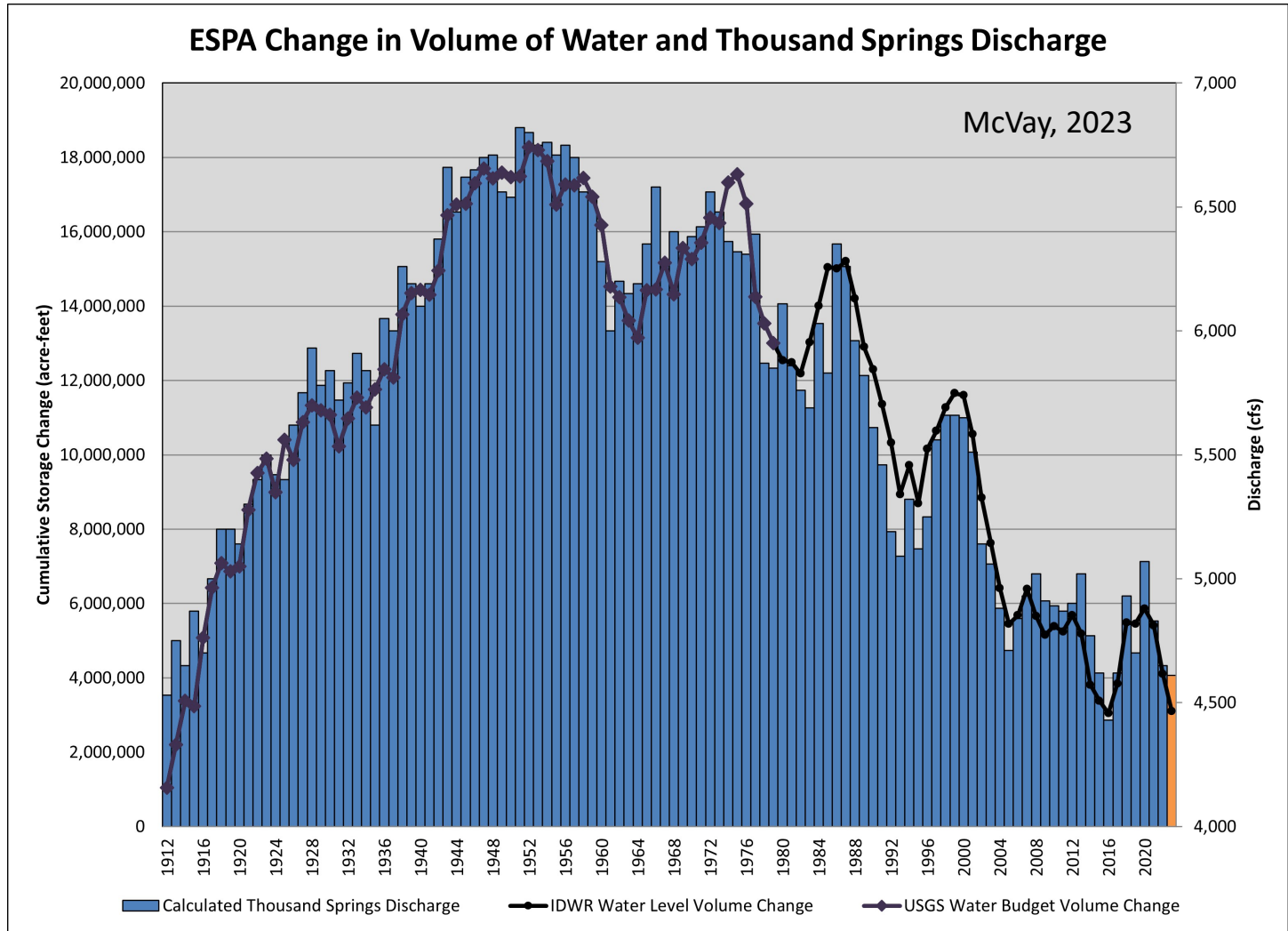


An aerial photograph of Idaho with a white outline tracing the boundary of the Eastern Snake Plain Aquifer (ESPA). The terrain is a mix of brown, tan, and green, representing different land uses and vegetation. The text 'ESPA Water Budget' is overlaid in the center in a large, black, sans-serif font.

ESPA Water Budget

Presented to the ESPA GWMA Advisory Committee
Jennifer Sukow, P.E., P.G., Idaho Department of Water Resources
November 15, 2023

ESPA water budget history



ESPA water budget components

Areal recharge (dependent on weather and human activities)

- Natural recharge
- Incidental recharge
- Managed recharge

Head-dependent recharge
(dependent on aquifer water levels)

- Seepage losses from Snake River between Ashton/Heise and near Blackfoot gages

Areal discharge (dependent on human activities and weather)

- Consumptive use of groundwater
- Evaporation from wetlands

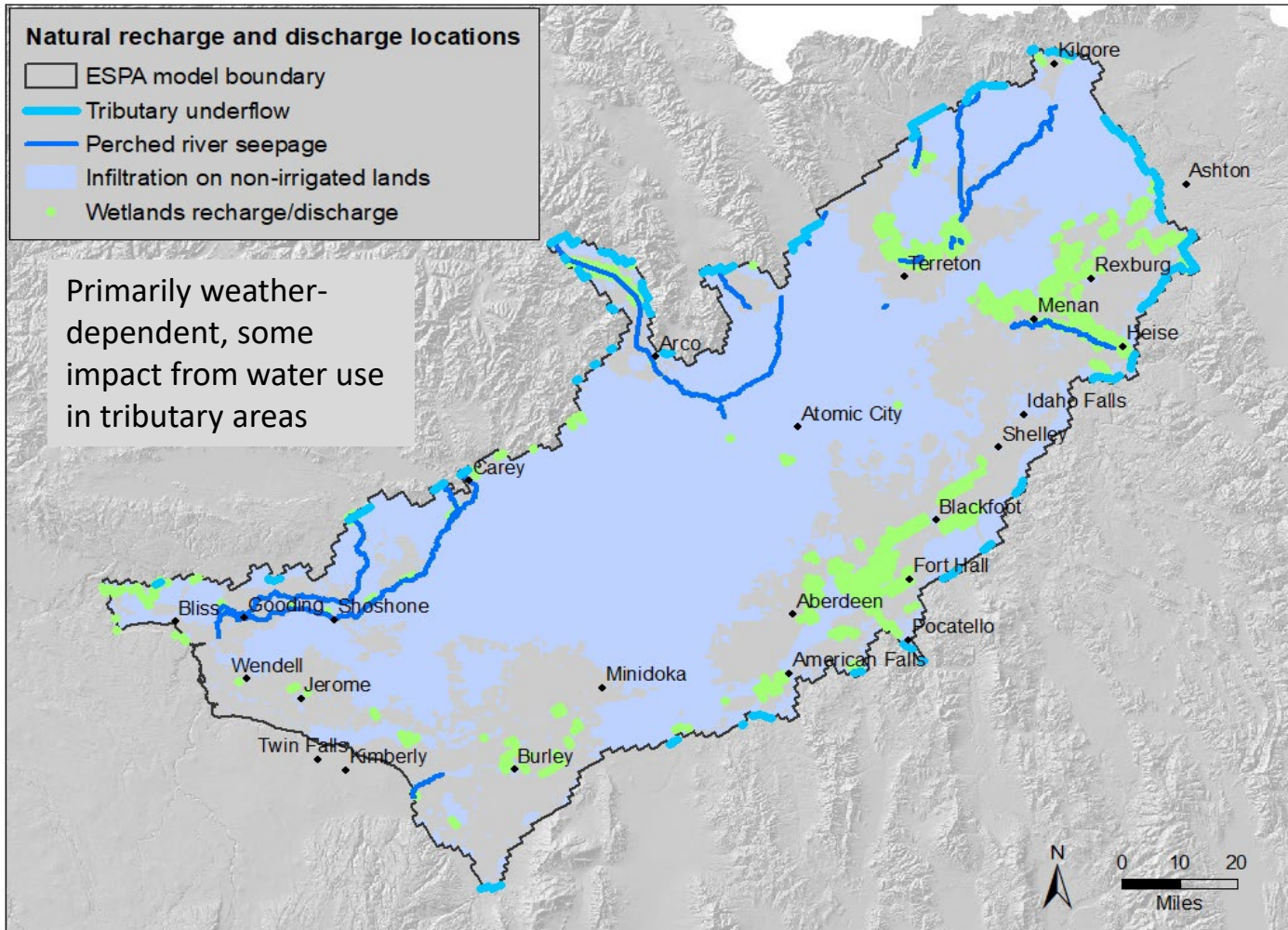
Head-dependent discharge
(dependent on aquifer water levels)

- Aquifer discharge to Snake River and springs (near Blackfoot to Minidoka and Kimberly to King Hill)

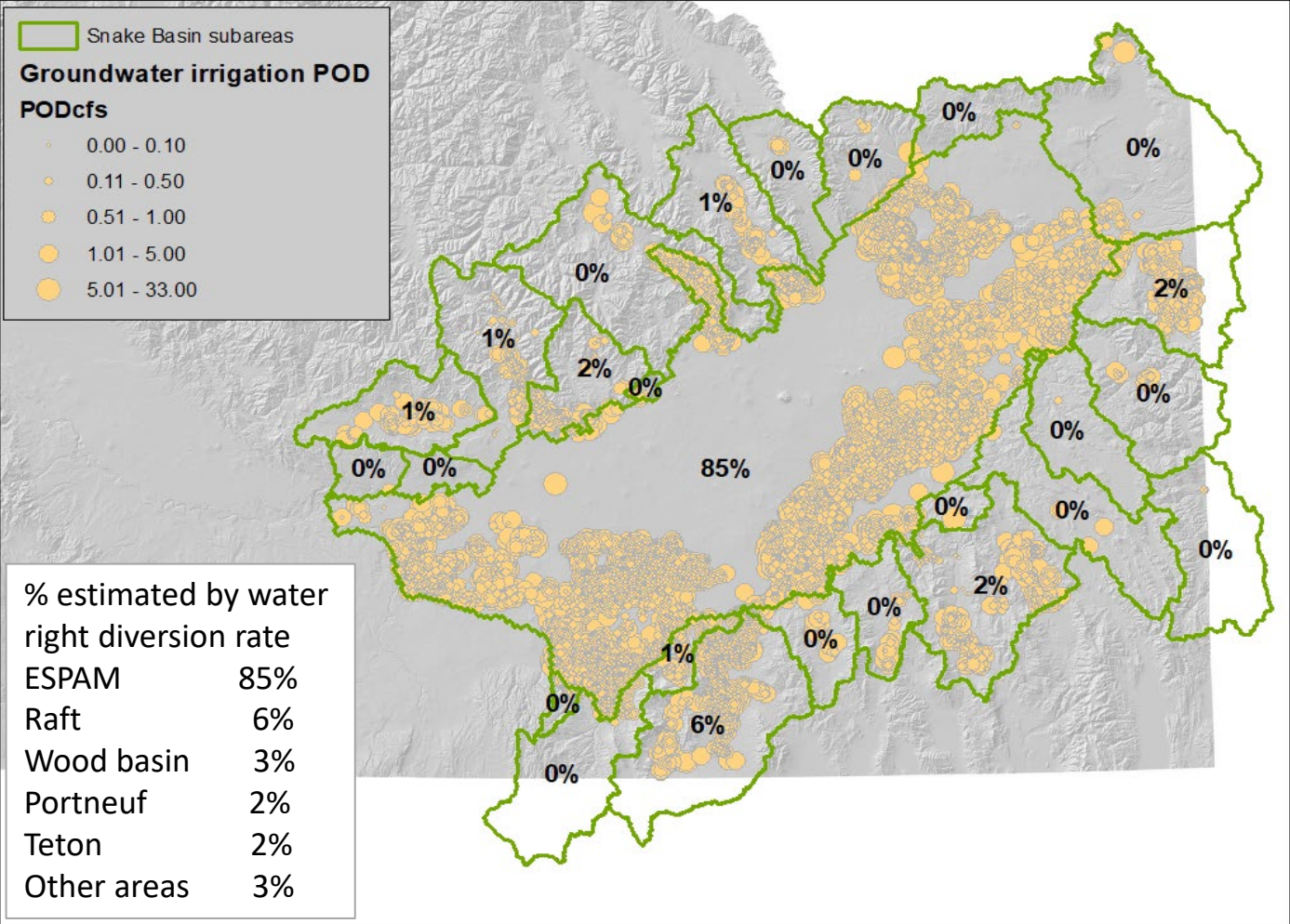
Change in aquifer storage

- When discharge exceeds recharge, water will be removed from aquifer storage
- When recharge exceeds discharge, water will be added to aquifer storage
- Observed change in aquifer water levels are best indicator of relative imbalance between recharge and discharge

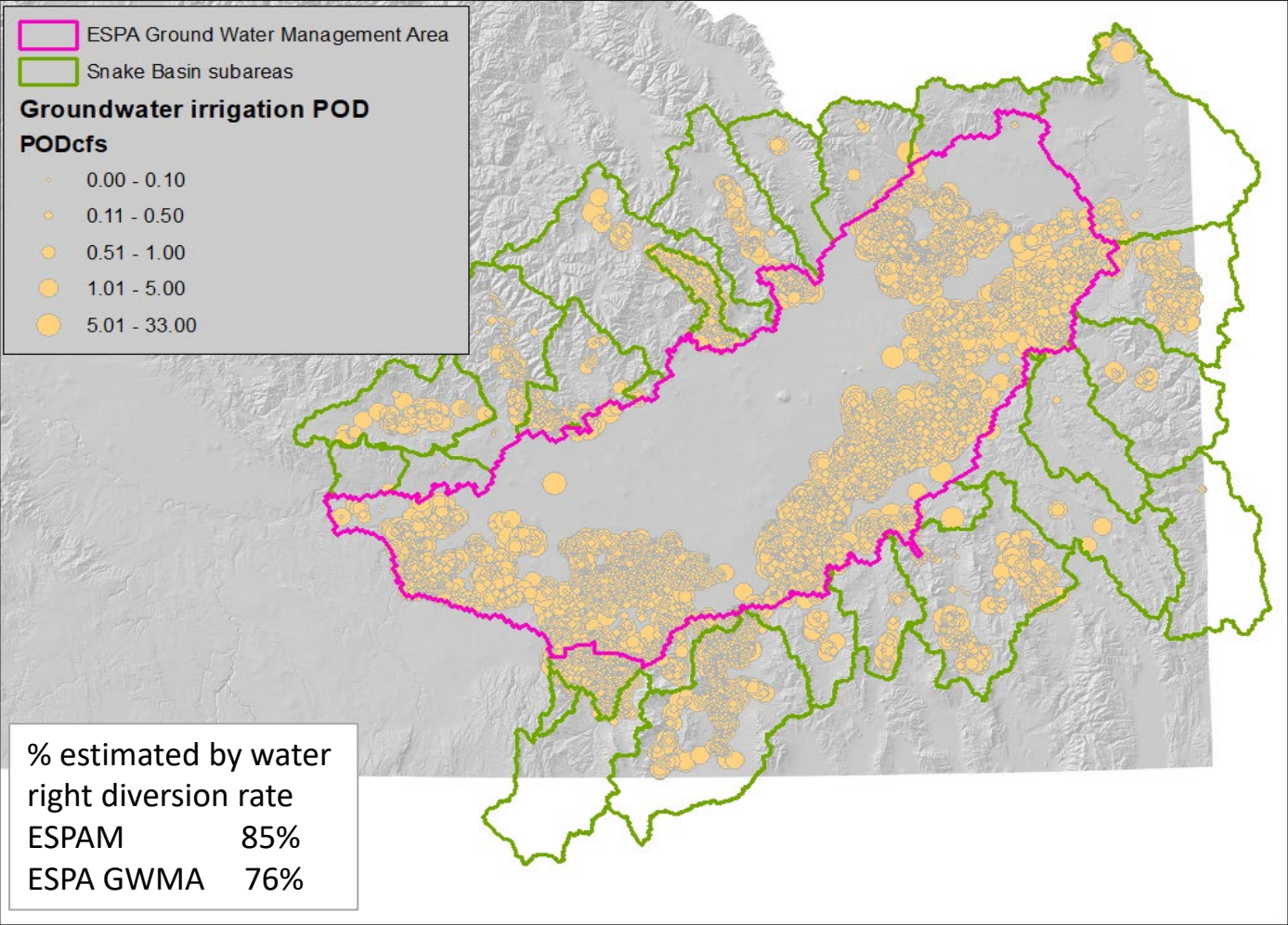
Natural recharge components and locations



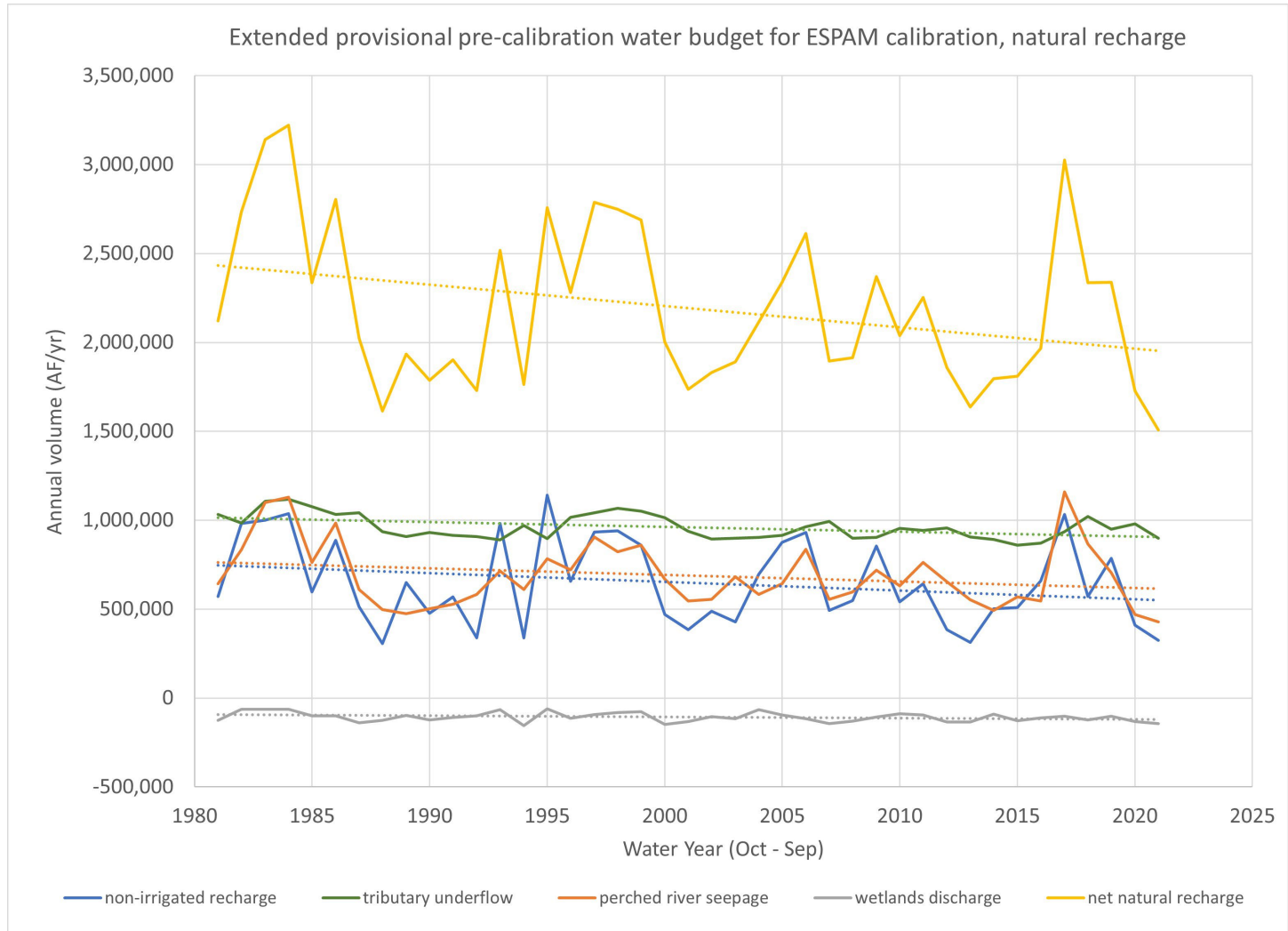
Groundwater irrigation in tributary areas



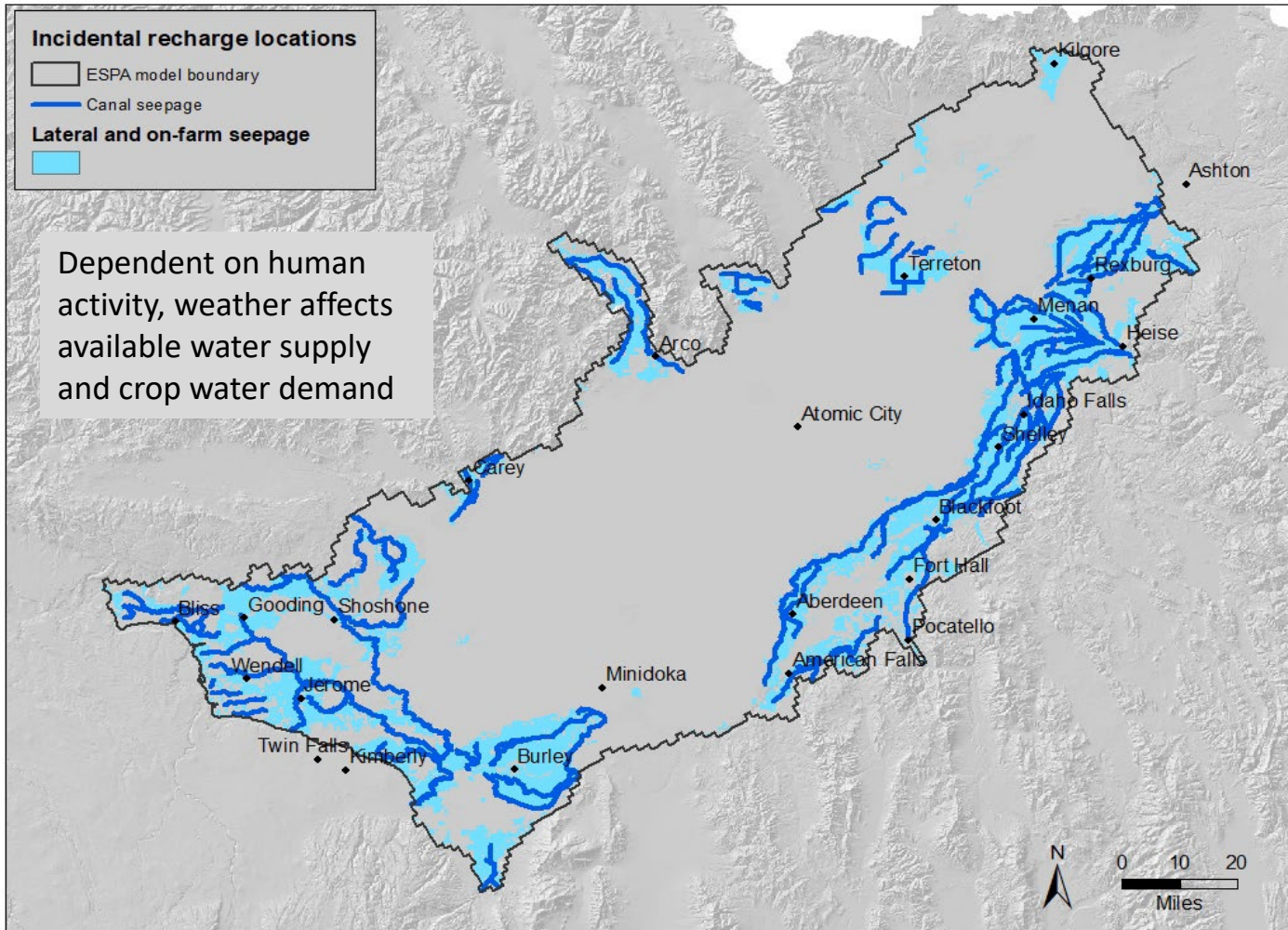
Groundwater irrigation in ESPA GWMA



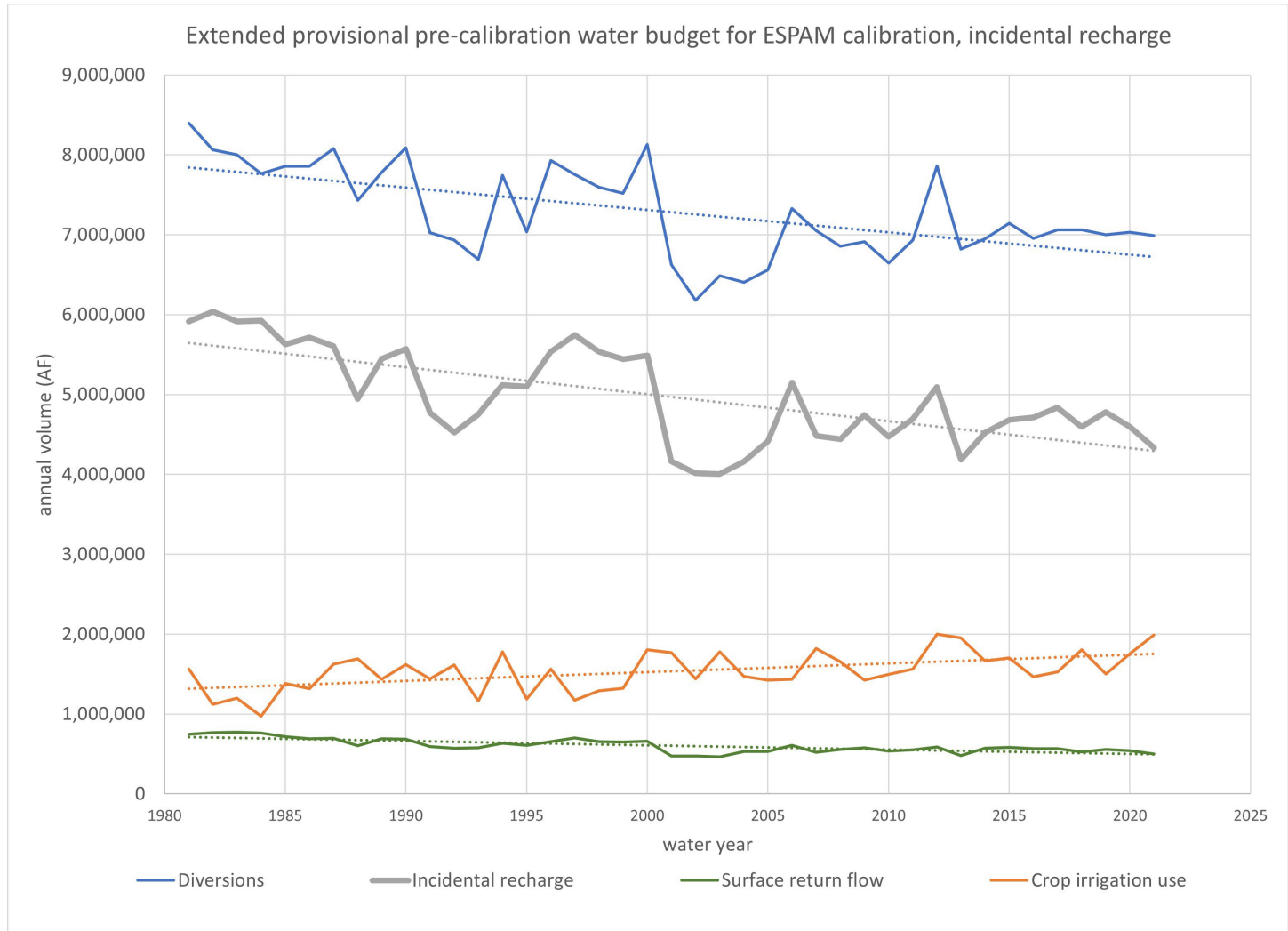
Natural recharge trends (WY1981-WY2021)



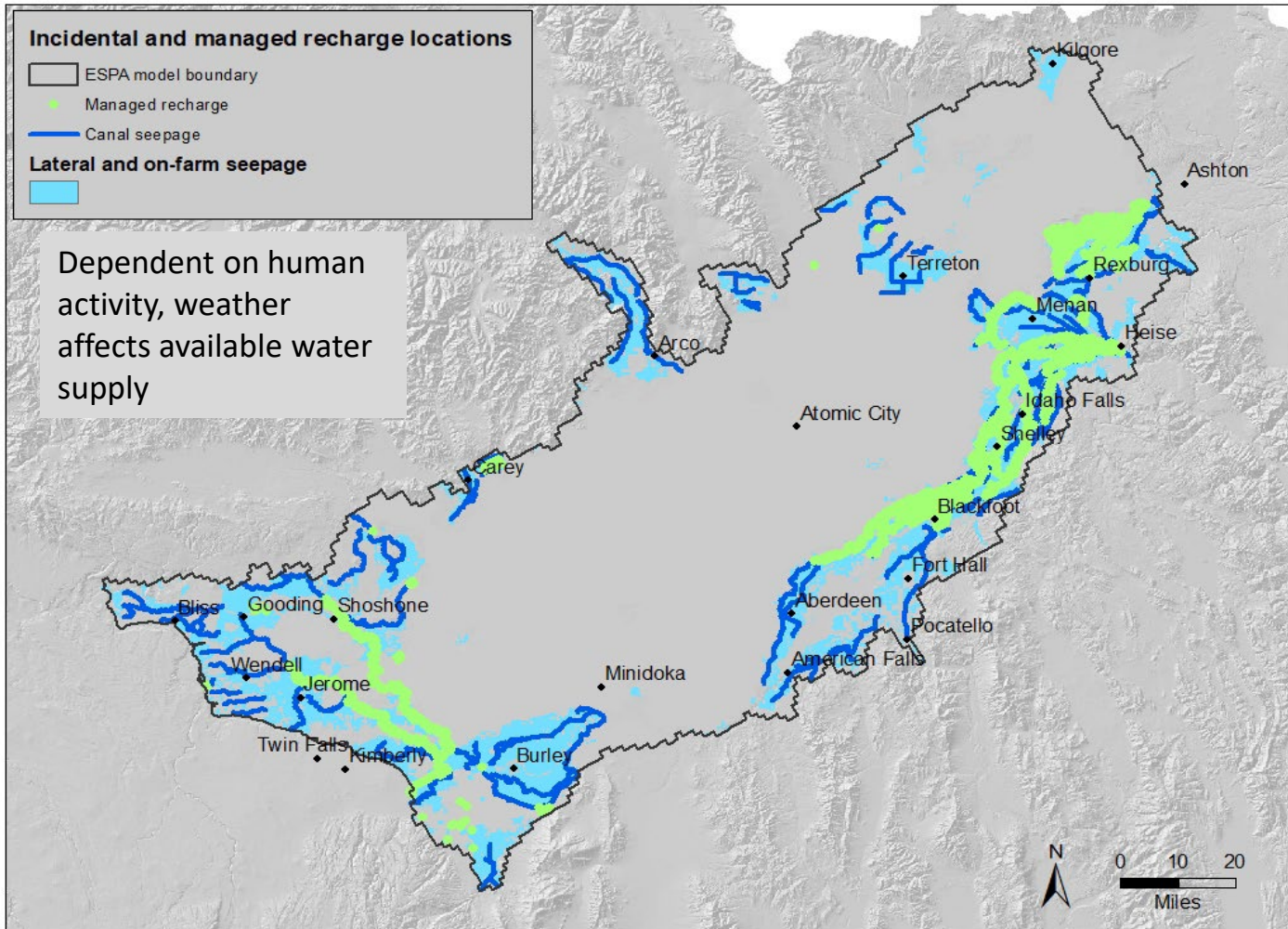
Incidental recharge components and locations



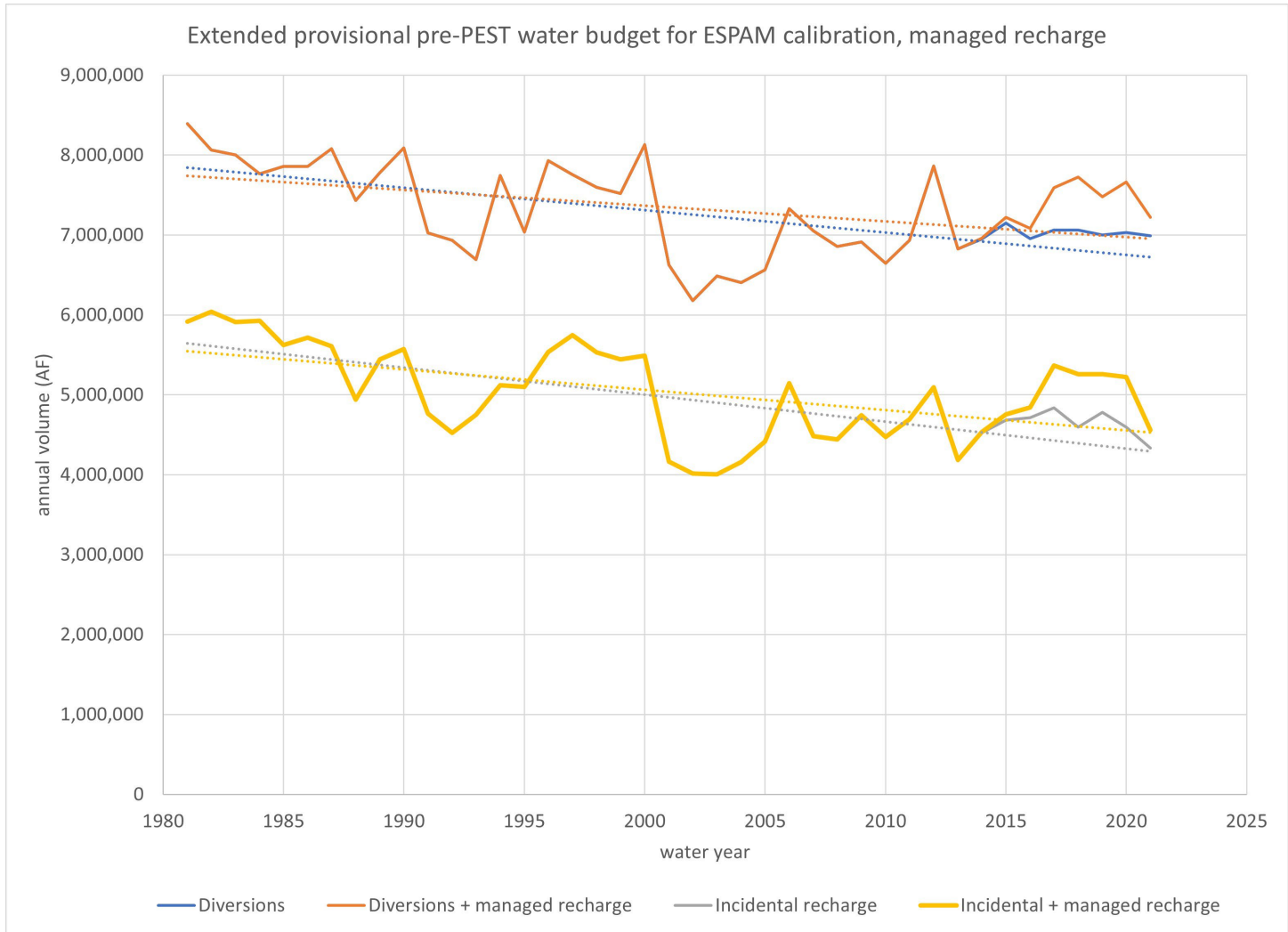
Incidental recharge trends (WY1981-WY2021)



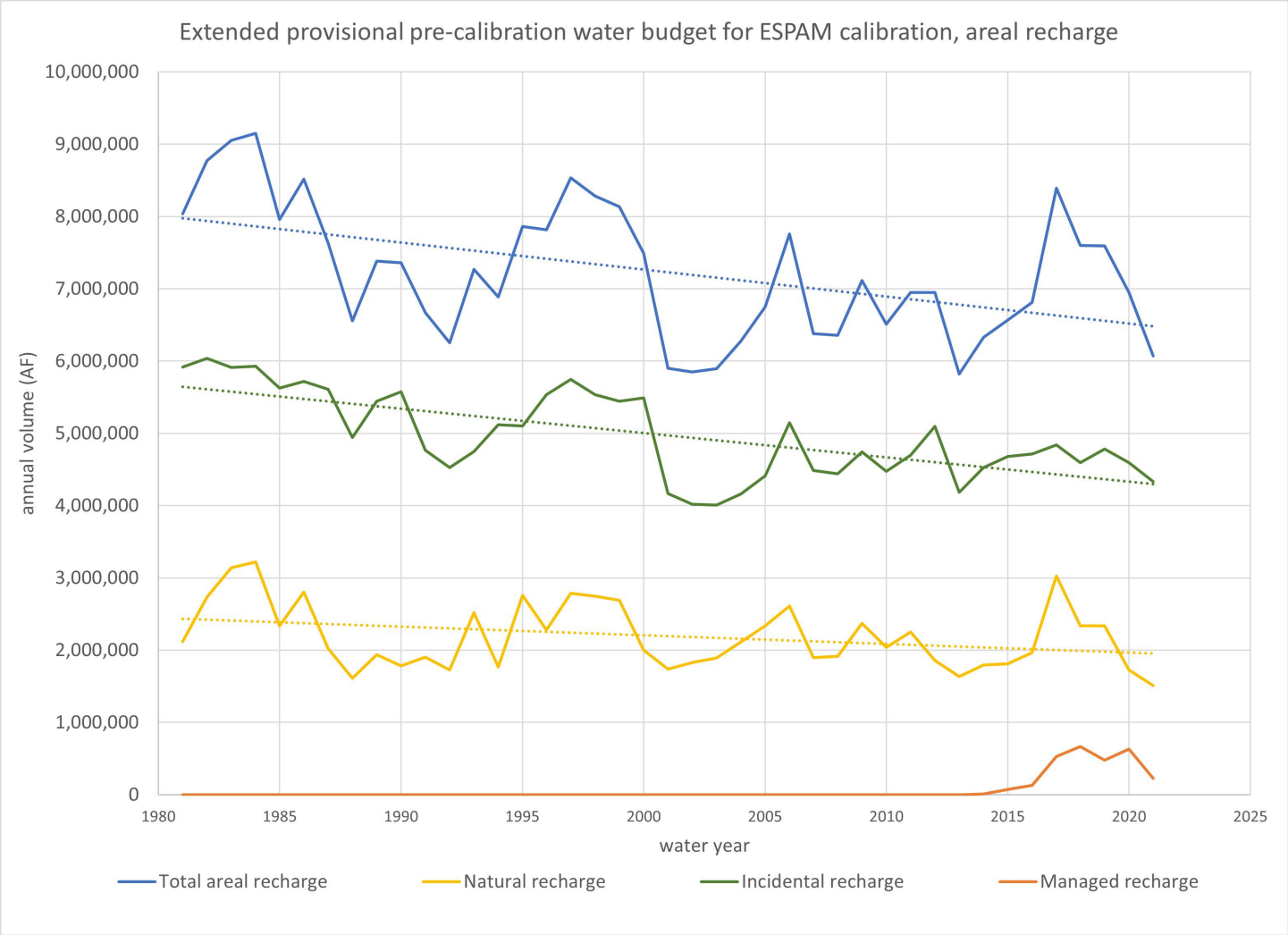
Managed recharge locations



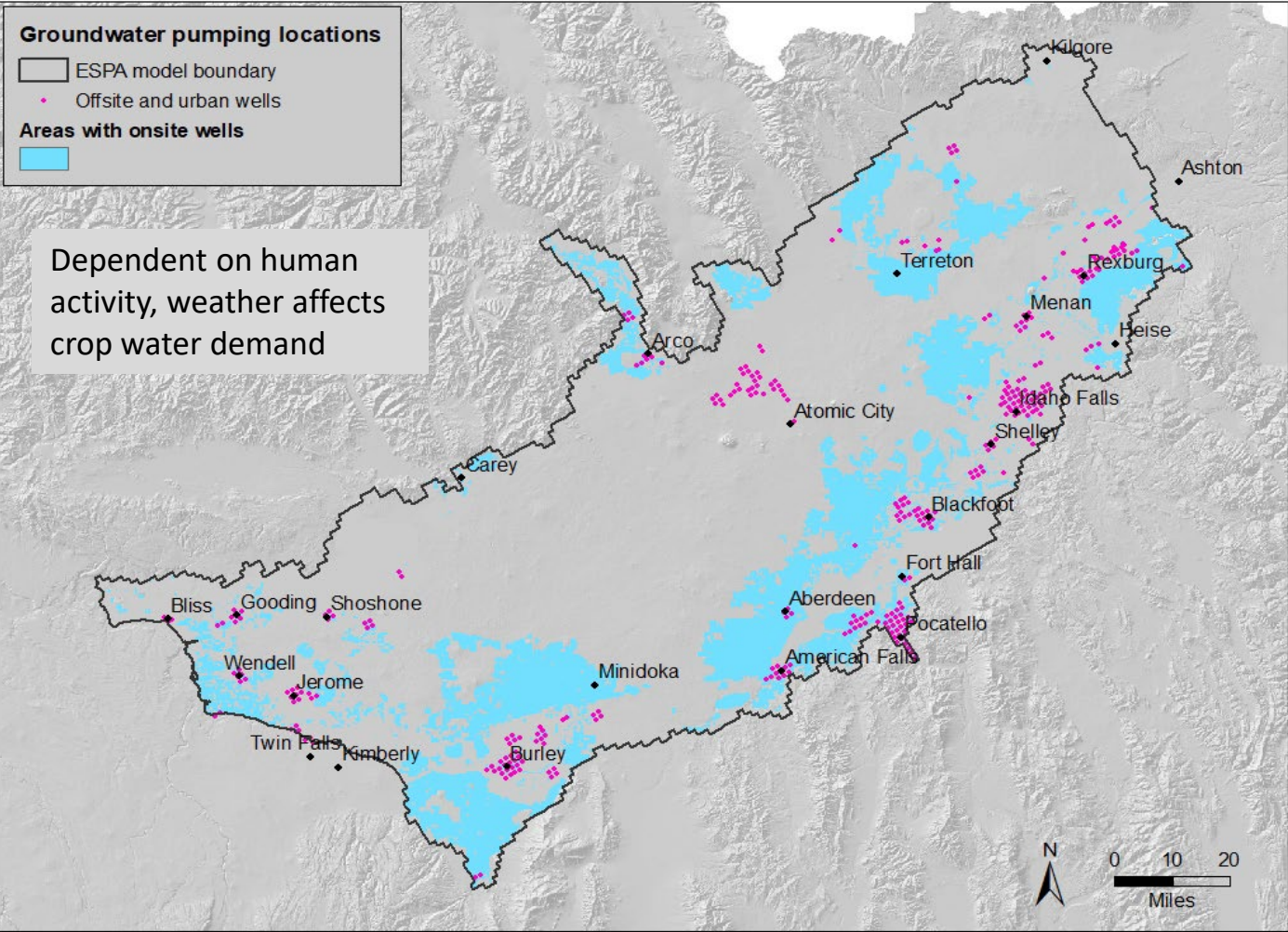
Incidental + managed recharge trends (WY1981-WY2021)



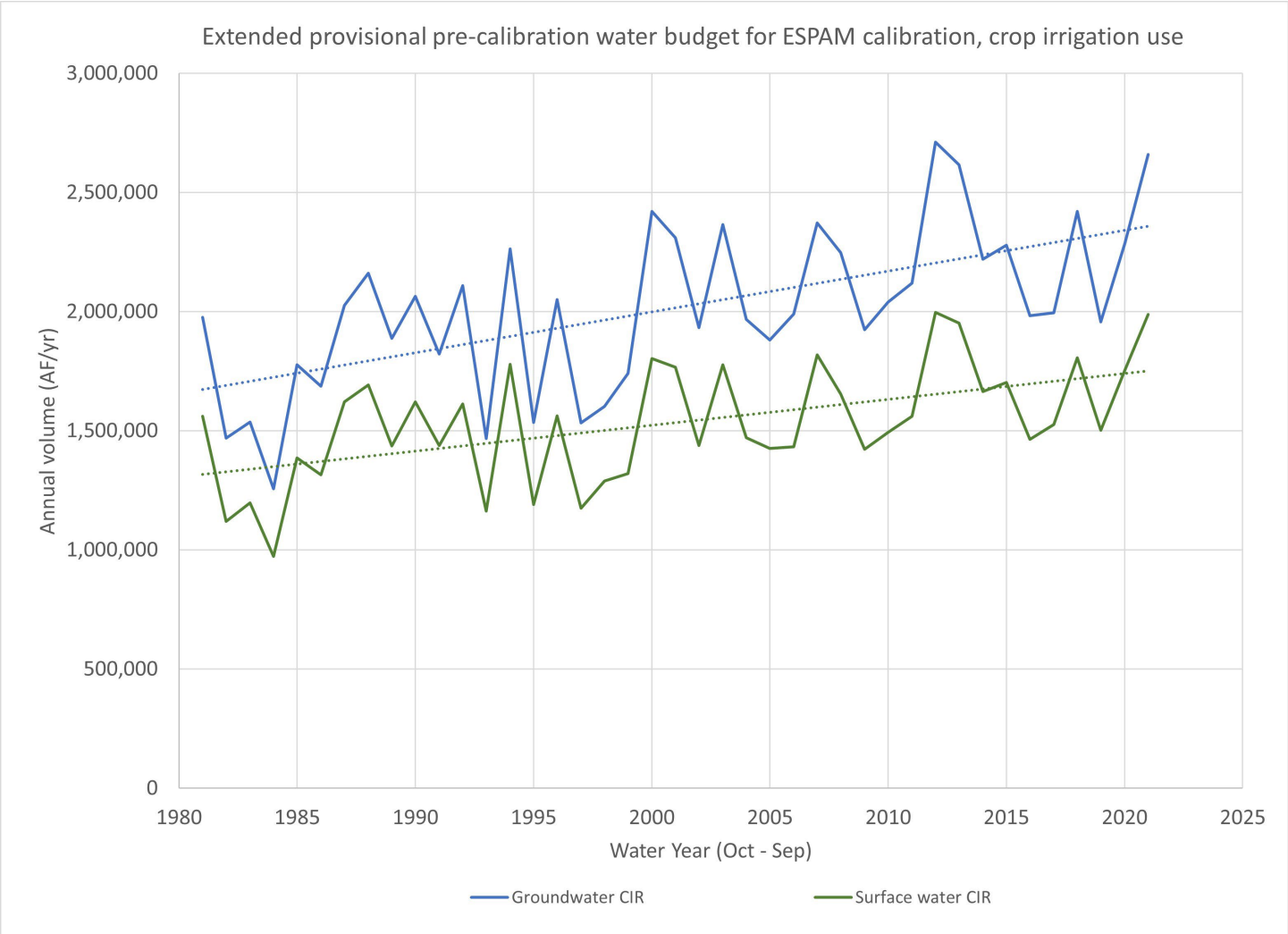
Total areal recharge trend (WY1981-WY2021)



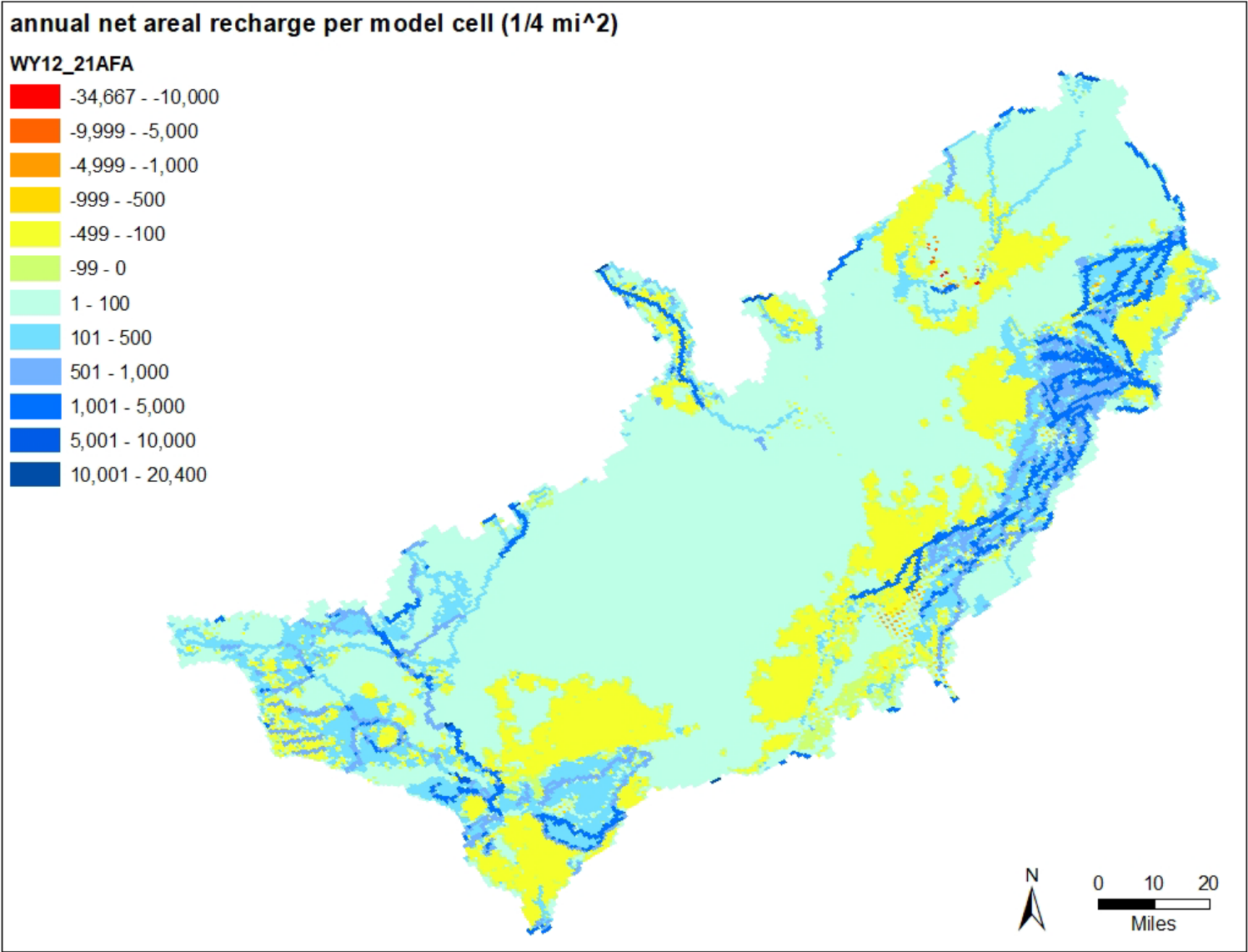
Groundwater pumping locations



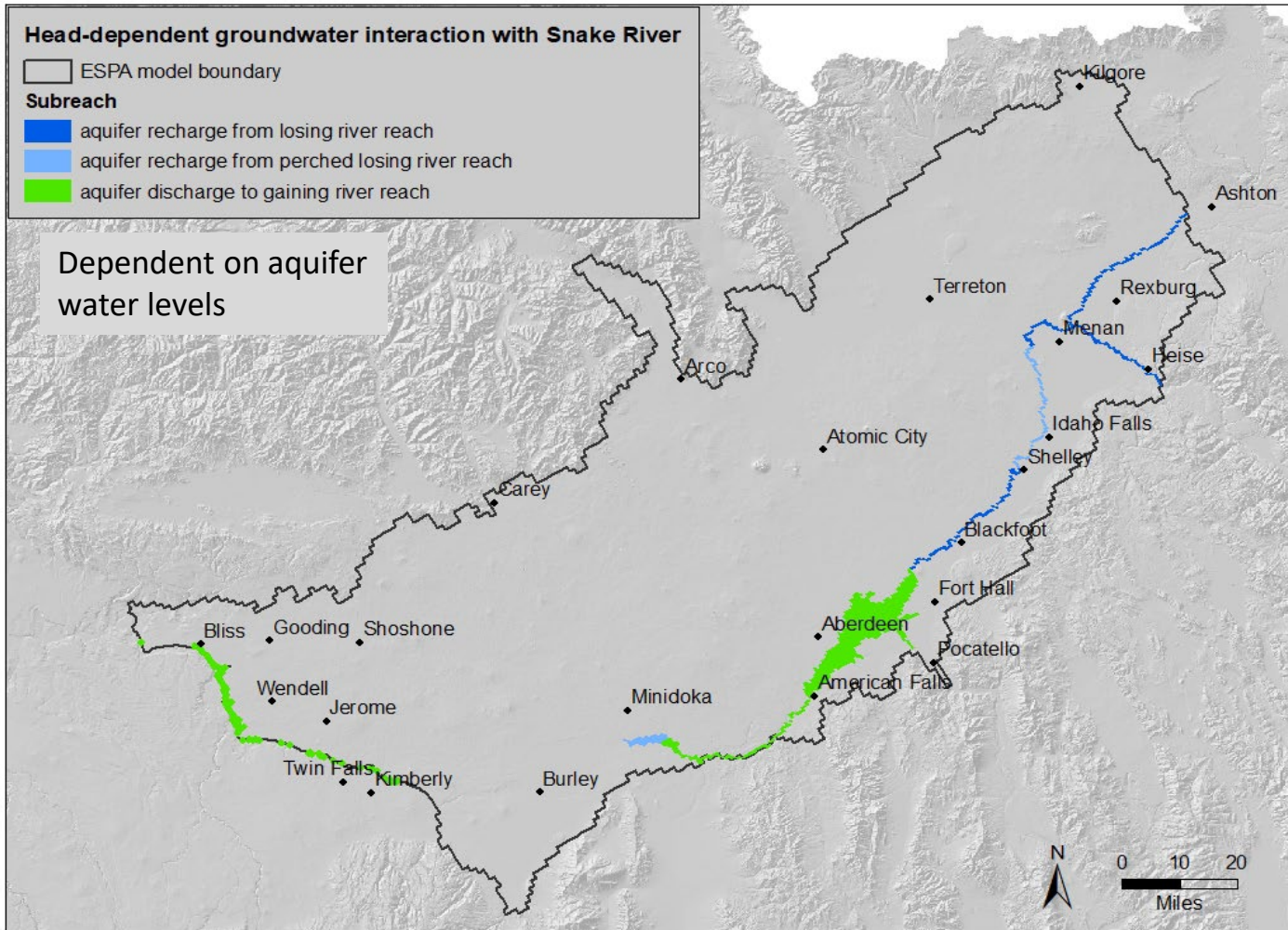
Groundwater consumptive use trend (WY1981-WY2021)



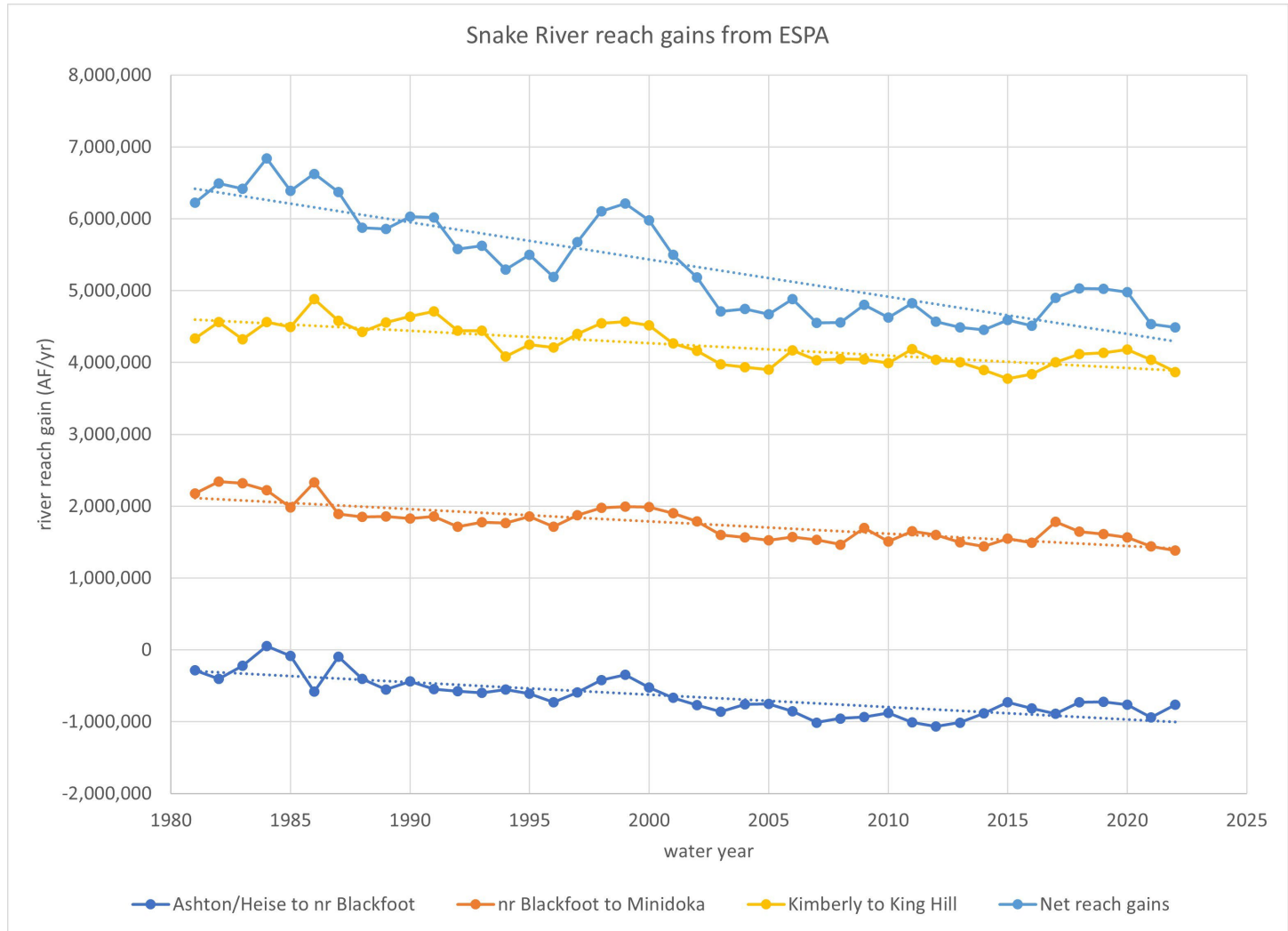
Spatial distribution of net areal recharge and pumping



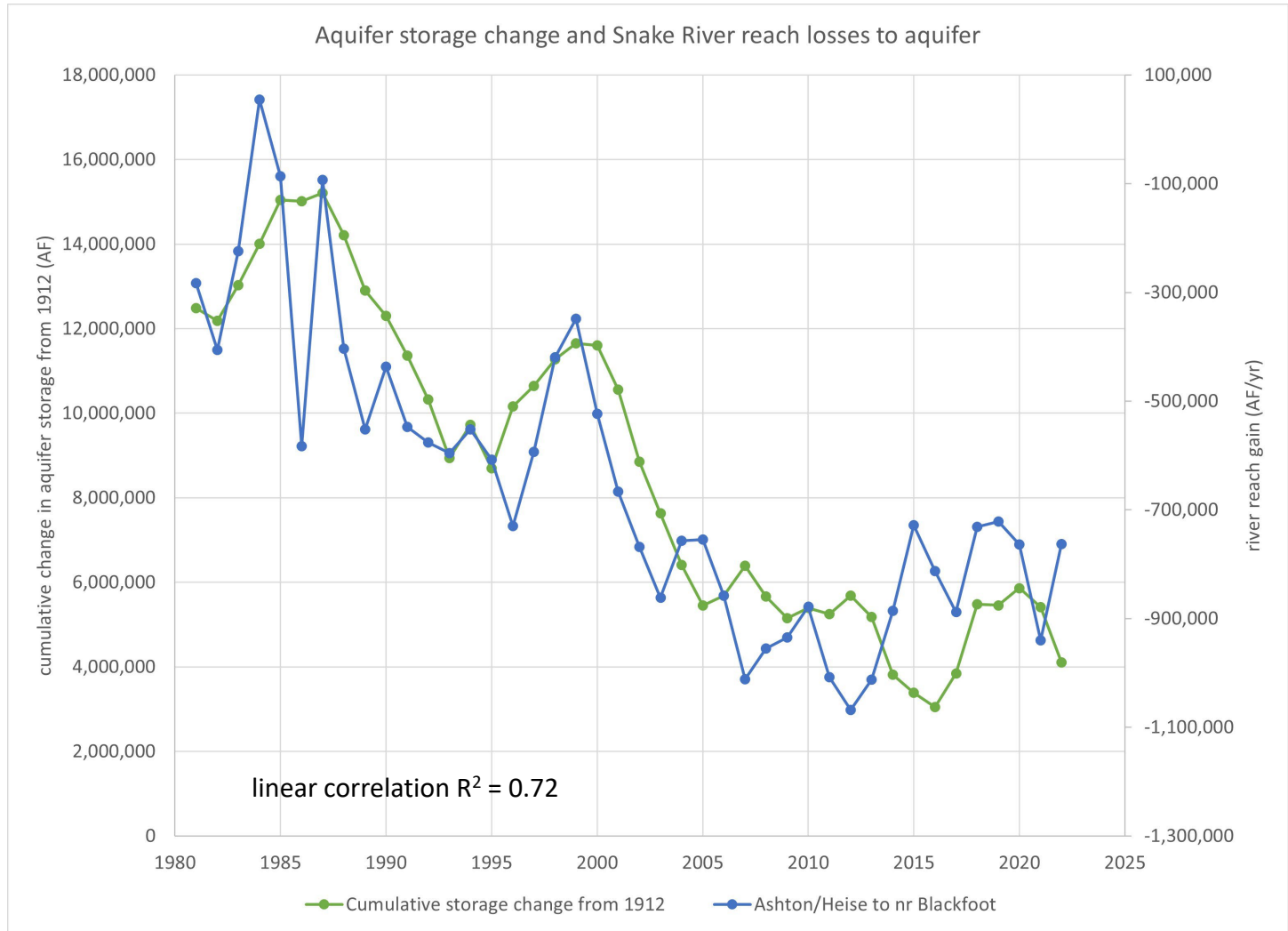
Head-dependent aquifer recharge and discharge



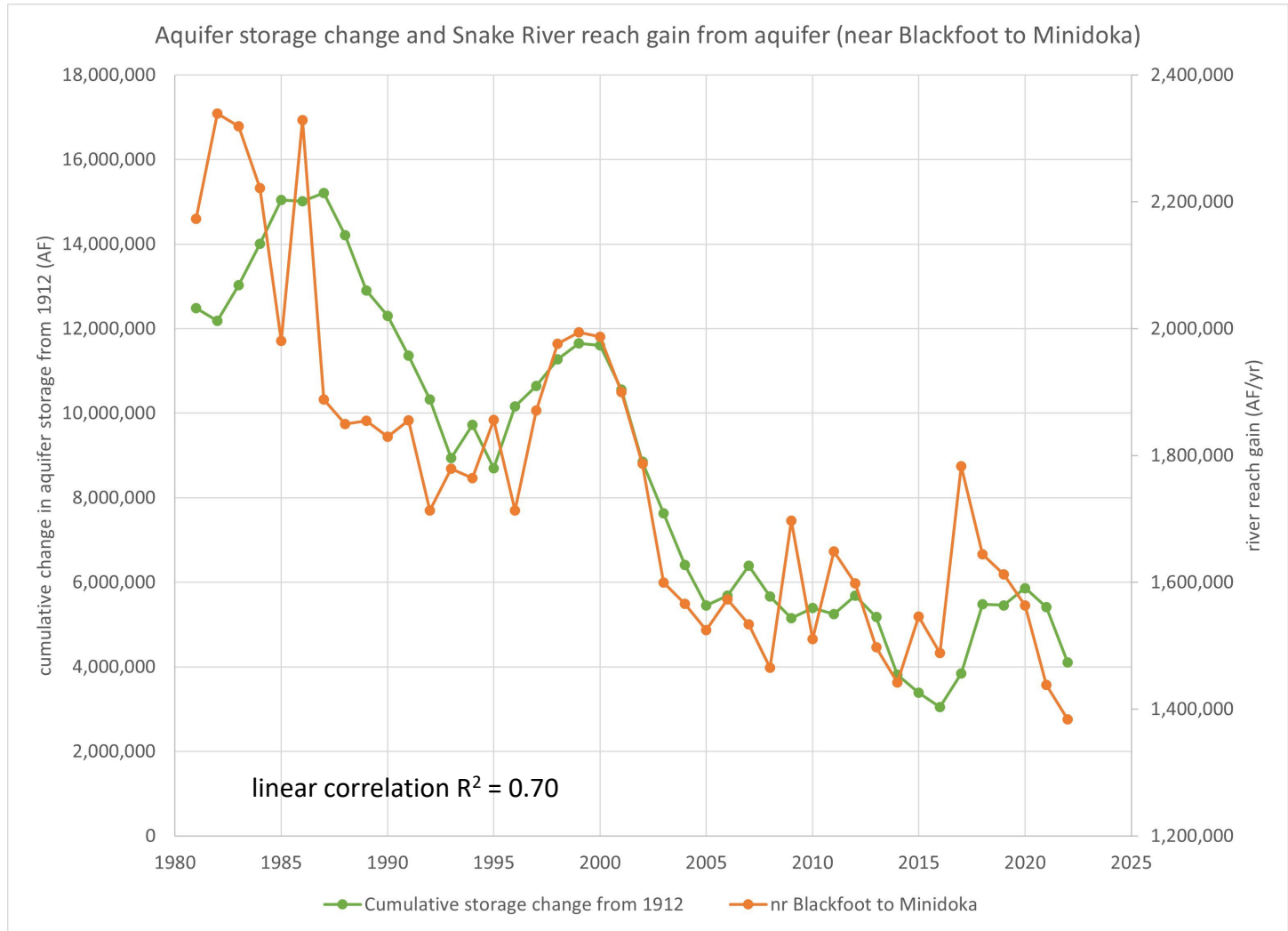
Observed head-dependent recharge and discharge



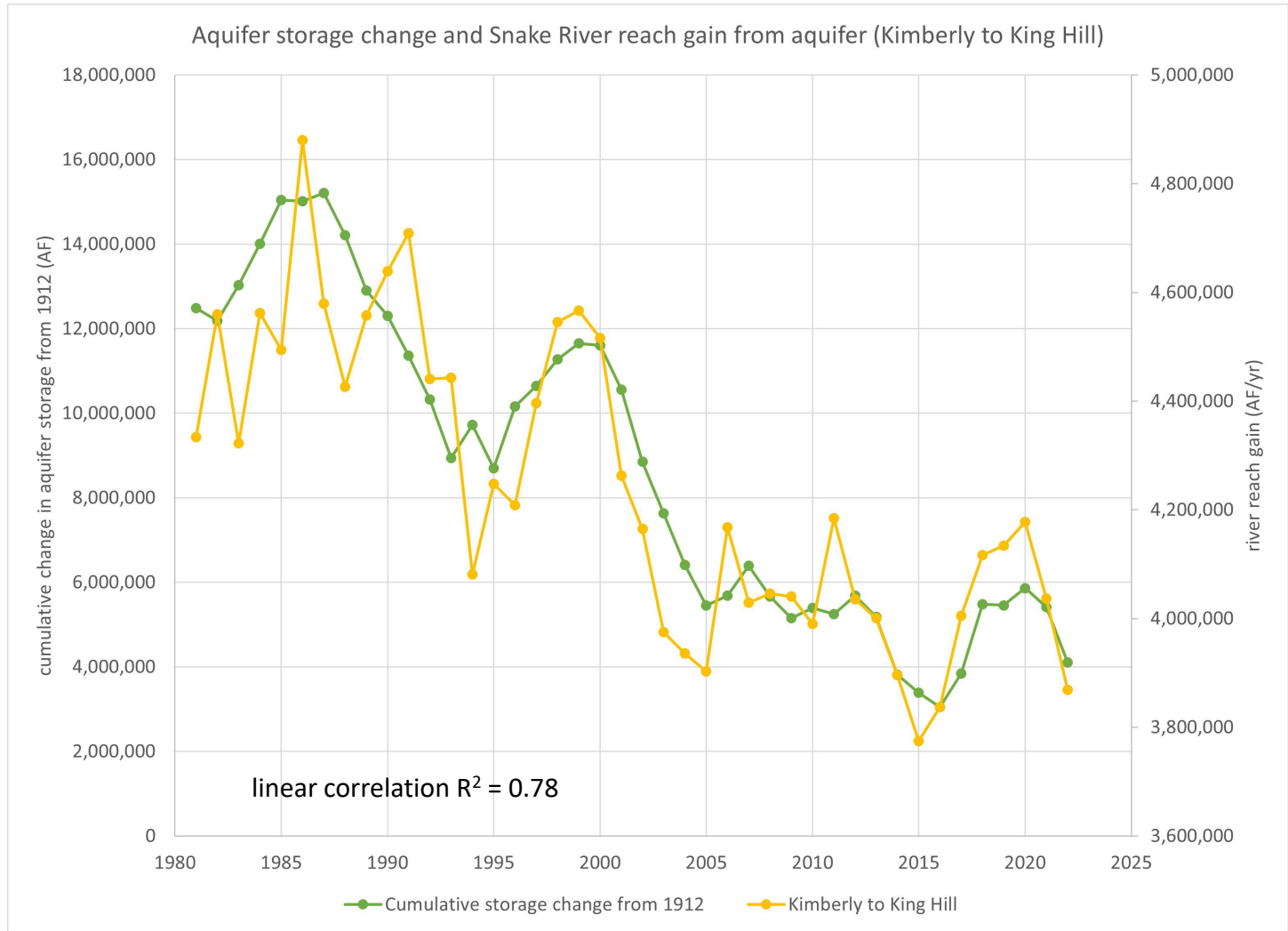
Observed head-dependent recharge and aquifer storage



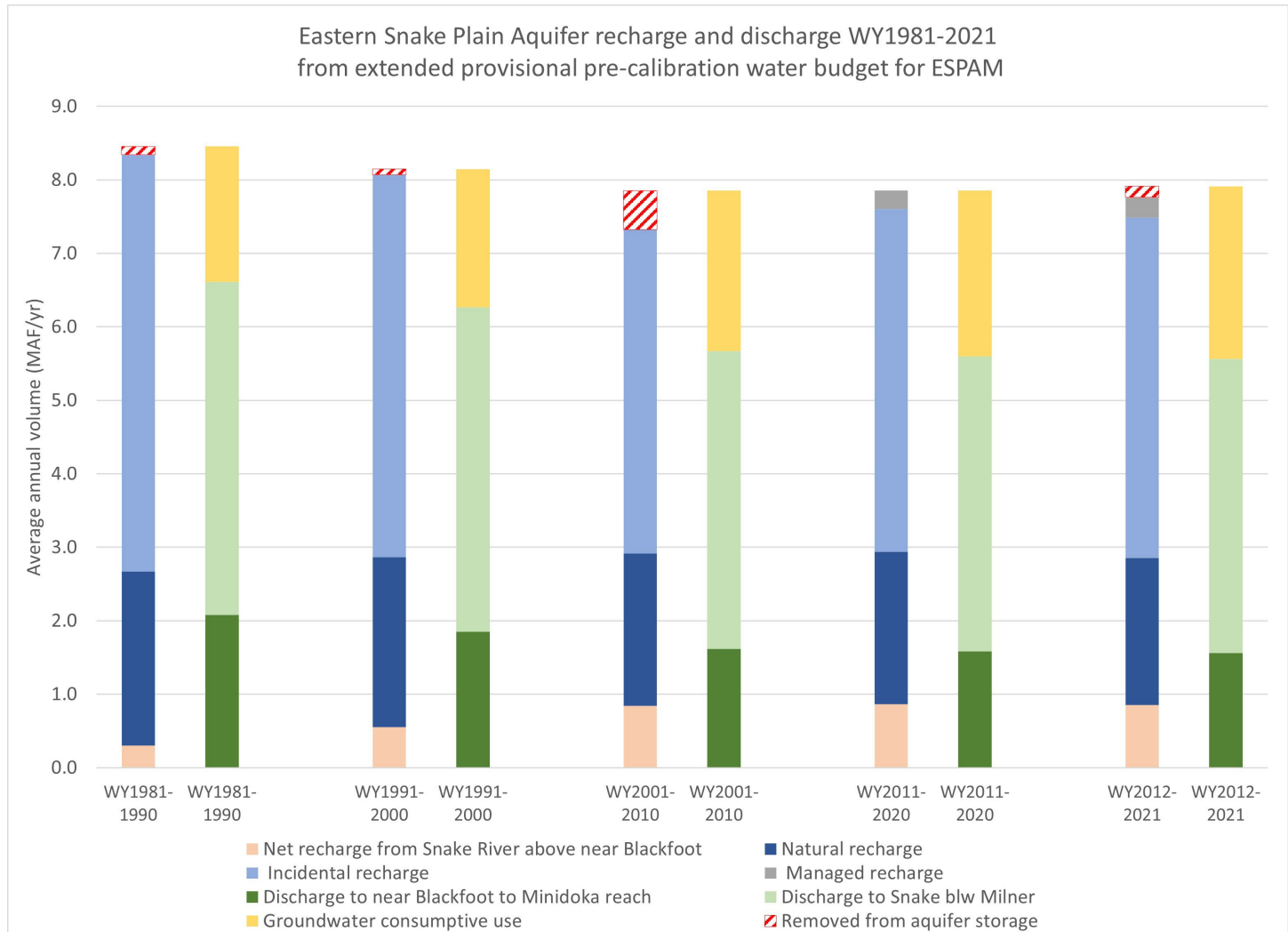
Observed head-dependent discharge and aquifer storage



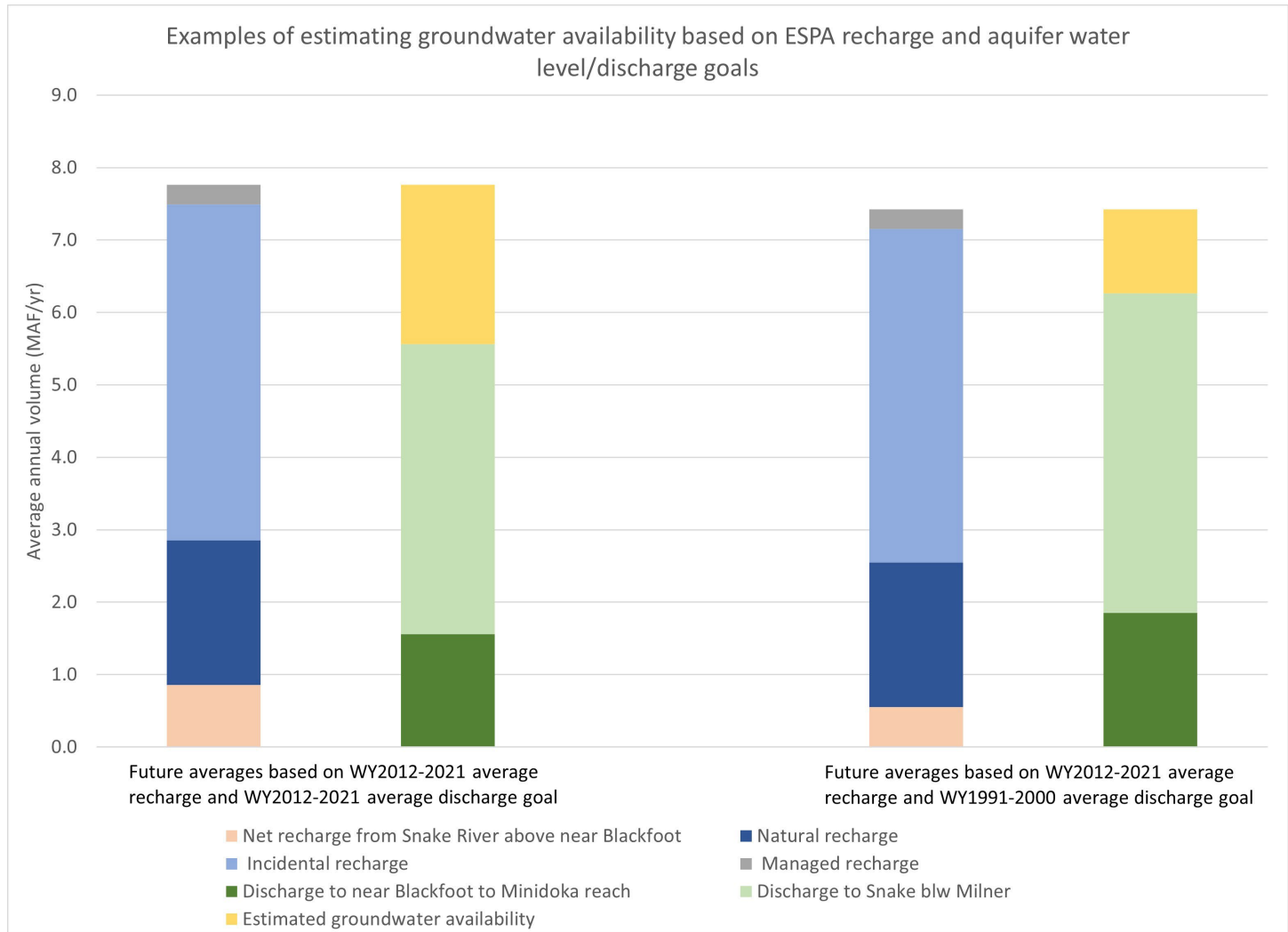
Observed head-dependent discharge and aquifer storage



Average ESPA water budget by decade



Examples of estimating groundwater availability relative to assumed future recharge and goals for aquifer discharge



Water budget challenges

- Aquifer water budget will vary year to year with weather
 - recent years had greater than 2 MAF/yr variation in areal recharge between a high water-supply year with mild summer and a low water-supply year with hot summer
 - even with long-term stabilization, the minimum aquifer level and aquifer discharge will be considerably lower than the long-term average
- Uncertainty in measurement and estimation of water budget components is greater than the estimated average annual water budget deficit
 - aquifer water levels are the most reliable indicator for monitoring aquifer status and guiding adaptive management

Water budget challenges

- Uncertainty in future trends for natural recharge, incidental recharge, and managed recharge adds to uncertainty in estimating an average available groundwater pumping volume
 - adaptive management will be needed to respond to future changes in natural, incidental, and managed recharge
- Compilation of data required to calculate water budget has time lag
 - Many data not available until following year
 - Many data are compiled from hand-written or scanned Watermaster reports (can't be automated)
 - As of November 2023, water budget is updated through WY2021

An aerial satellite photograph of a region, possibly a watershed or a specific administrative area, outlined with a white, irregular boundary. The terrain is a mix of brownish-tan and green, indicating different land uses or vegetation. The word "Questions?" is written in a large, black, sans-serif font in the center of the image. A small blue circular icon is visible in the bottom right corner.

Questions?