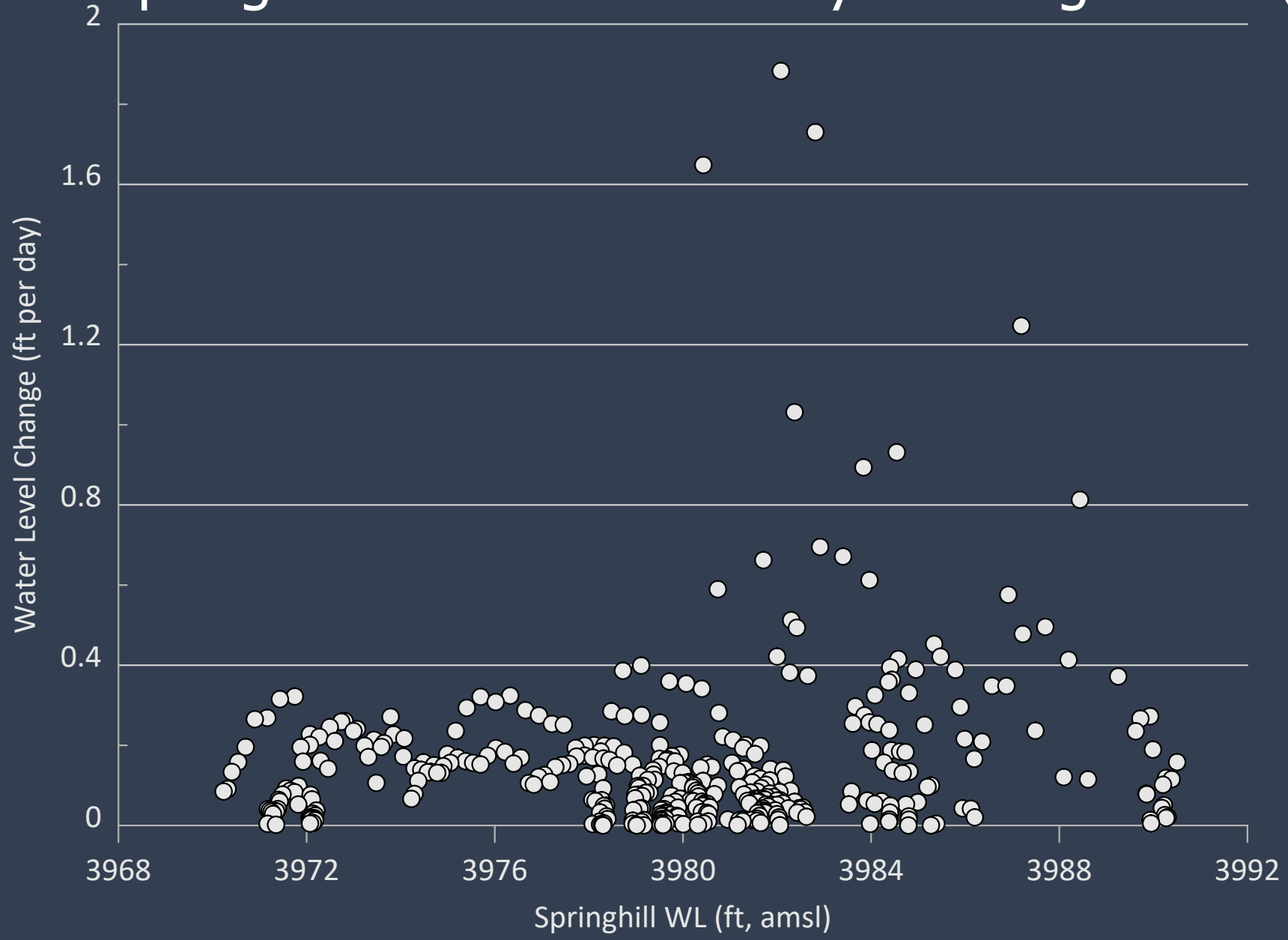
Recharge:

- Teton river above Springhill Reach
- Surface water below Springhill Reach
- Irrigation losses
- Precipitation
- Bedrock aquifers

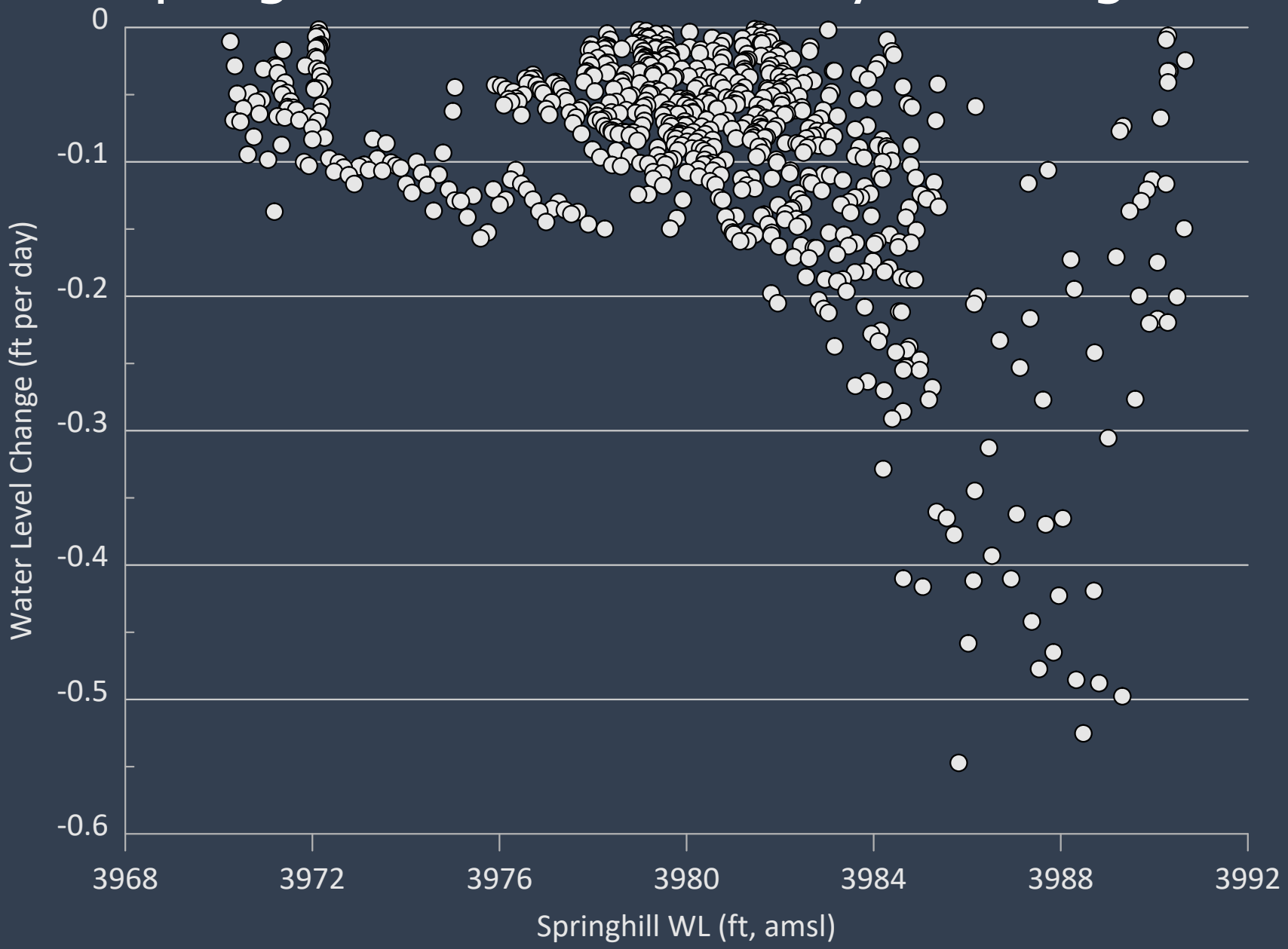
Discharge:

- Surface water (including springs)
- ET
- GW flux out
- Wells

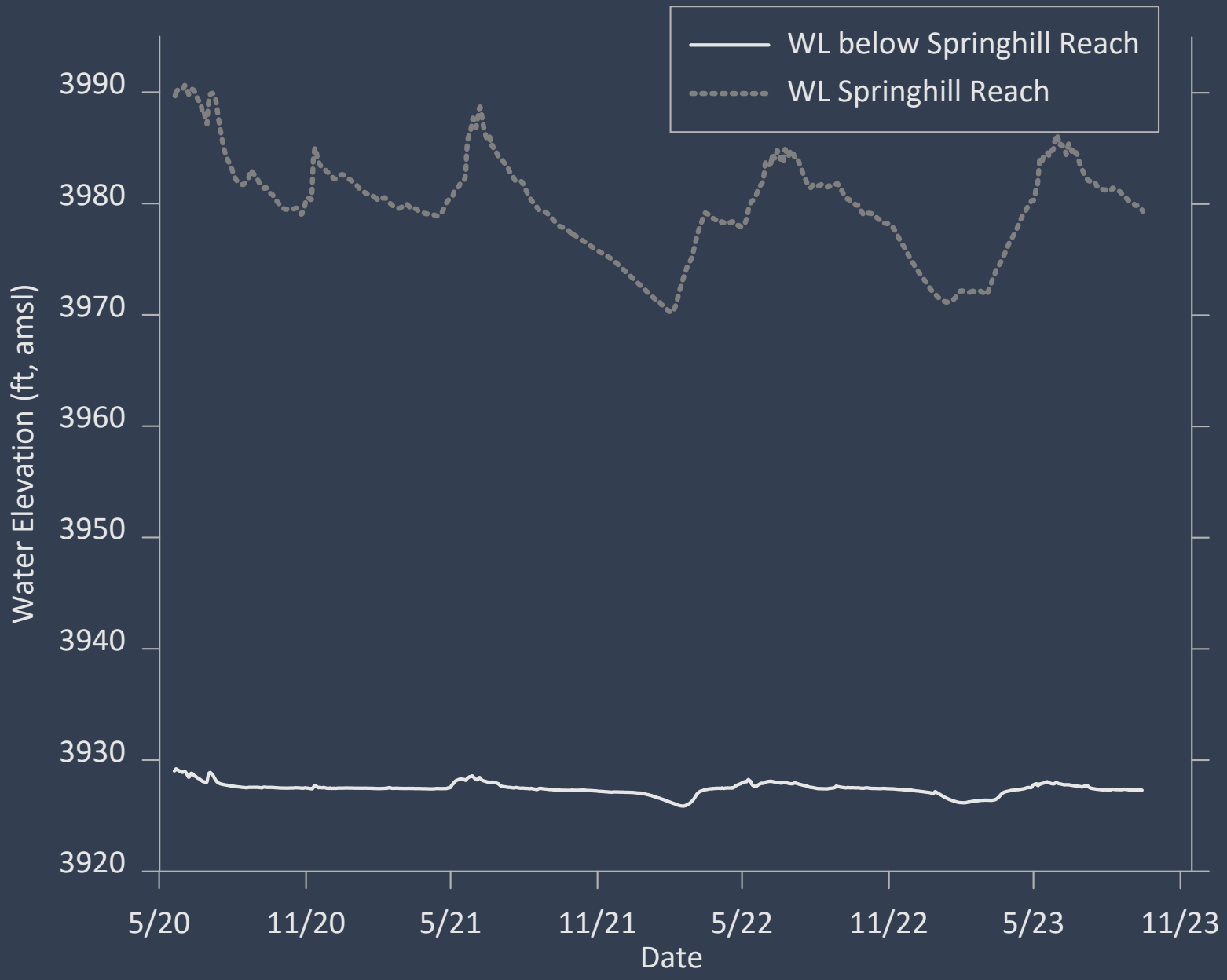
Springhill Groundwater Daily Recharge Rate (+)



Springhill Groundwater Daily Discharge Rate (-)



Groundwater Elevations - Teton Alluvium



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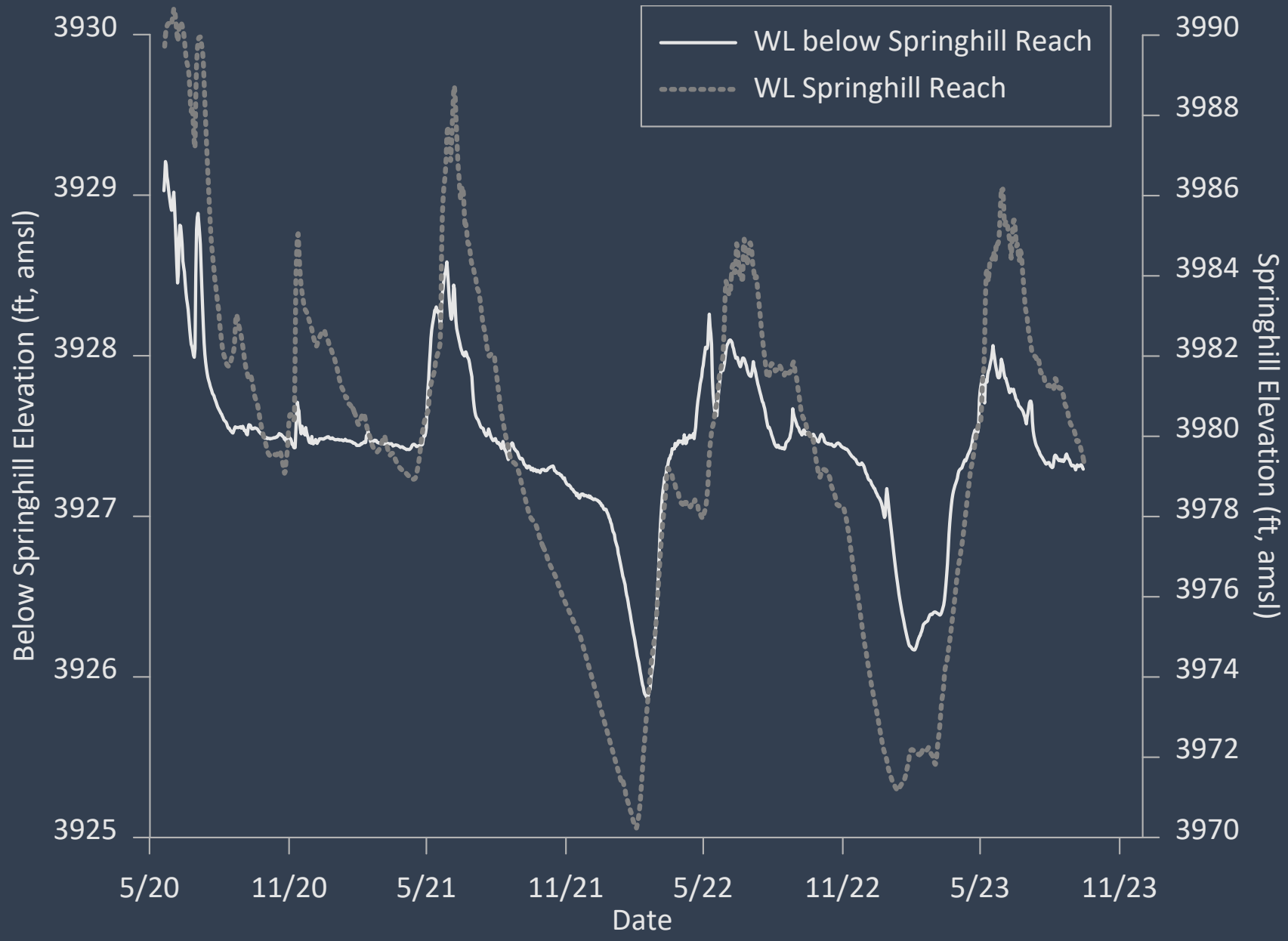
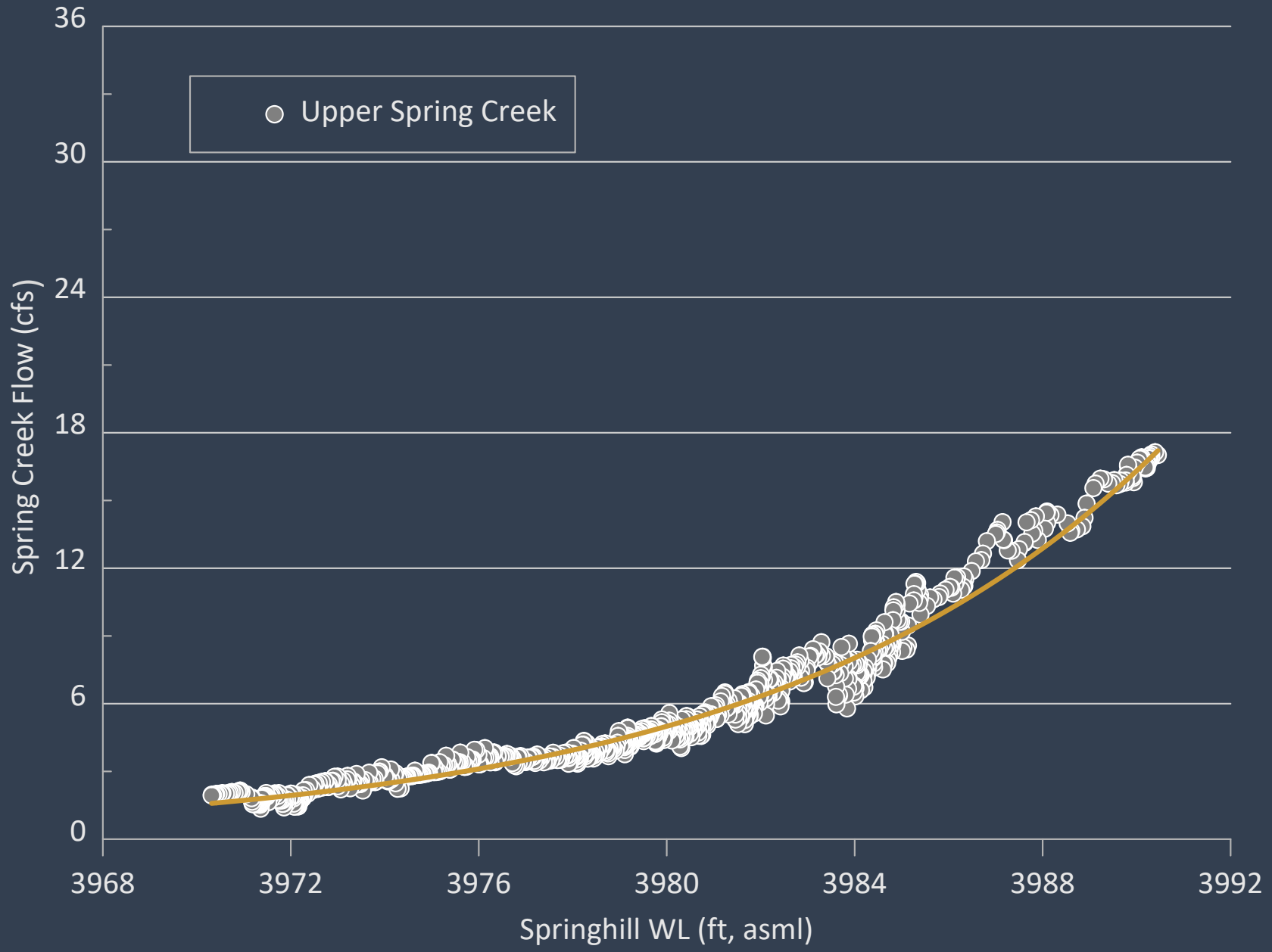


Spring Creek Flow and Springhill Water Levels



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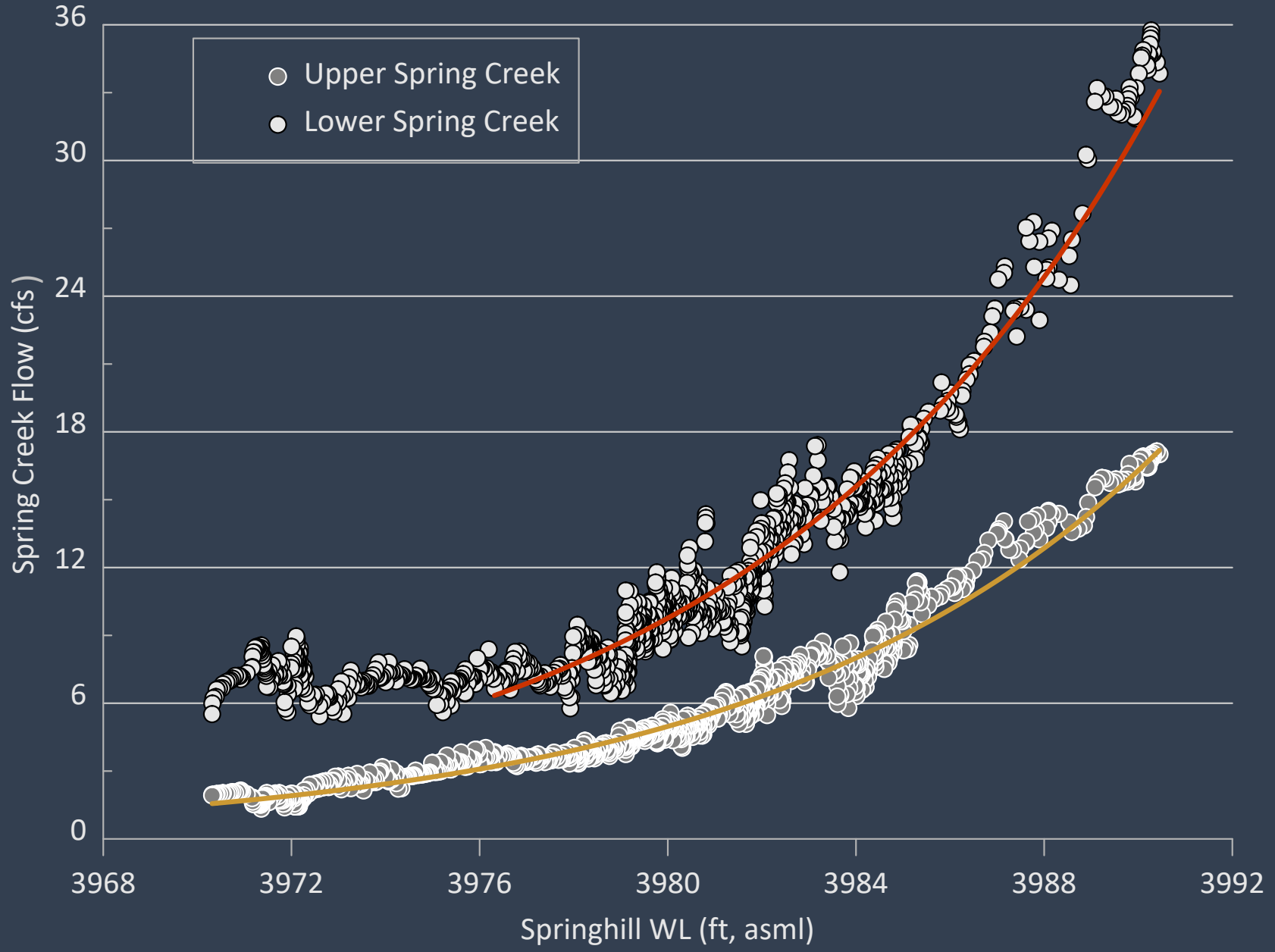
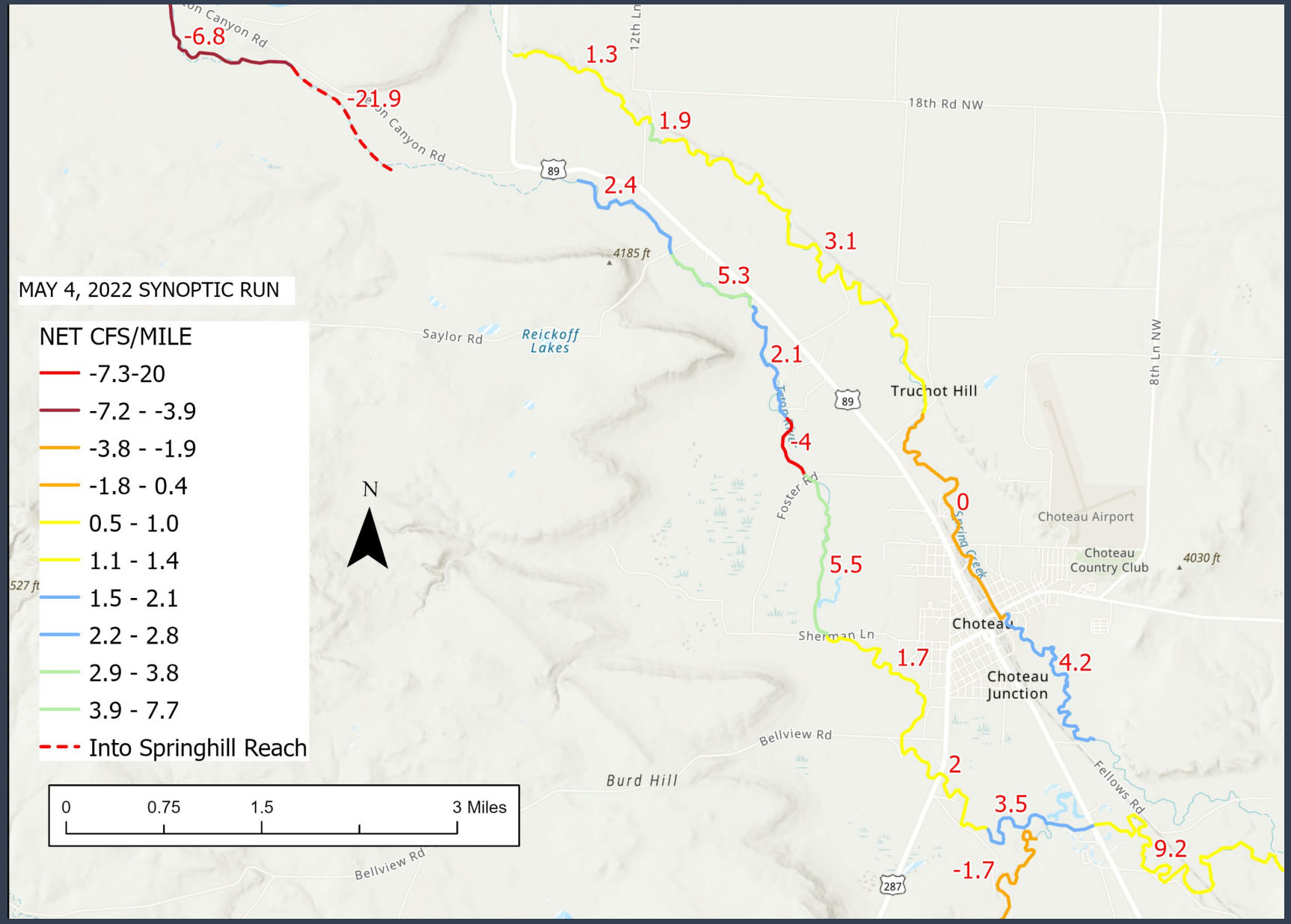


Synoptic event – Spring, 2022



What we know…

- Teton River
  - Generally influent
  - Perched
  - Non-connected, bedrock control
  - 30-35% of upstream recharge, discharges to Teton downstream

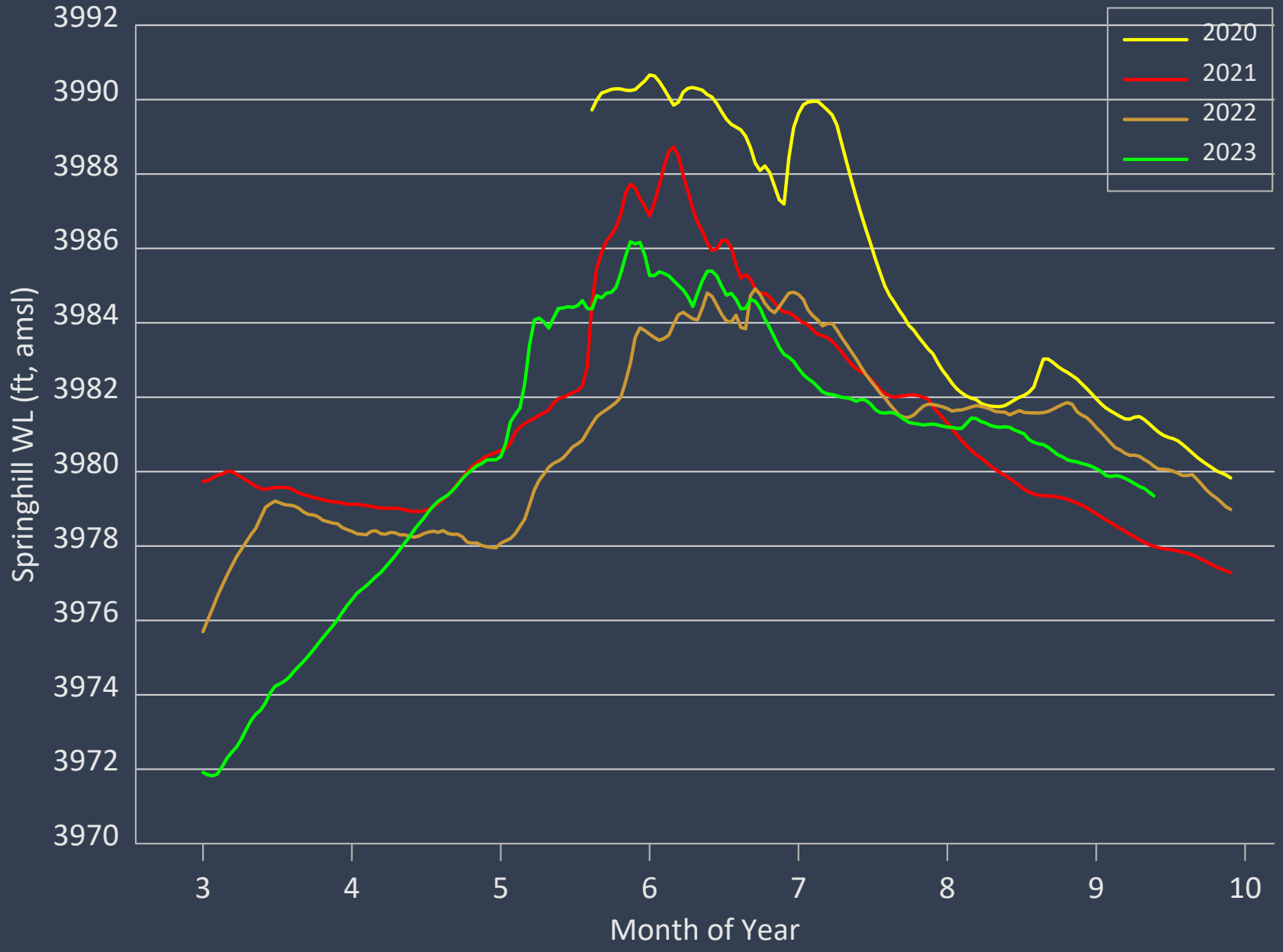
- Spring Creek + tributaries
  - Generally effluent
  - Predictable
  - Flow increases between 80% and 100%
  - Elevated Springhill WL, more gain along reach

Distribution Project:
Teton River abv Springhill Target Flows vs Observed

Month	Target Flows (cfs)	2023	2022	2021	2020
March	**15**				
April	**20**				
May	**25**				
June	**25**				
July	**20**				
August	**20**				
September	**15**				
	Seasonal Average (cfs)				
	Seasonal Acre-feet				

Fall/Winter Target Flows – 10 cfs

Springhill Water Elevation by Year



If… then…

Future work and applicability

- Numerical modeling, incorporate forecasting
- Reduce non-real-time stream gaging
  - Utilize real-time groundwater levels
  - Establish target water groundwater elevations
- Refine target stream flows, water levels

Thank you –
Questions or comments?

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