Butte Valley Water Budget and Projected Future Water Budget

Butte Valley GSA Advisory Committee

May 27 2021

Butte Valley Model 1989-2018: Comparison to Measured Data

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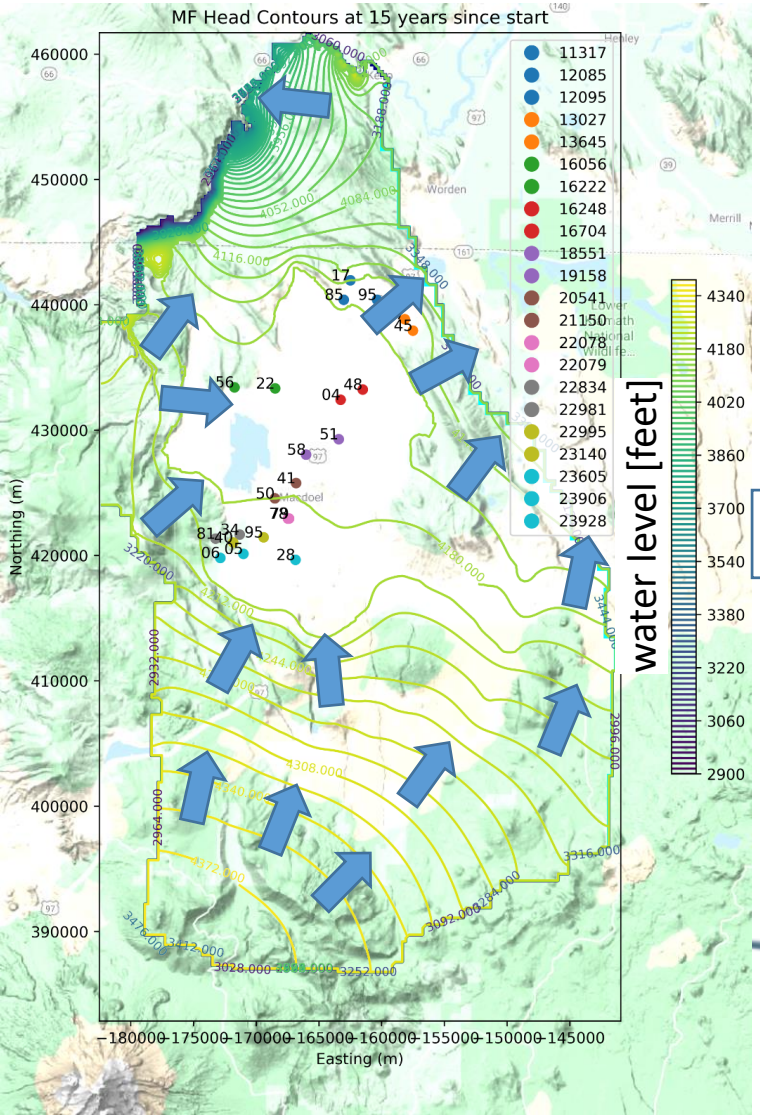

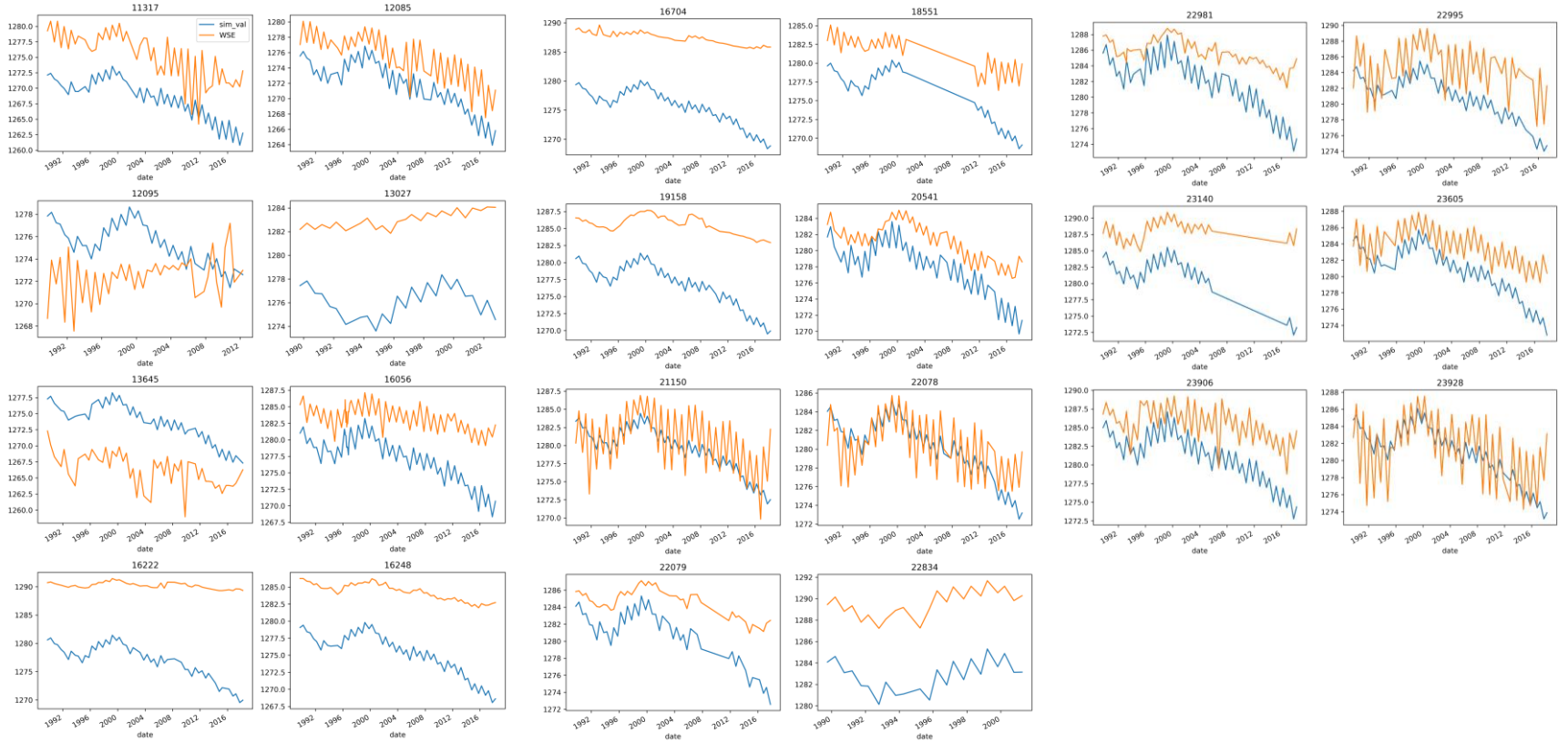

Groundwater Budget: Entire Watershed

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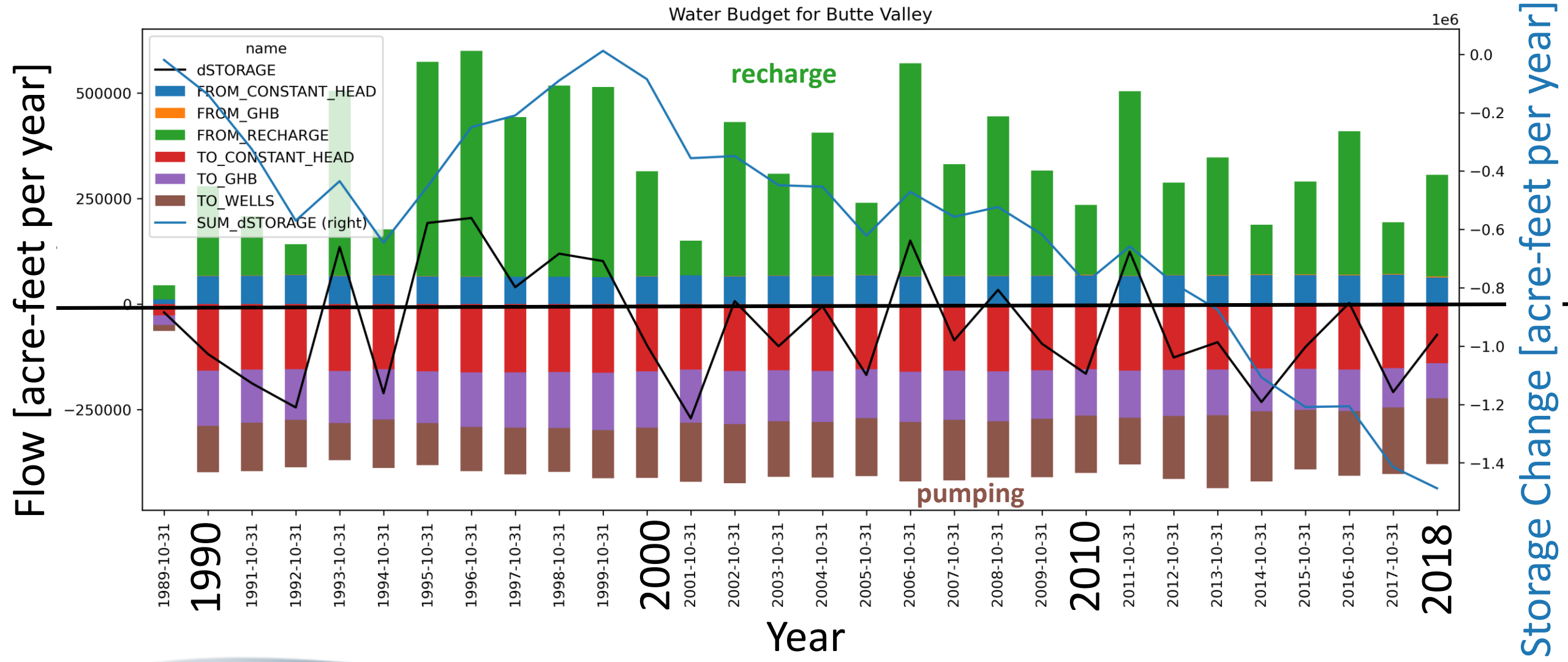

recharge from Klamath River along northern boundary

seepage to Klamath River along northern boundary

groundwater outflow through northeastern and eastern boundary

annual change in groundwater storage

Groundwater Budget: GSA Basin

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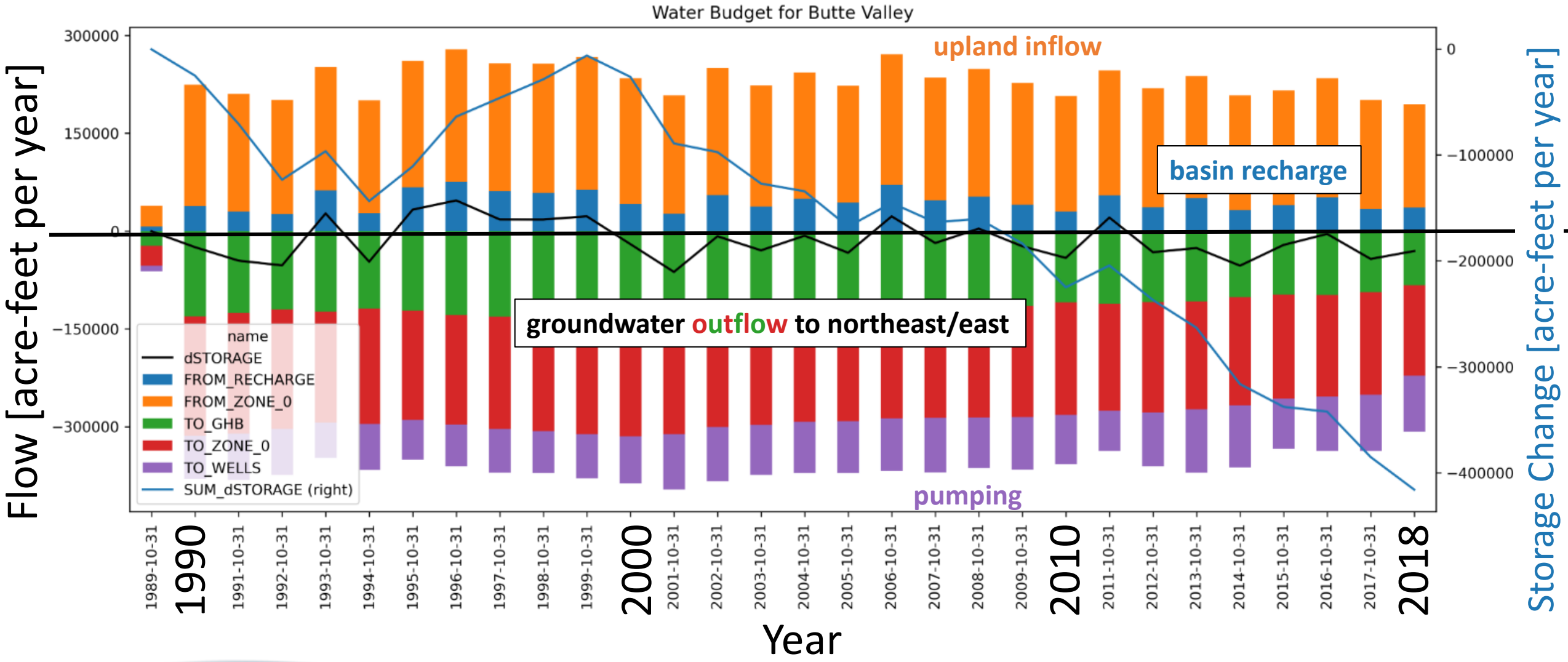

annual change in groundwater storage

groundwater outflow through northeastern and eastern boundary

groundwater outflow through northeastern and eastern boundary

DWR Guidance for Future and Climate Change

- DWR requires a future baseline of 50 years
  - Water years 1991-2011 used multiple times to make a 50-year scenario
- Climate change guidance is to model 4 scenarios;
  - Near-future climate (2030 – **Near**)
  - Far-future climate (2070 – **Far**)
  - Far-future, wet (2070WMW – **Wet**)
  - Far-future, dry (2070DEW – **Dry**)
- Climate guidance is done through perturbing Reference ET, Precipitation, and Streamflow (inflow) values

Changes to Precipitation and Reference ET

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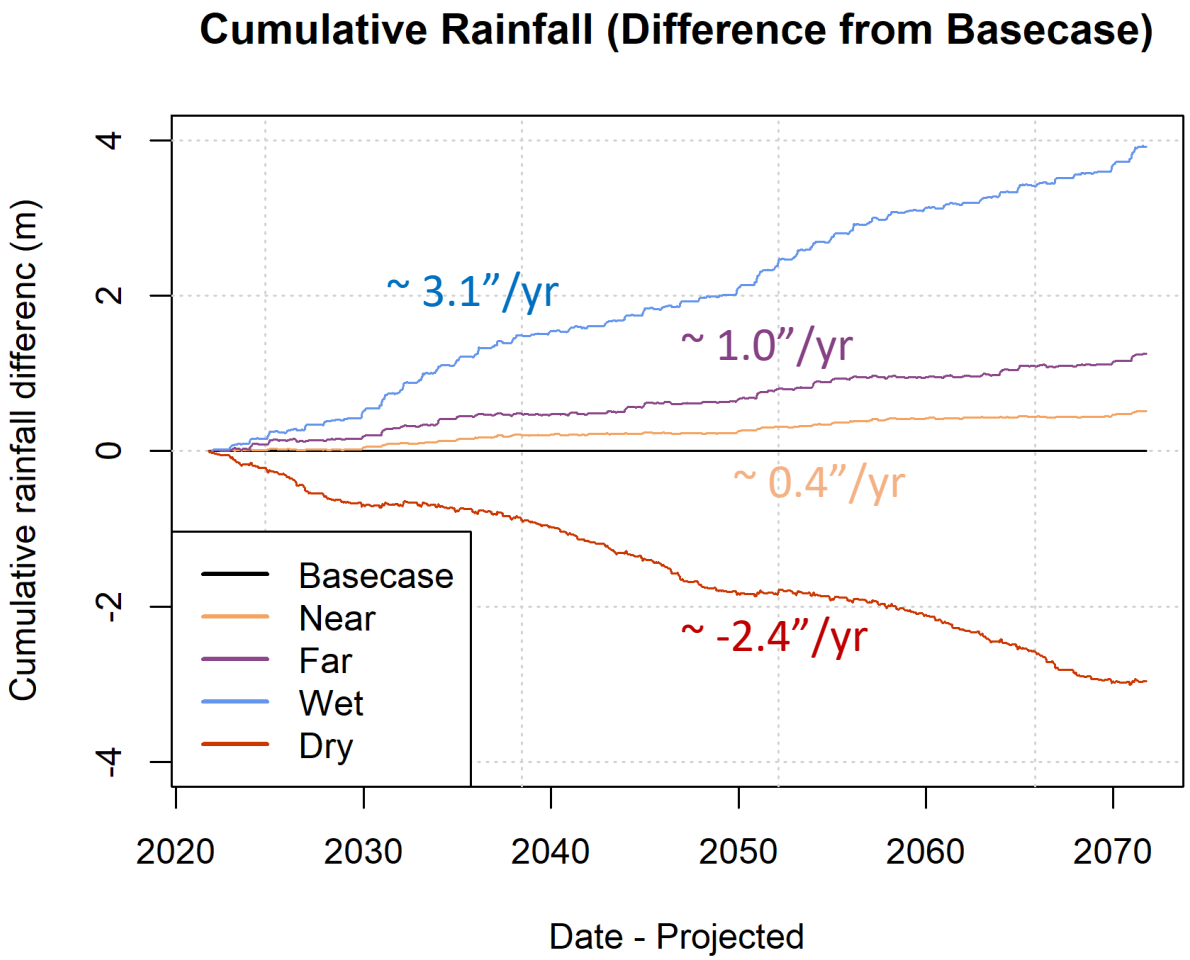
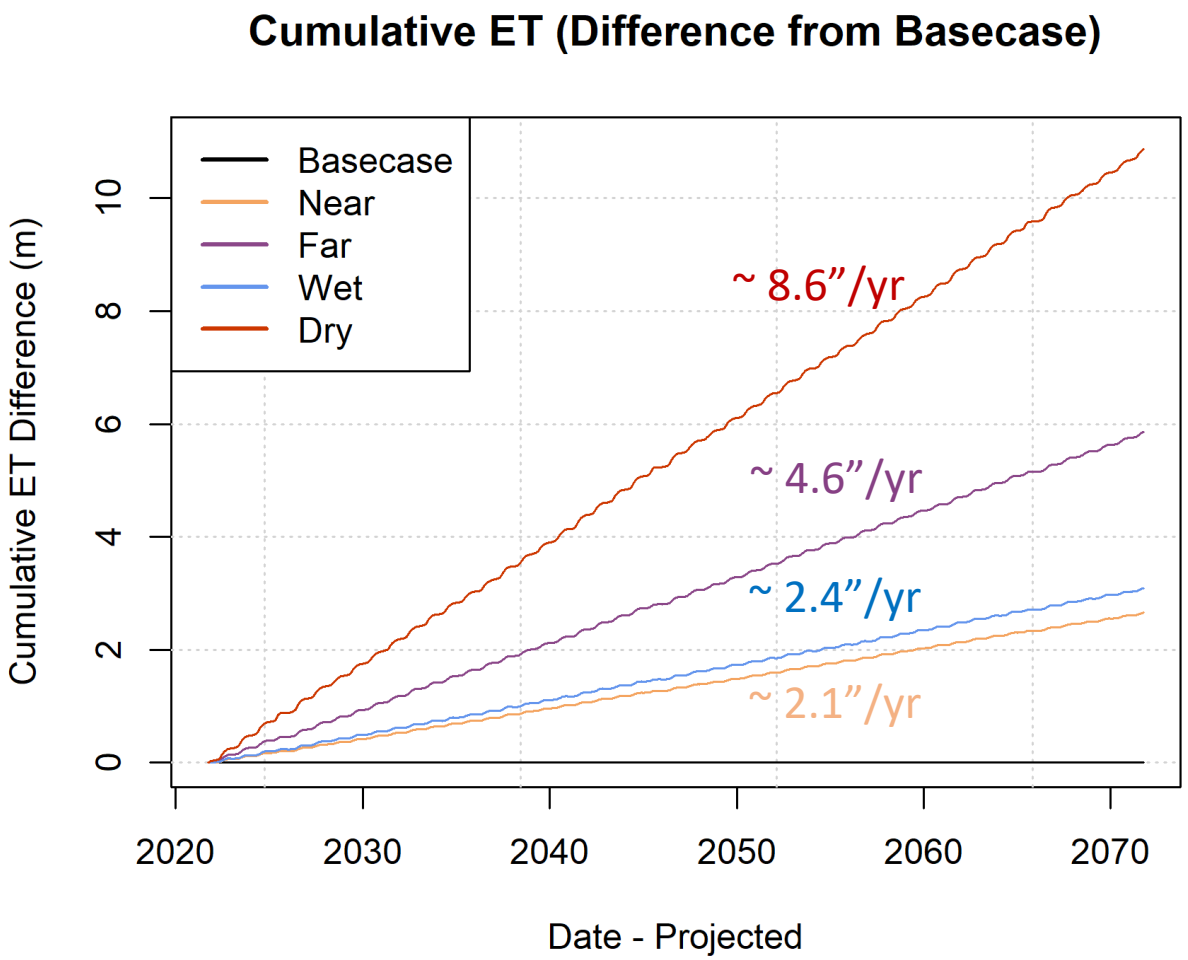
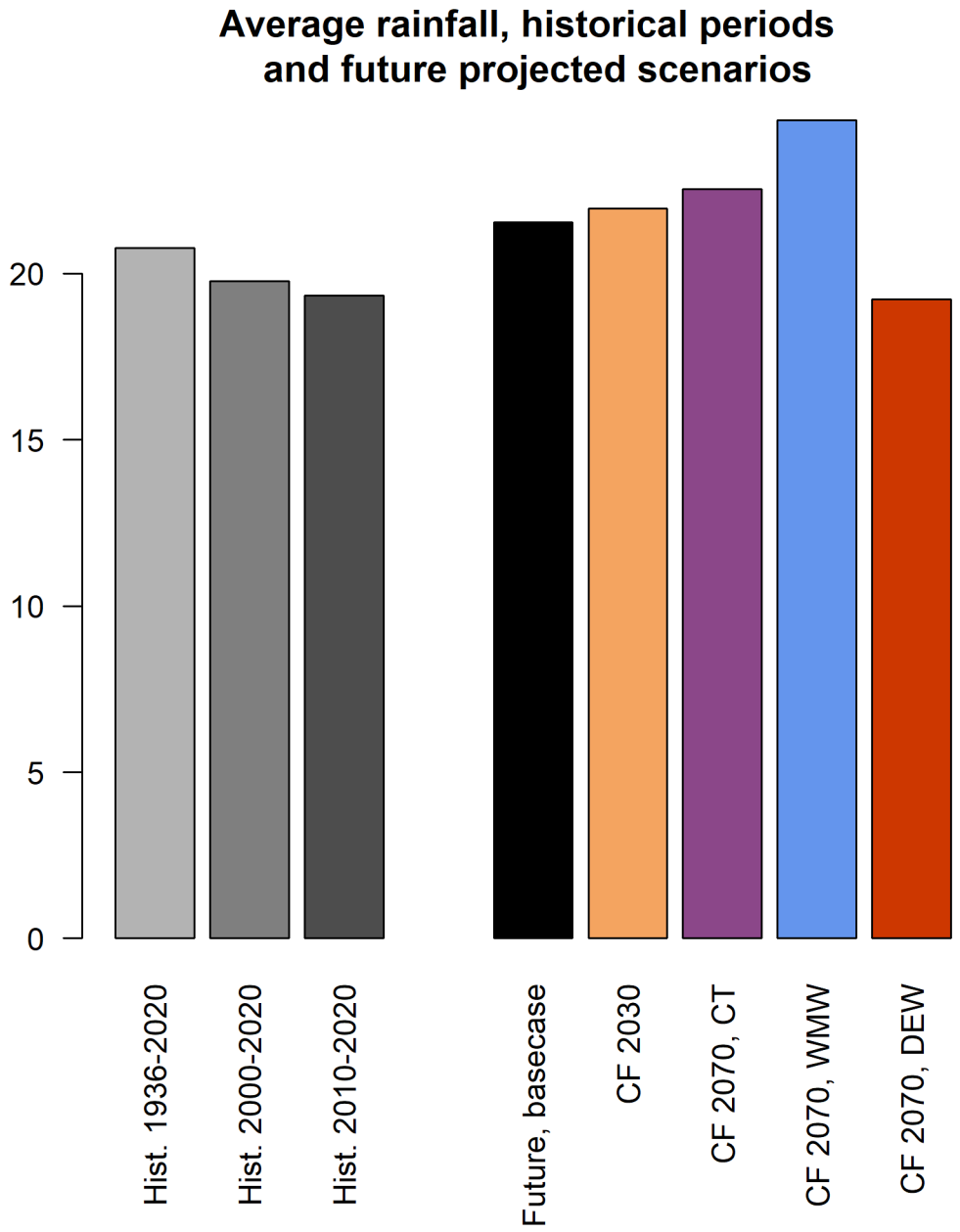




Historical context (shown here for Scott Valley)

Historical Period or Future Scenario	Average Rainfall (in/year)
Long-term historical (1936-2020)	20.8
Last 20 years (2000-2020)	19.8
Last 10 years (2010-2020)	19.3
Future projected (2022-2071) **(basecase)**	21.5
Future projected, 2030 change factors **(Near)**	21.9
Future projected, 2070 change factors **(Far)**	22.5
Future projected, 2070 WMW change factors **(Wet)**	24.6
Future projected, 2070 DEW change factors **(Dry)**	19.2



Projected Future Water Budget - basecase

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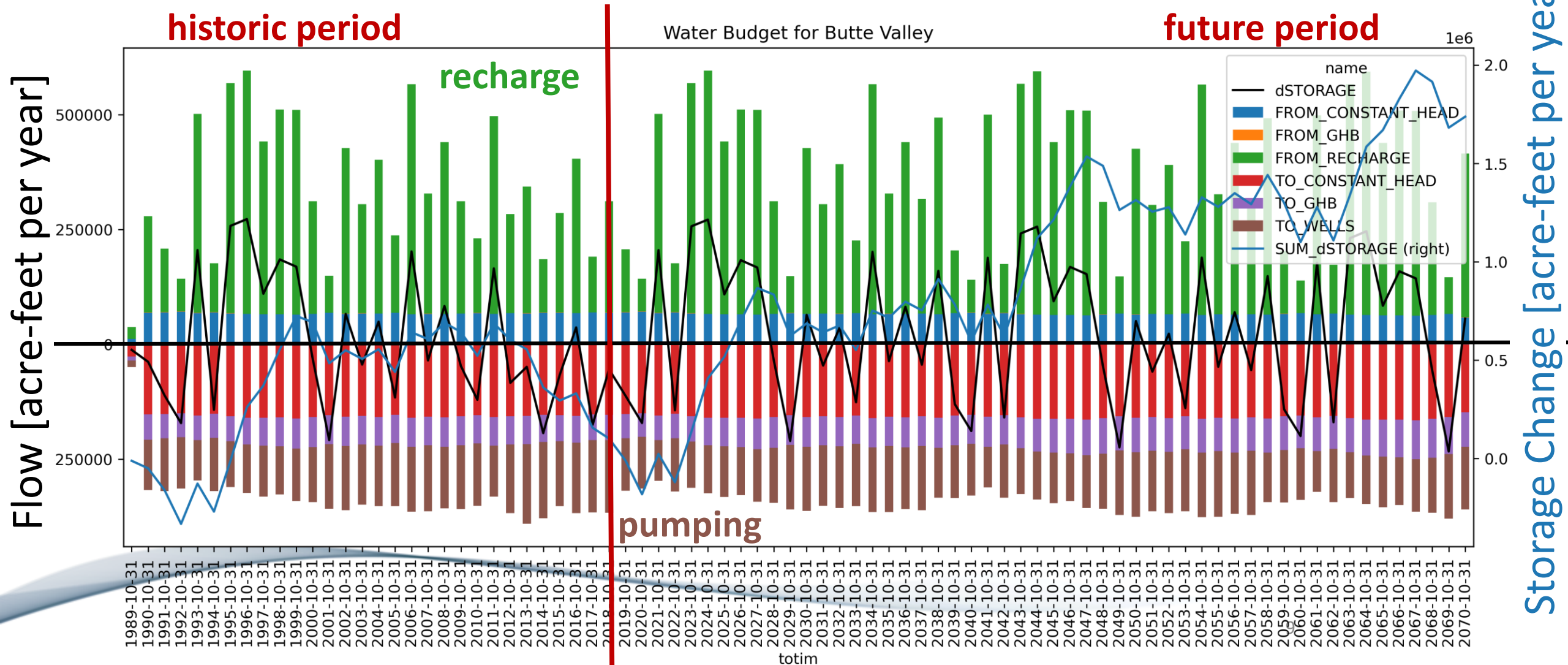

Projected Future Water Budget - **Near**

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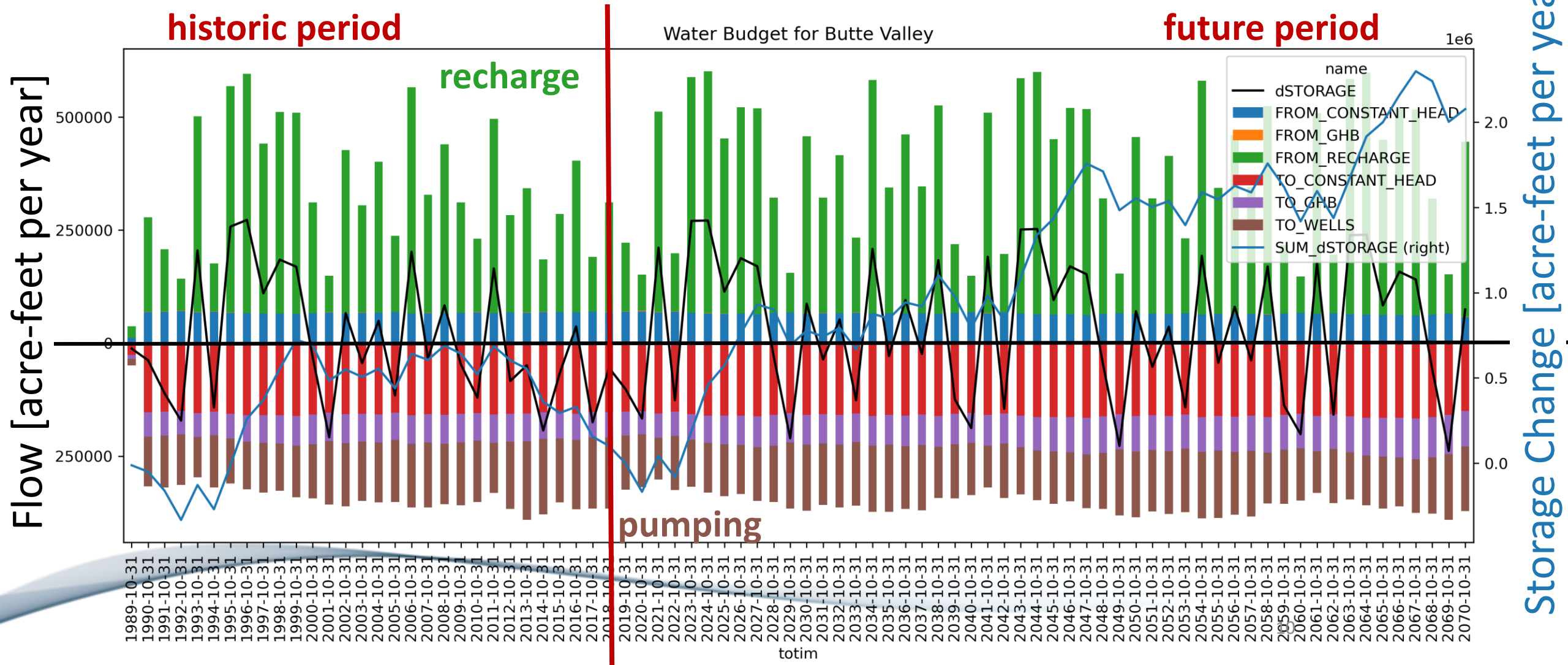

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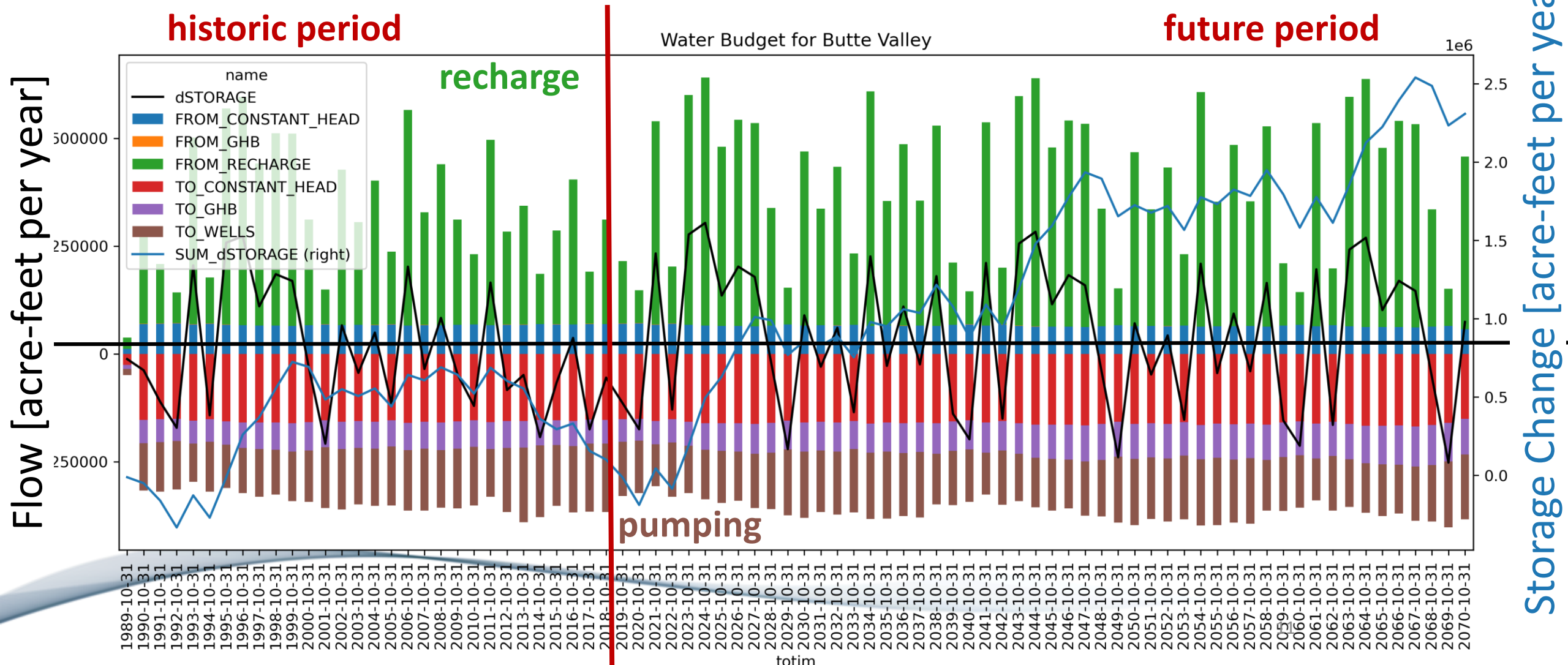
Projected Future Water Budget – Far



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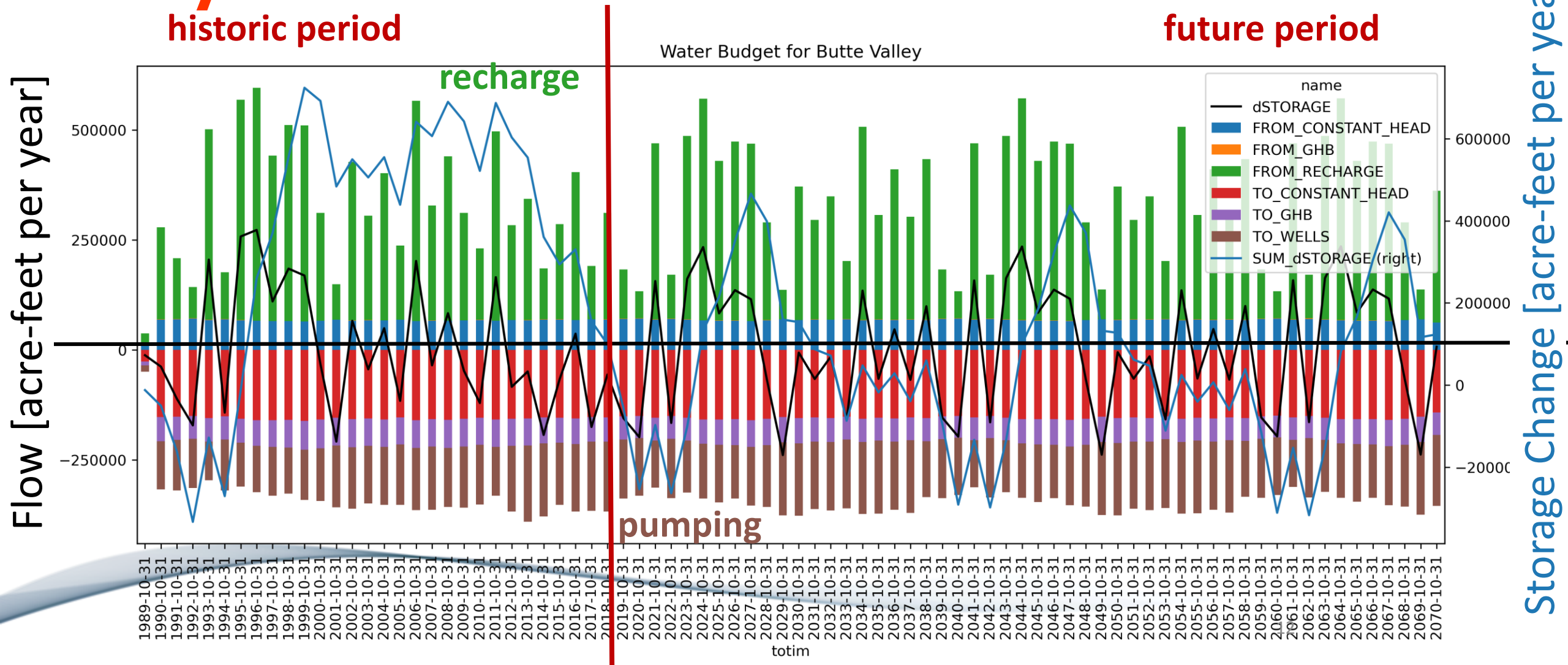
Projected Future Water Budget – Dry



Key Take-Aways

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- Watershed recharge main source of Butte Valley groundwater
- Large groundwater underflow toward Lower Klamath Wildlife area
- Water level variations can be explained by measured variations in watershed recharge & groundwater pumping

Key Take-Aways

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- Groundwater basin not in overdraft
- Water levels adjust quickly to interannual changes in watershed-wide changes in recharge & groundwater pumping
- Limiting groundwater extraction to current levels:
  - Keeps water levels within historically observed range
  - Stable or even rising water levels under future climate conditions (including DWR's suggested dry & extreme warming future climate)
  - Some future climate conditions may allow for more pumping late in the planning horizon (post-2042)