

ESPA water levels and contribution
to July minimum streamflow
SFIG question 5

Presented to the Swan Falls Technical Working Group

November 1, 2023

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Purpose

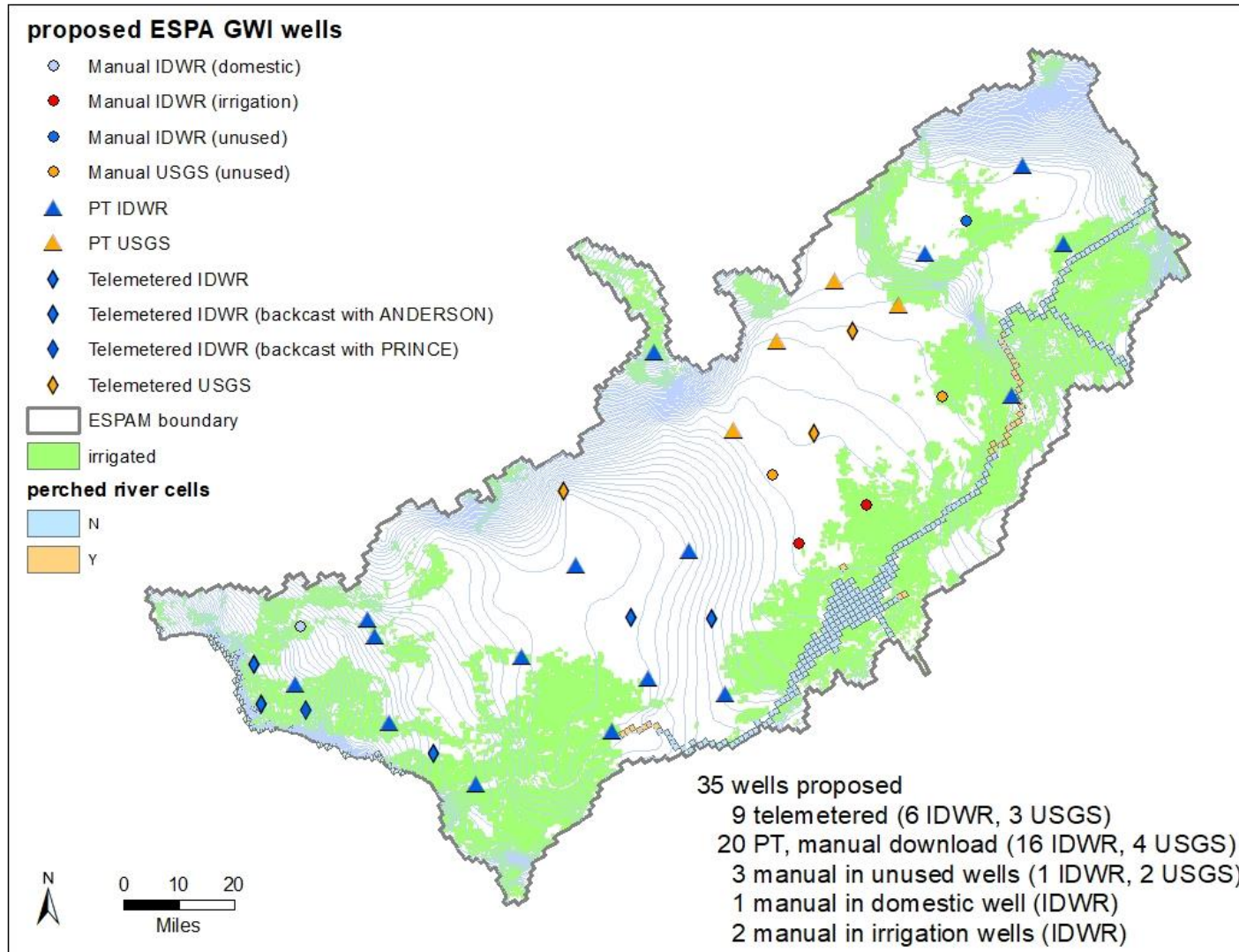
- Develop response to SFIG question 5

“Q5: Analysis of the necessary ESPA levels and/or cumulative storage change required to maintain the minimum flow rate at the Murphy Gage during the low flow period “

Overview

- ESPA water levels
 - preliminary IDWR proposal of ESPA “groundwater index” wells
 - correlation with ESPA aquifer storage and discharge to Snake River
- Preliminary IDWR proposal for GWI well subgroups
 - correlation with ESPA discharge to Snake River below Milner
- Development of targets for ESPA discharge to Snake River below Milner and ESPA water levels west of Great Rift

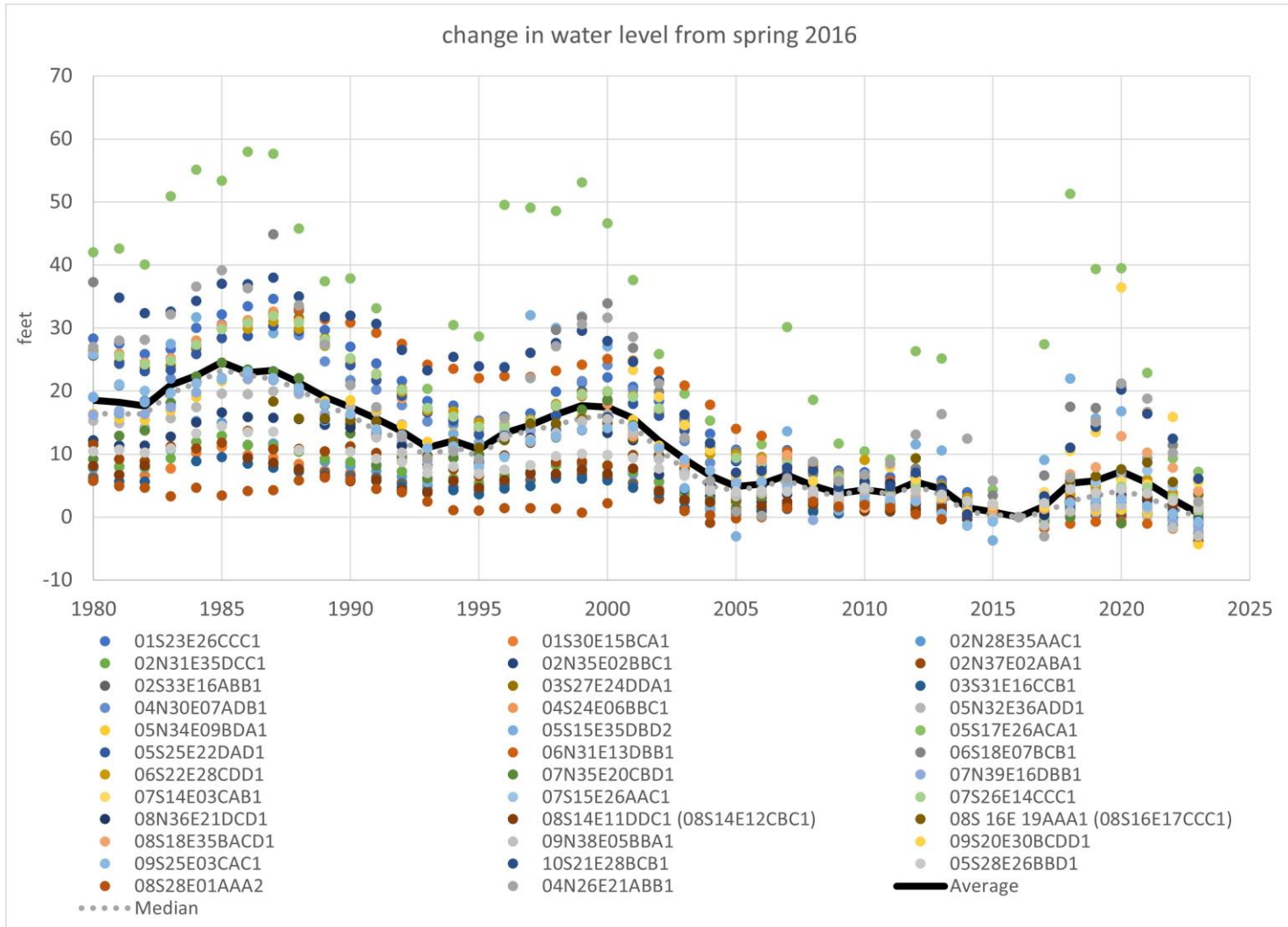
Proposed ESPA groundwater index (GWI) wells



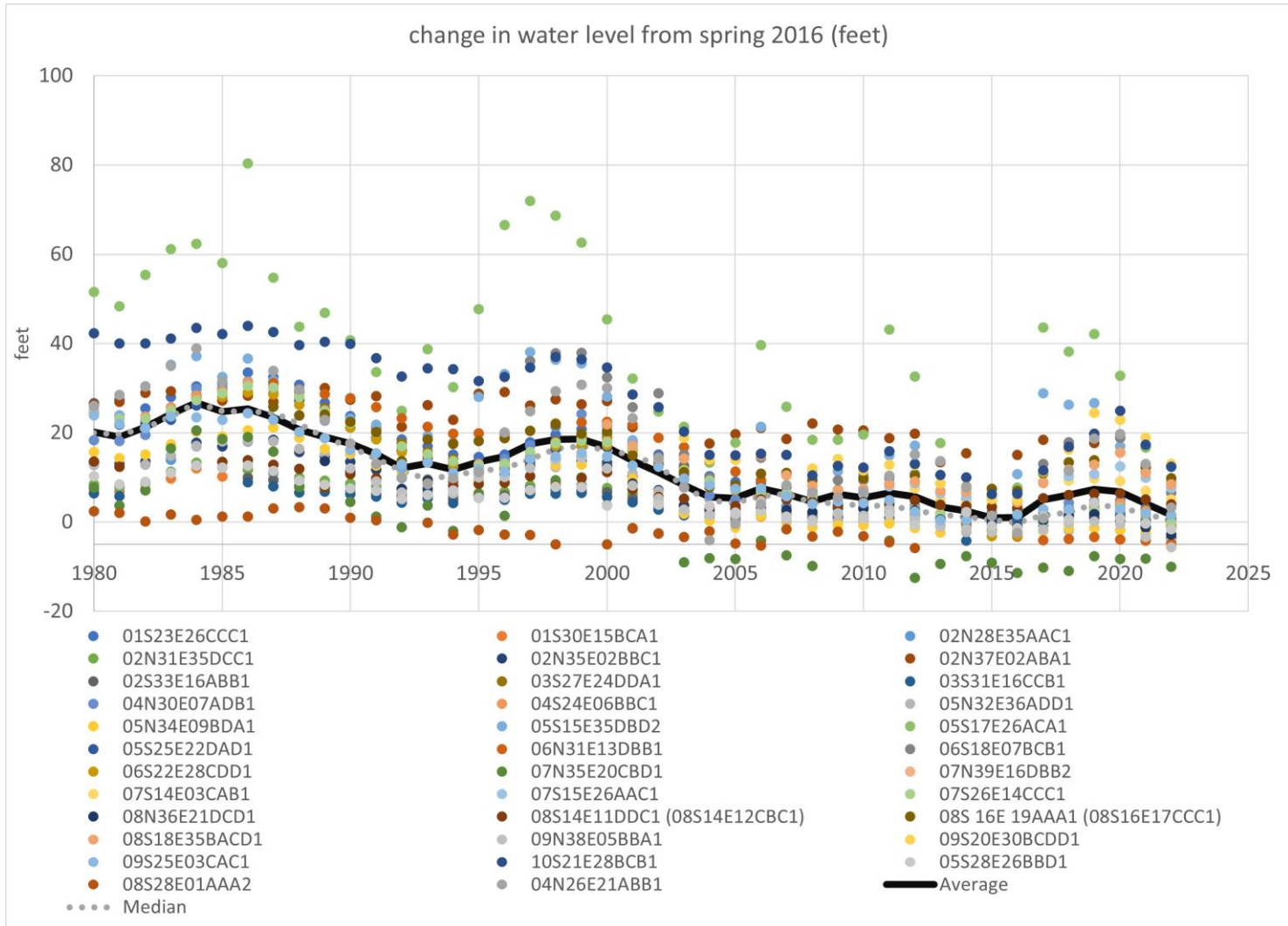
Proposed groundwater index calculation

- Normalize water levels to water level change from spring 2016 water level
- Calculate average change for all 35 wells
- Spring 2016 water level is baseline for all seasons
- Spring GWI calculated using median monthly water level for April (when available), March (1st alternate), May (2nd alternate)
- Fall GWI calculated using median monthly water level for November (when available), December (1st alternate), October (2nd alternate)

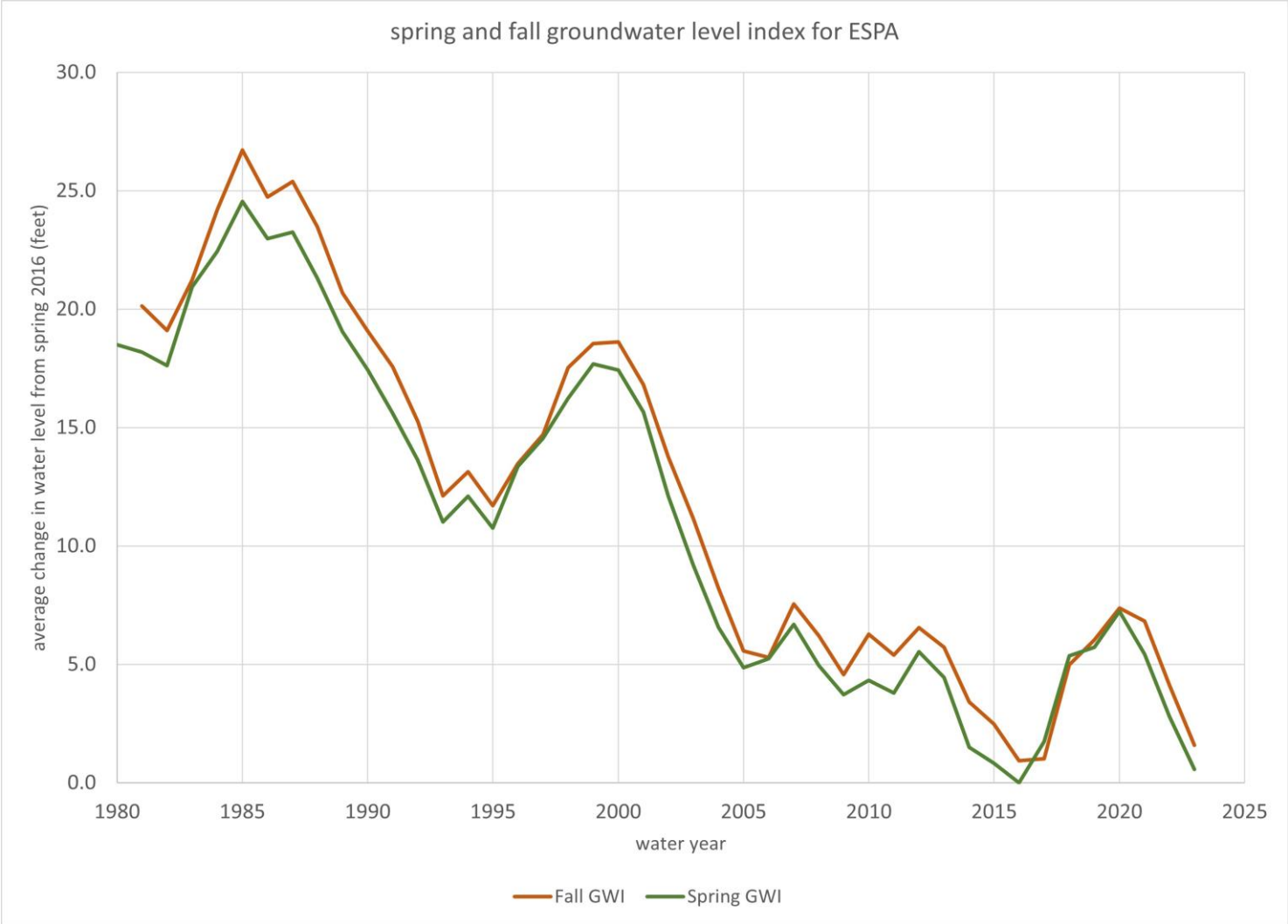
Spring ESPA GWI



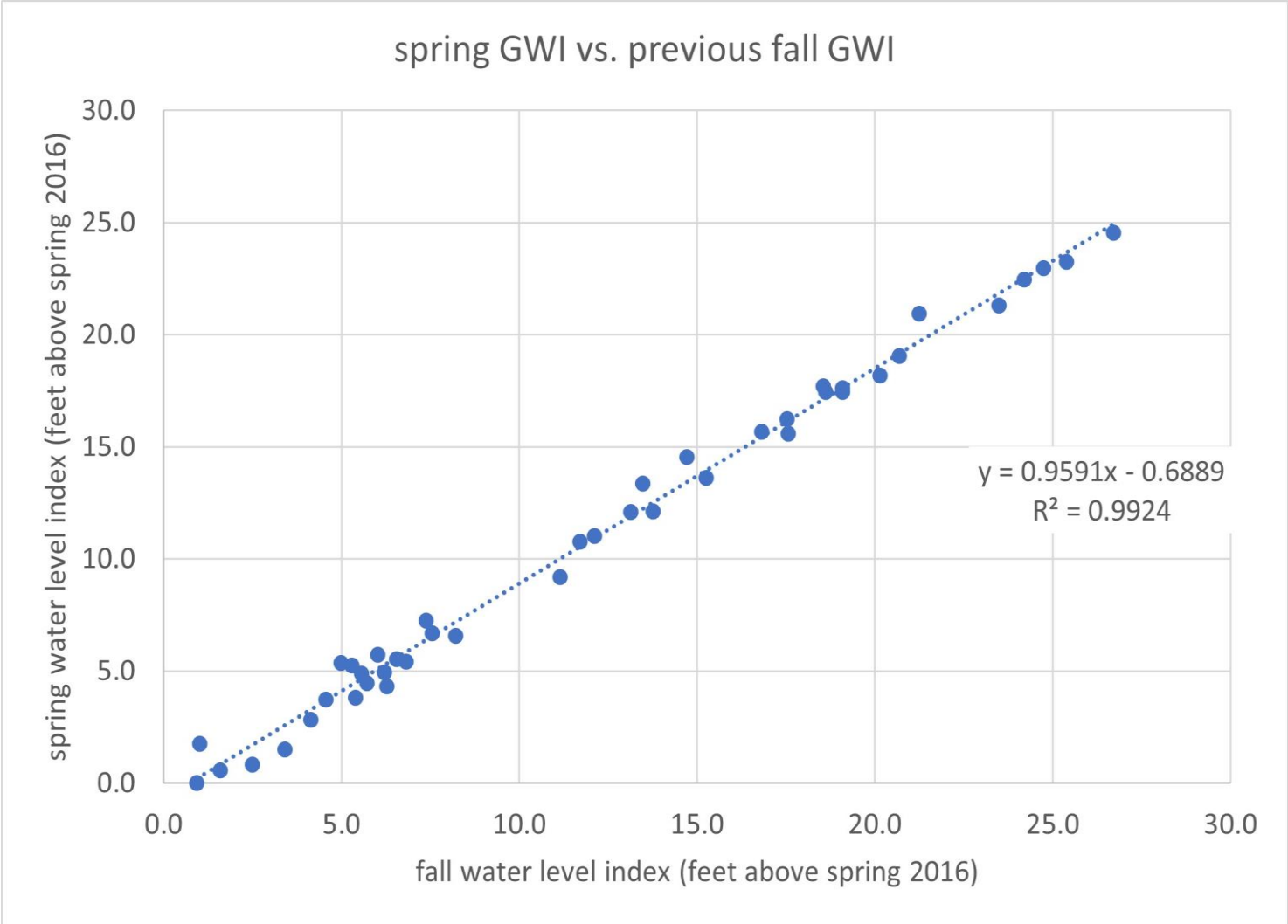
Fall ESPA GWI



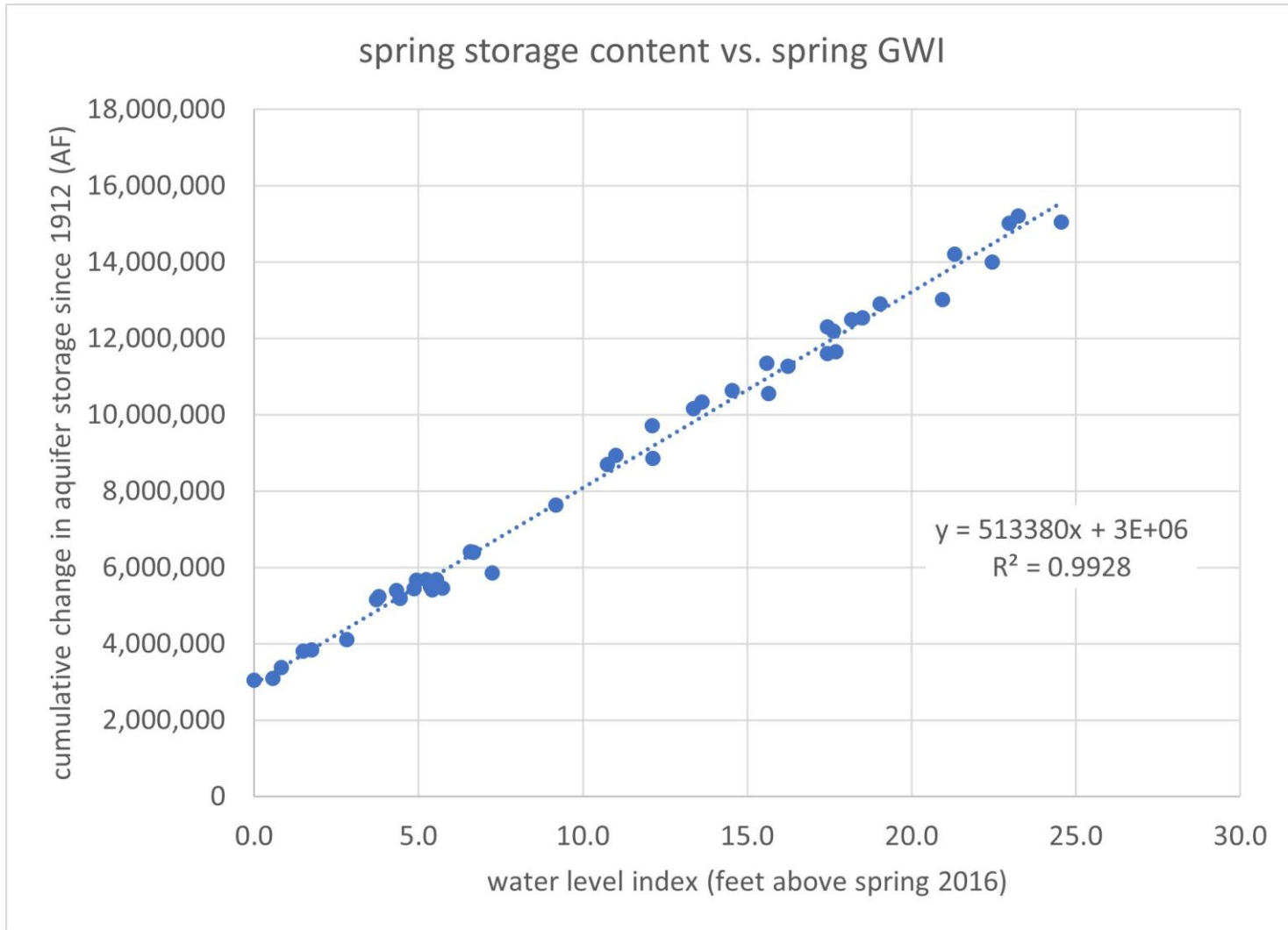
Spring and fall GWI comparison



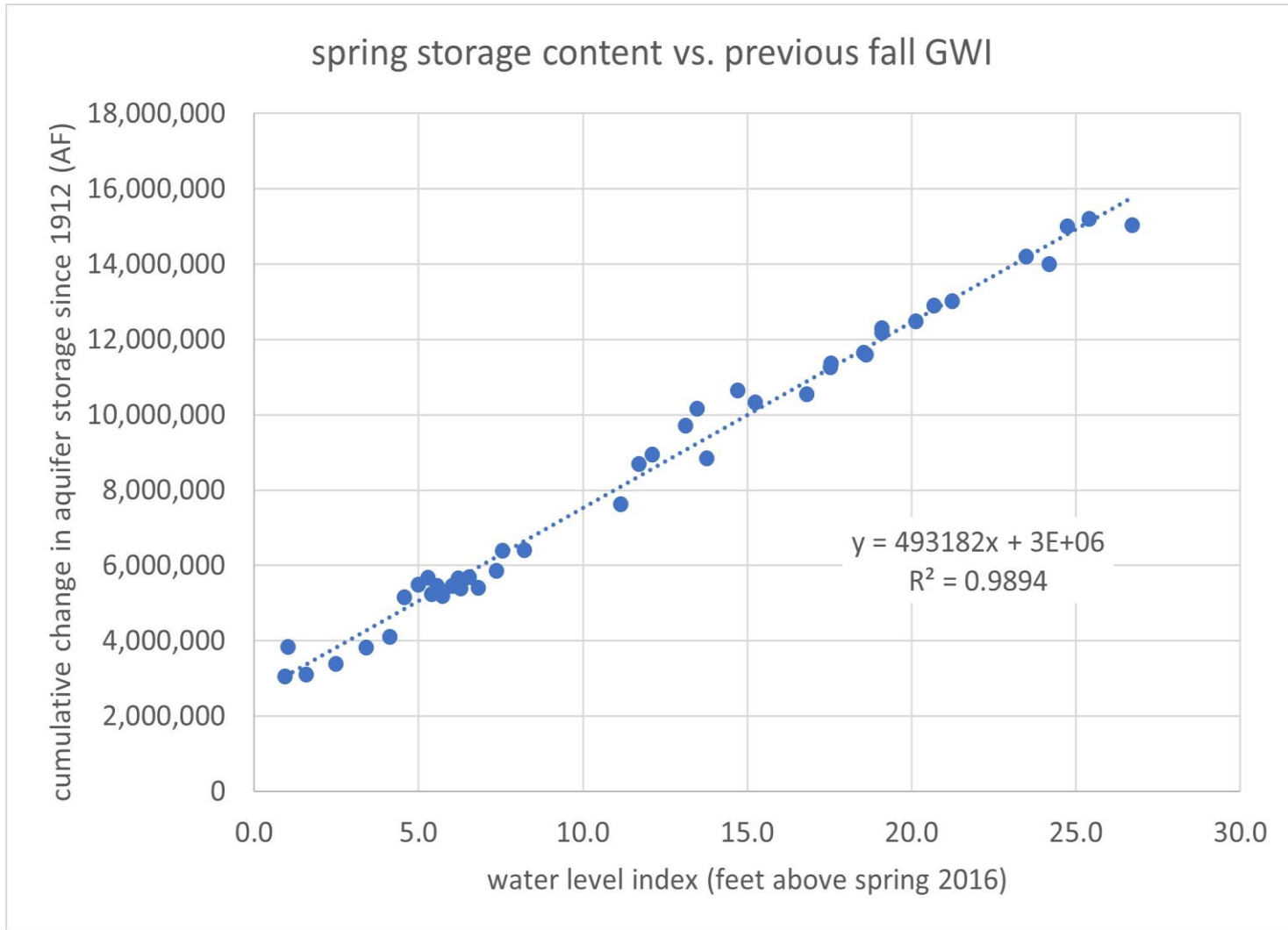
Spring and fall GWI comparison



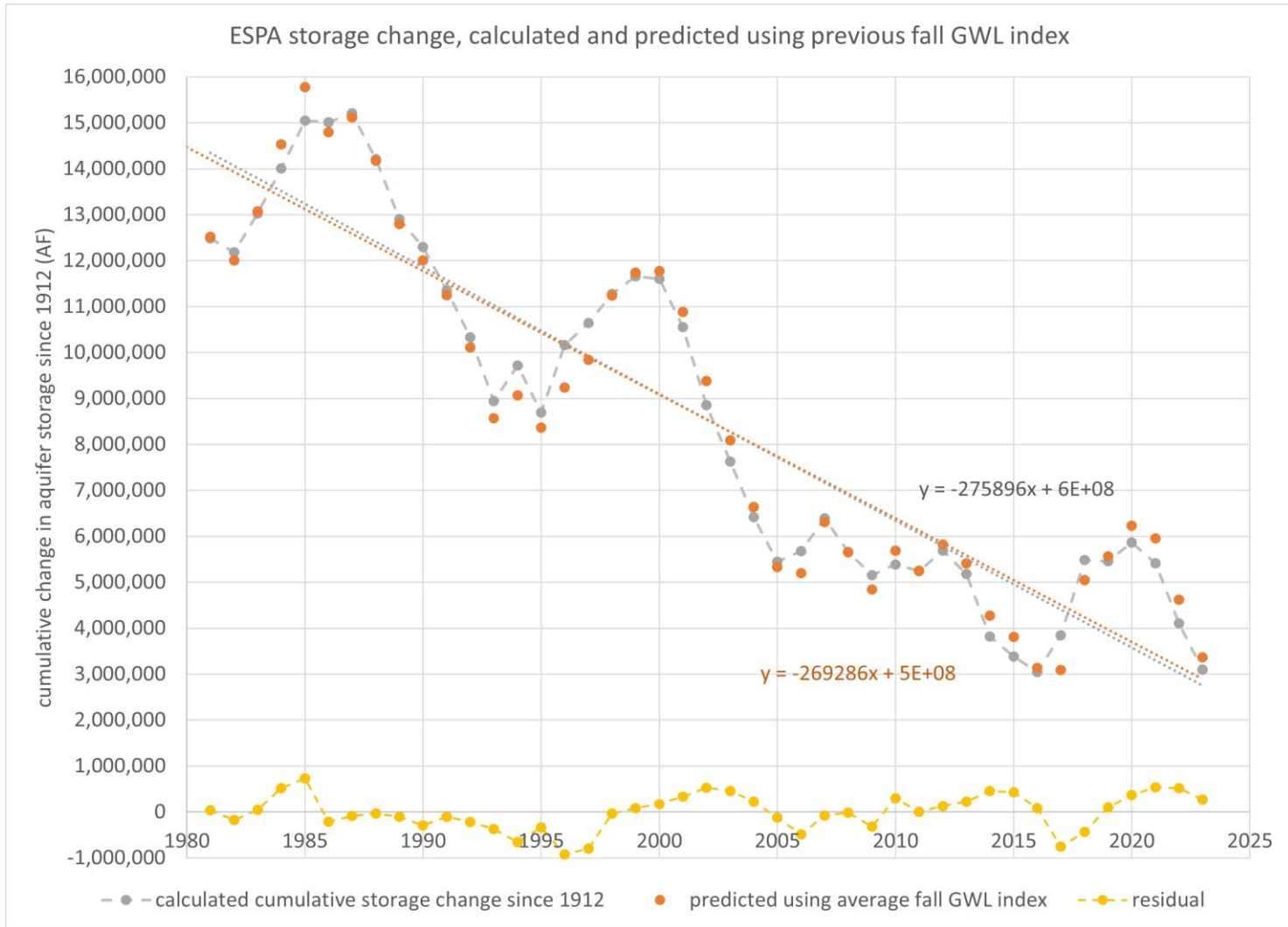
Correlation with ESPA aquifer storage



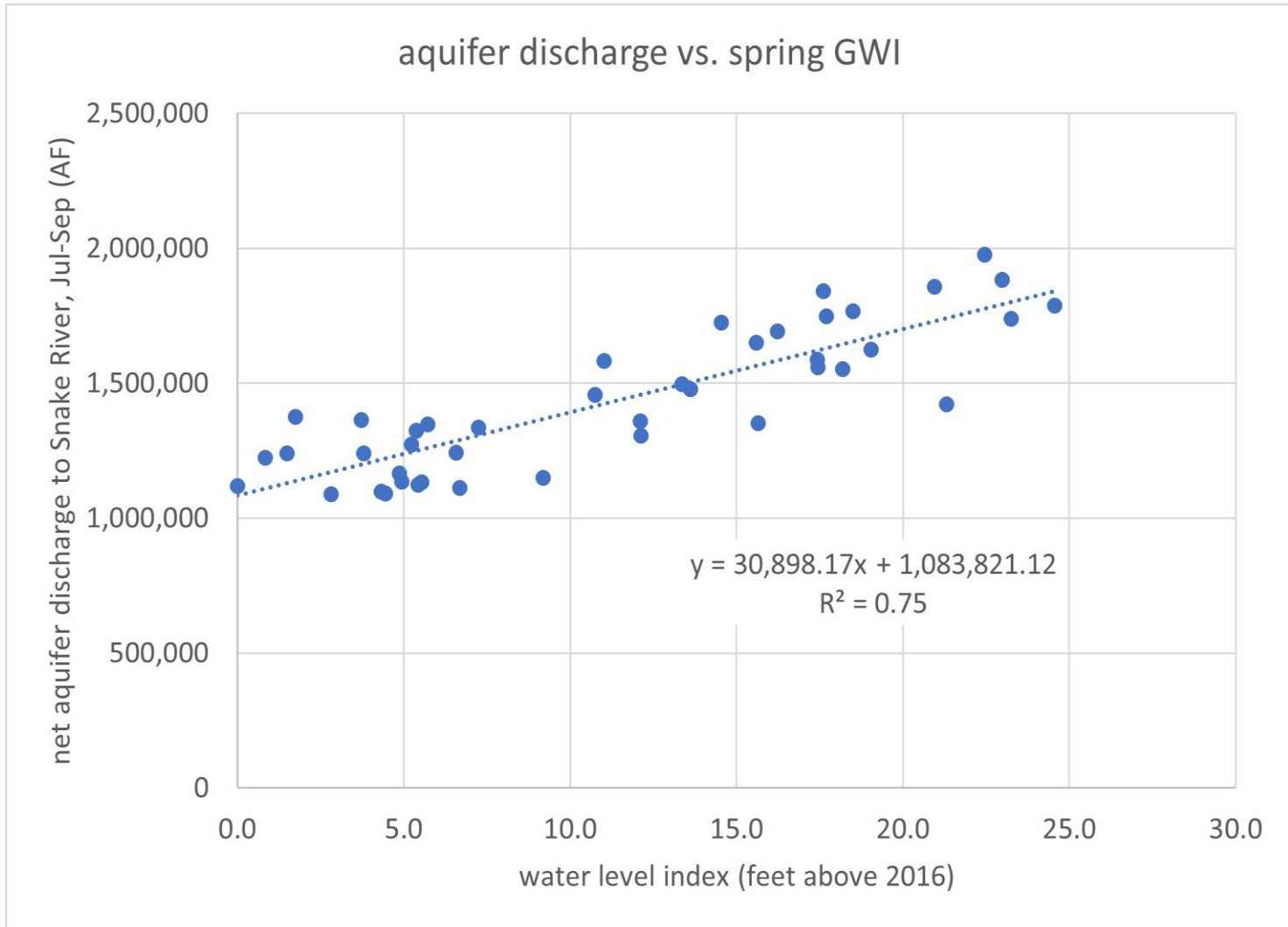
Correlation with ESPA aquifer storage



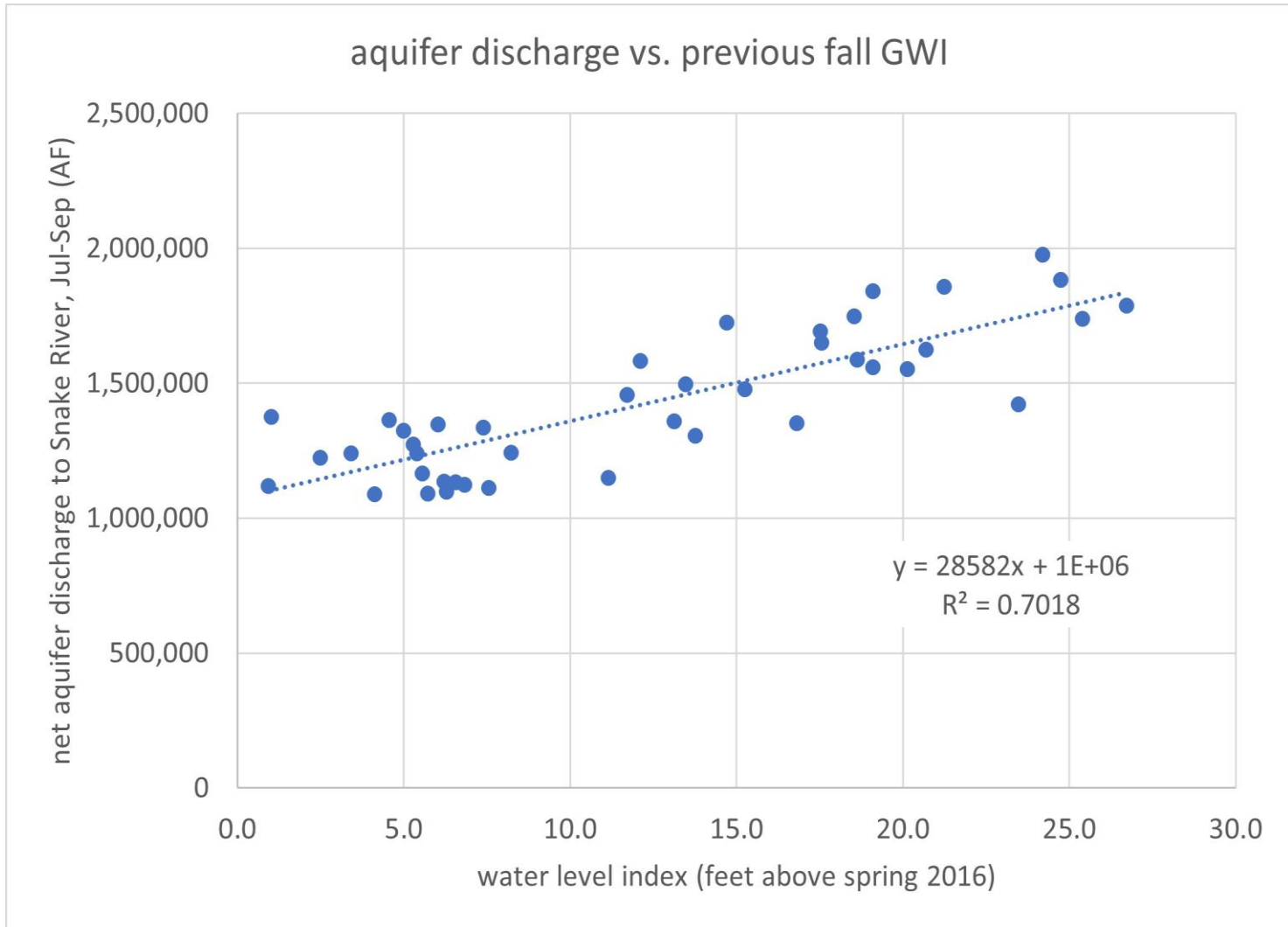
Prediction of ESPA aquifer storage



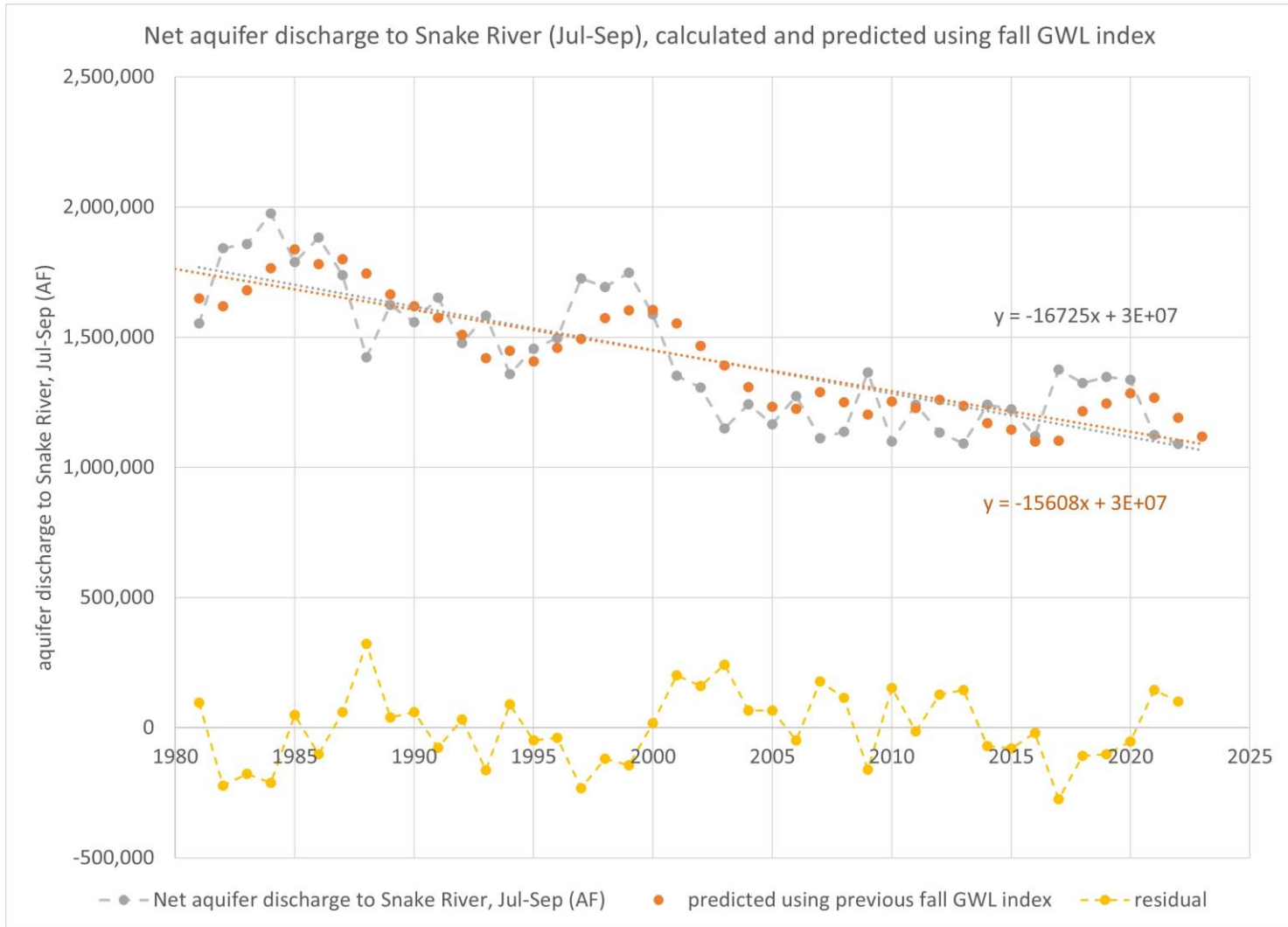
Correlation with ESPA aquifer discharge



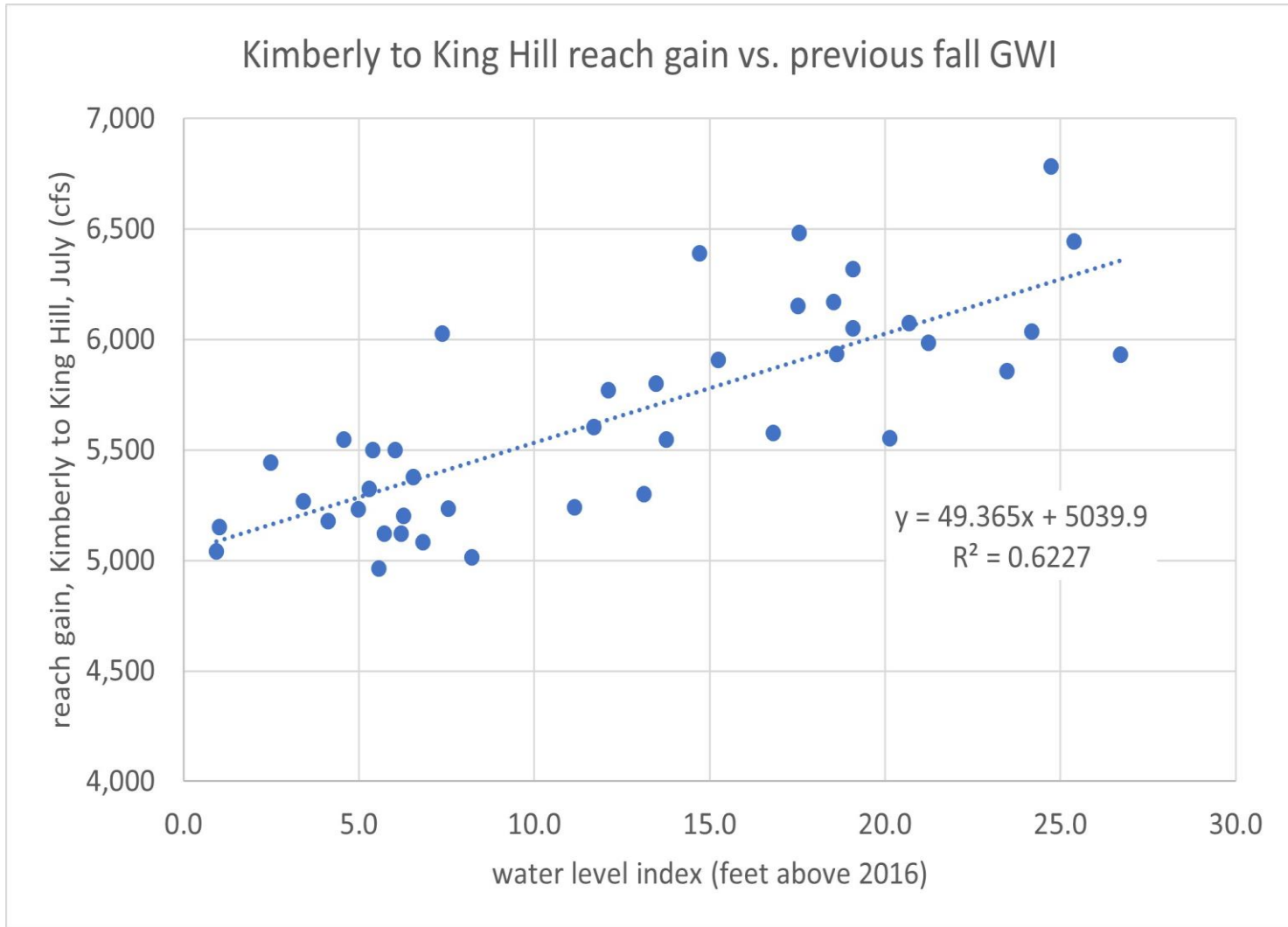
Correlation with ESPA aquifer discharge



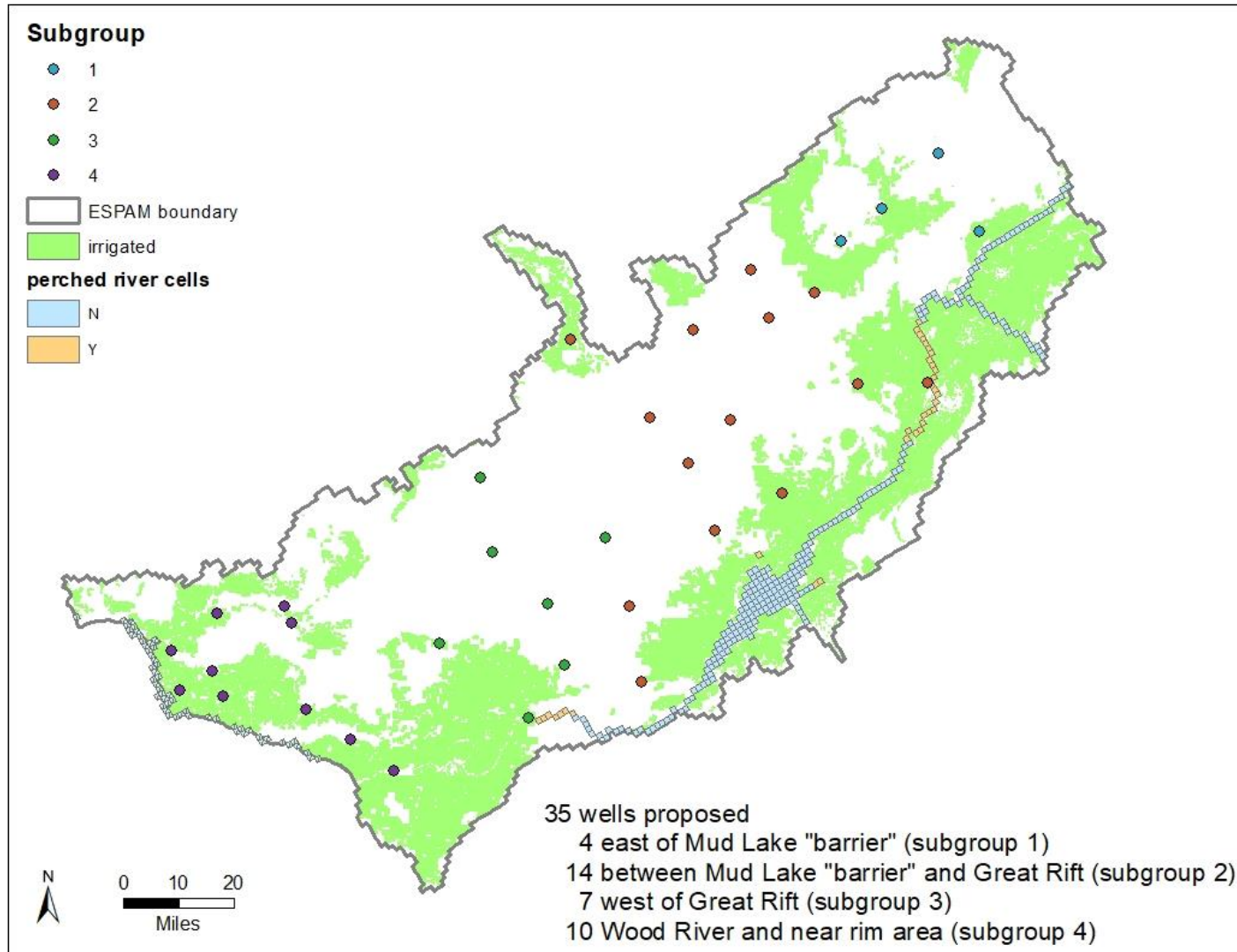
Prediction of ESPA discharge (Jul-Sep)



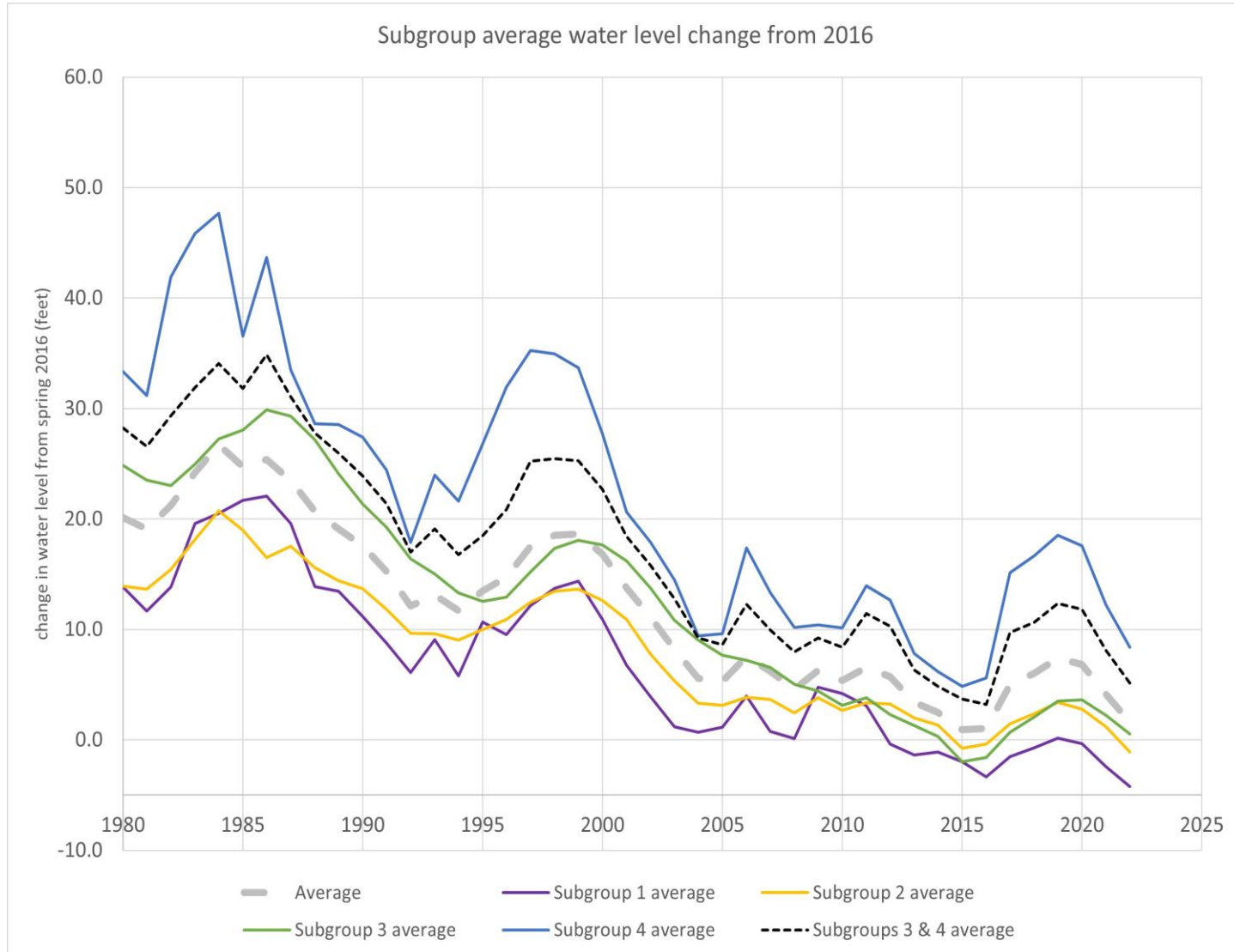
Correlation with ESPA discharge below Milner



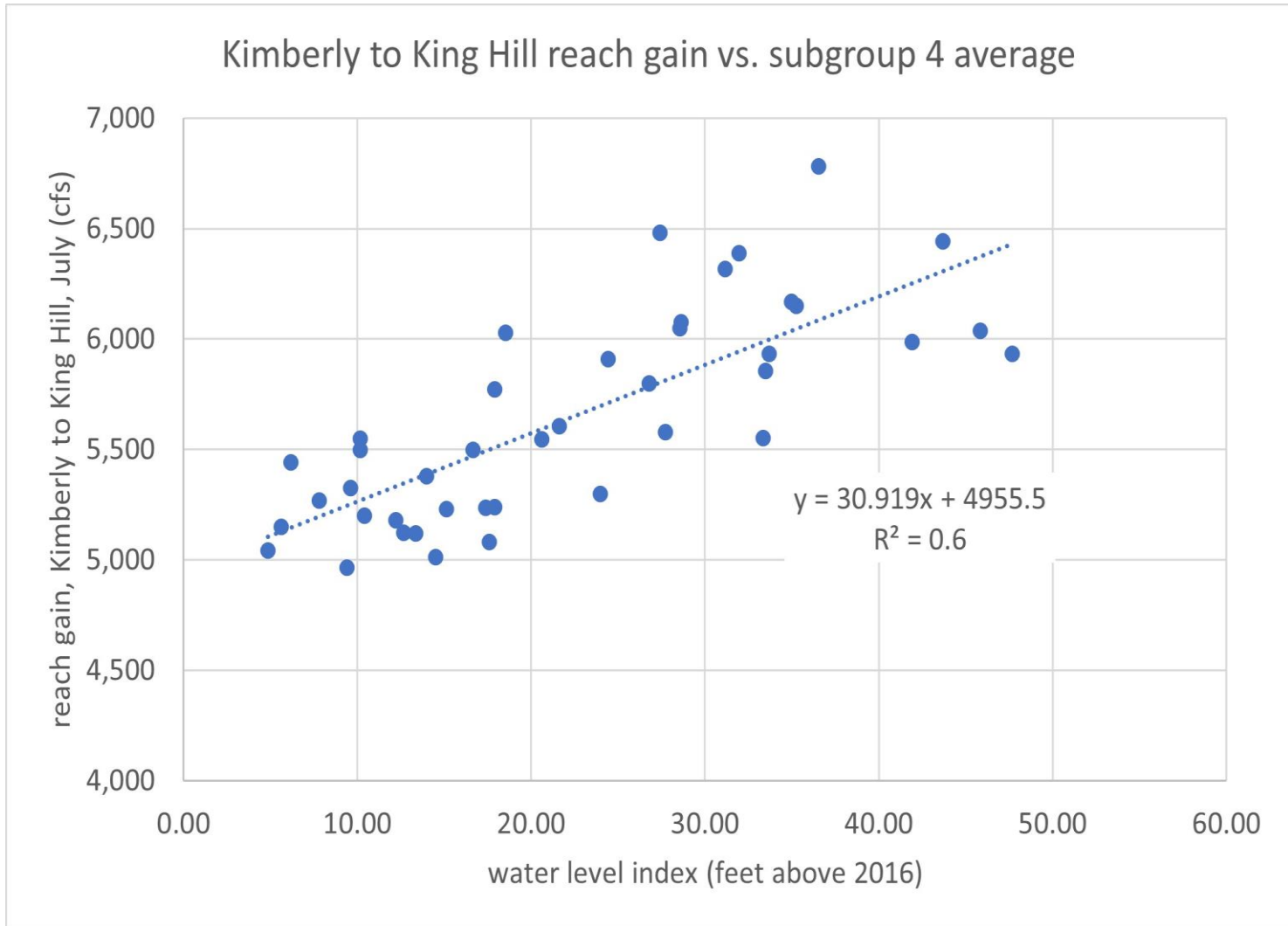
Proposed ESPA GWI subgroups



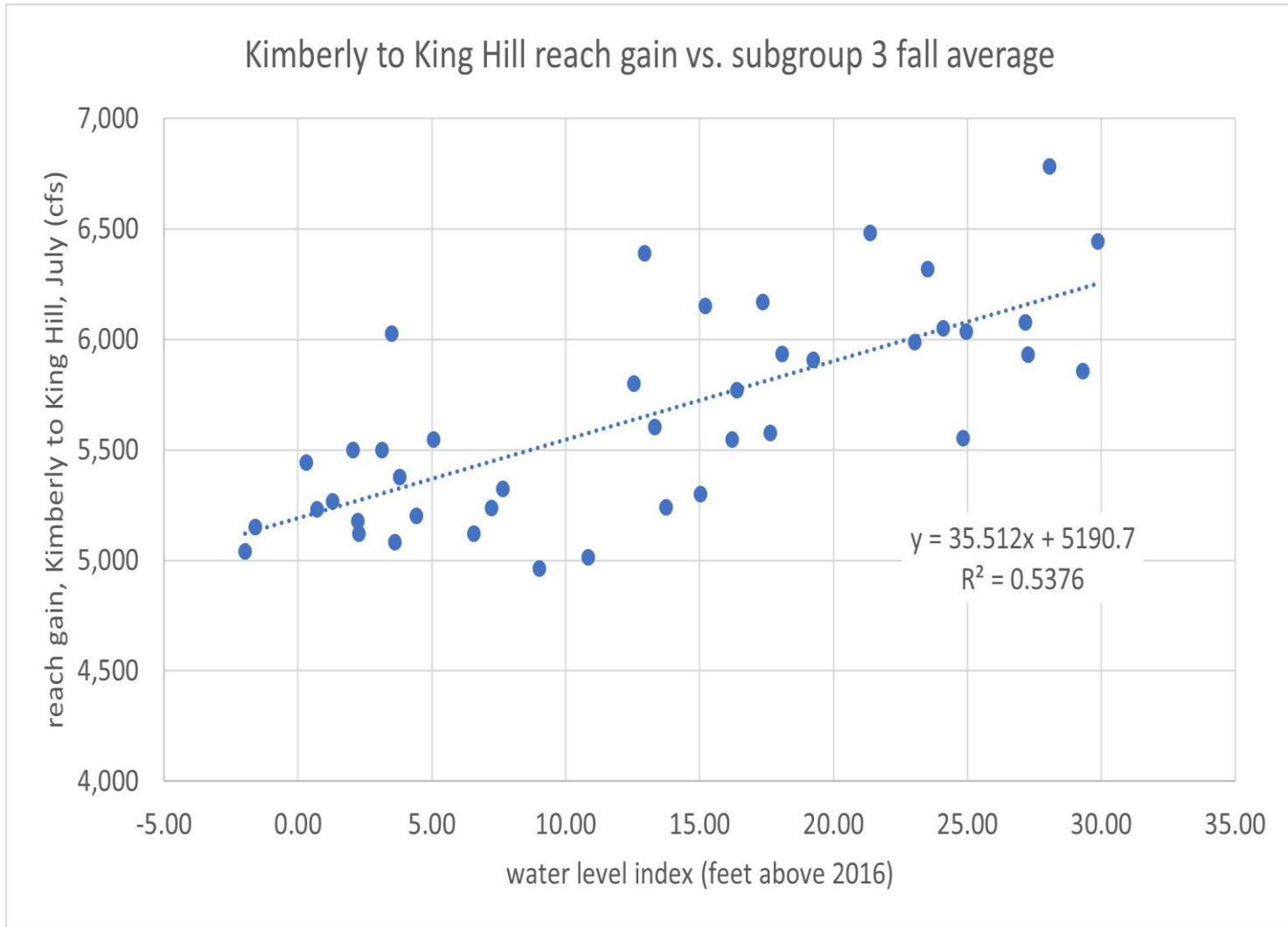
Proposed ESPA GWI subgroups



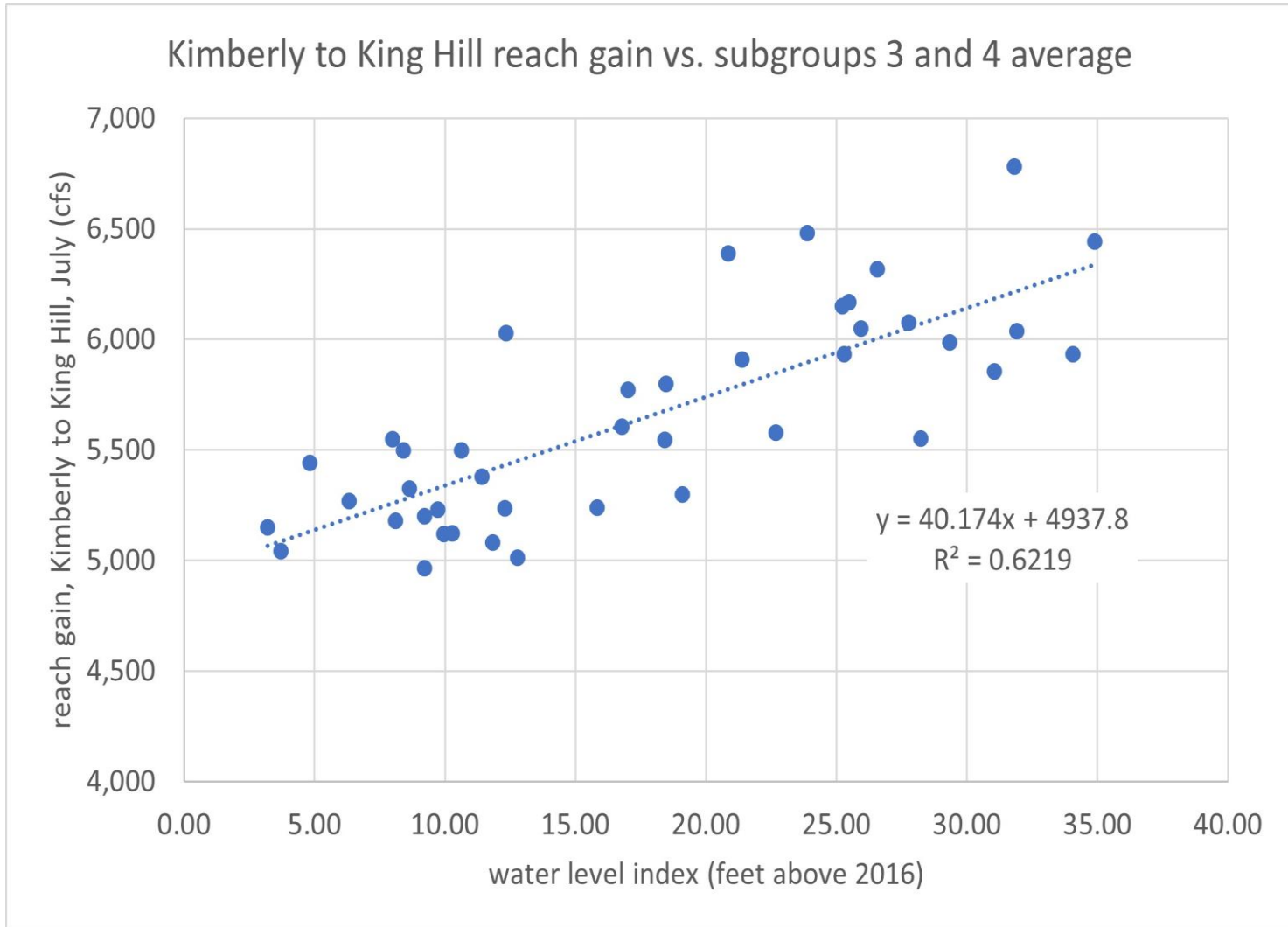
Correlation with ESPA discharge below Milner



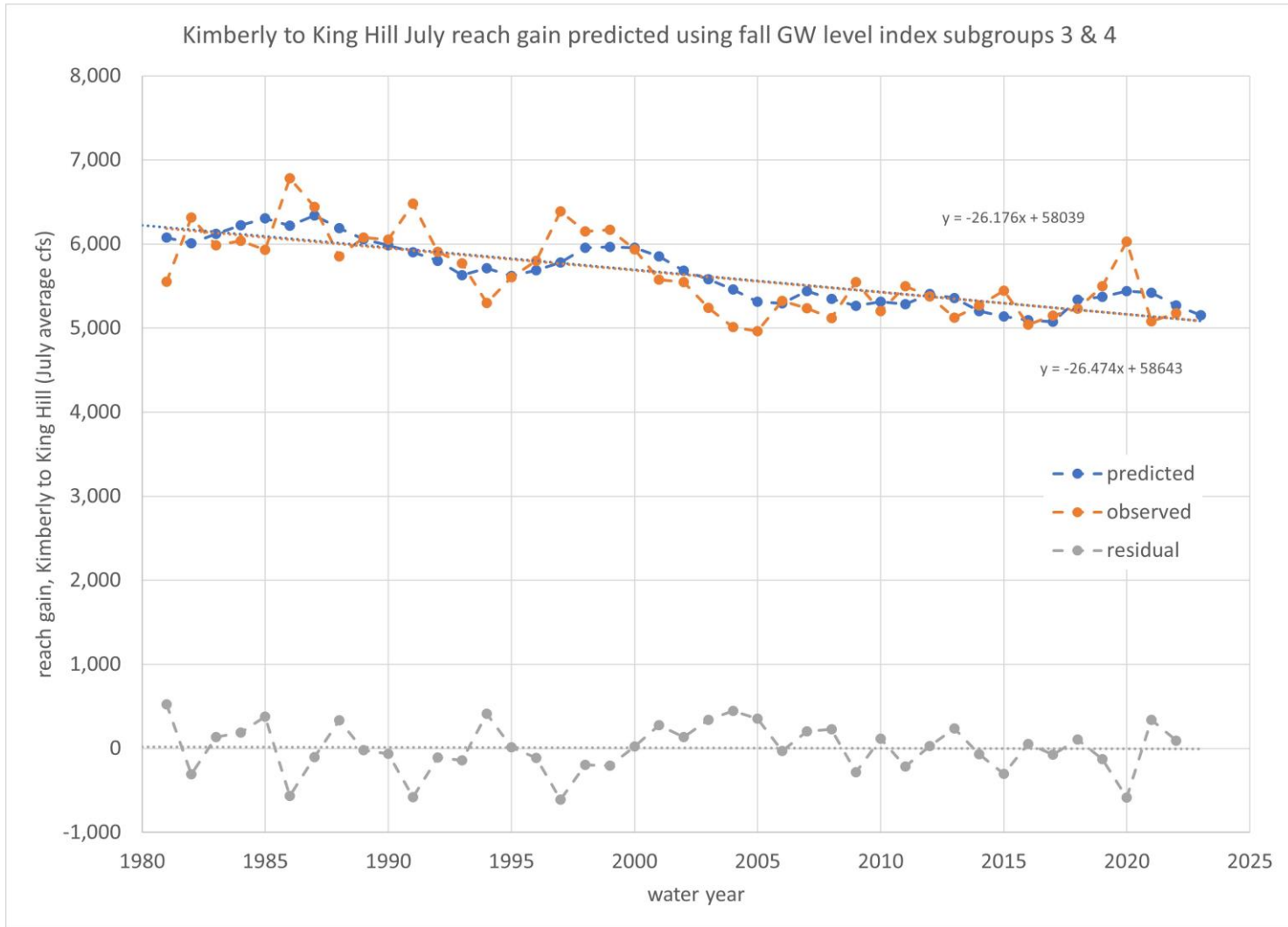
Correlation with ESPA discharge below Milner



Correlation with ESPA discharge below Milner



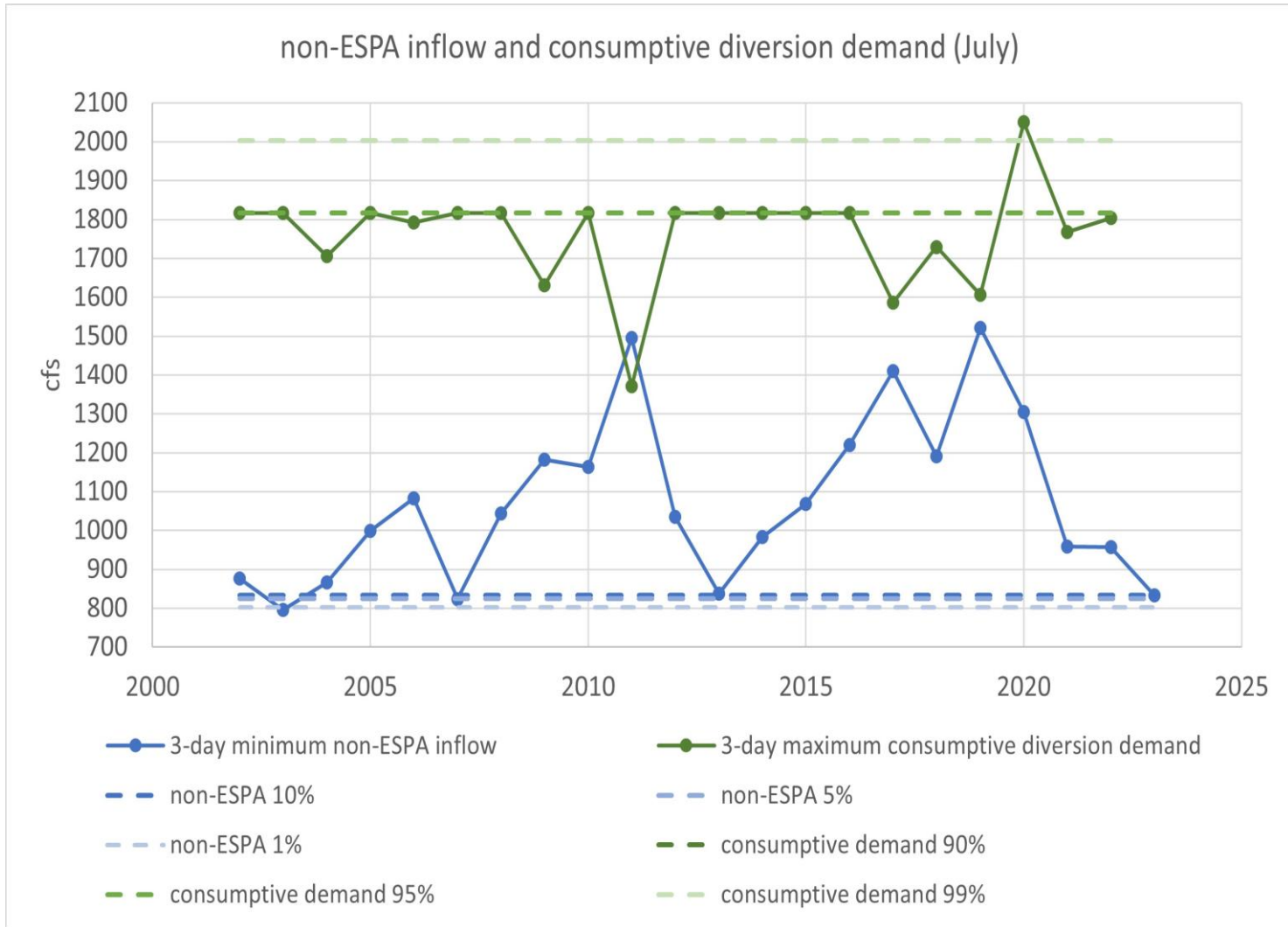
Prediction of ESPA discharge below Milner



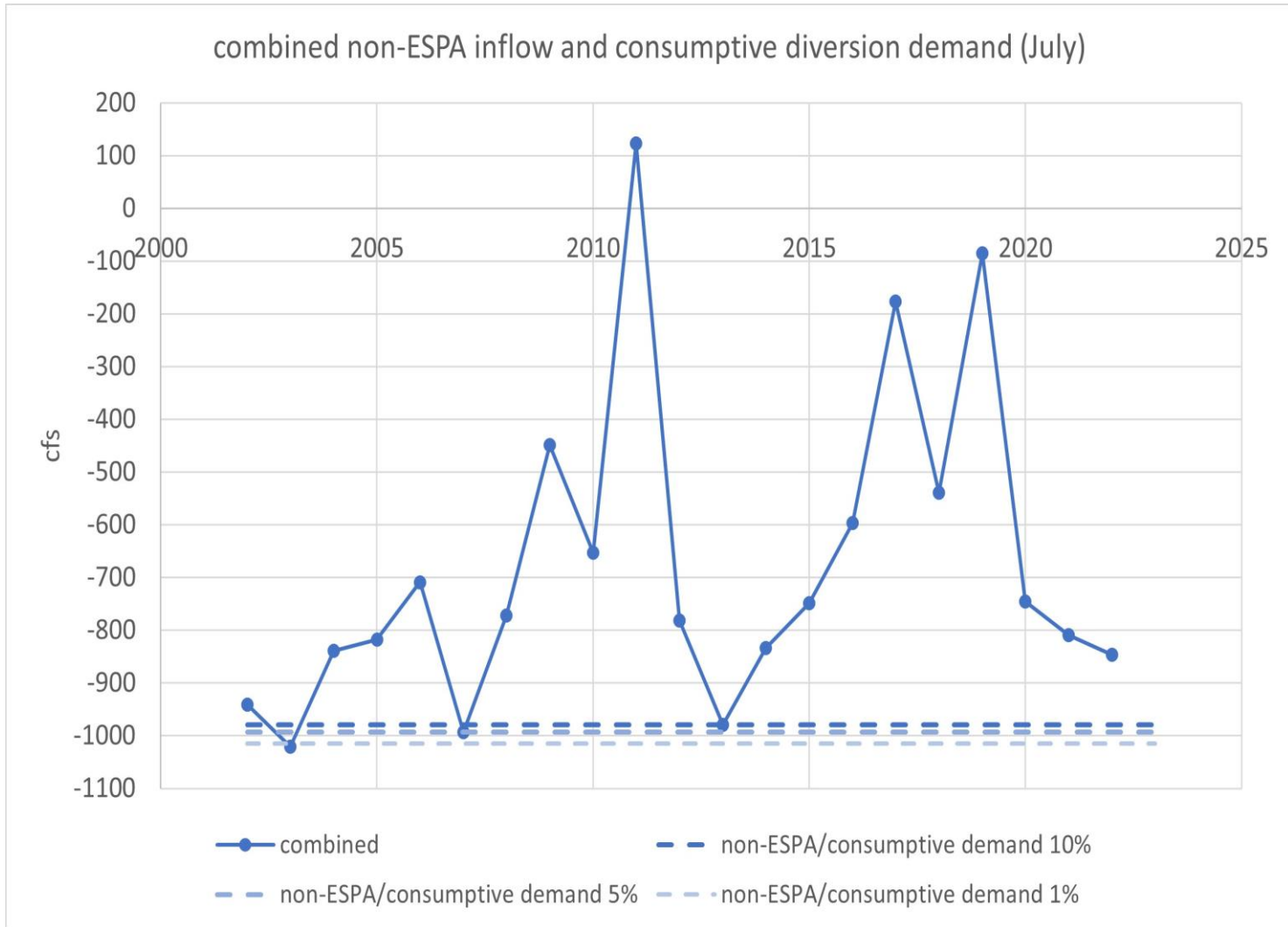
Proposal for response to SFIG question 5

- Develop a reasonably conservative target for ESPA discharge based on contribution of non-ESPA inflows and consumptive diversion demand to Swan Falls AADF
- Develop a reasonably conservative target for subgroup 3 & 4 fall groundwater level index based on ESPA discharge target and reach gain prediction residuals
 - Residuals represent contribution of Nov-Jun aquifer stresses and effects of gage error on correlation
- What is “reasonably conservative”?
 - Develop a range of options for SFIG to consider

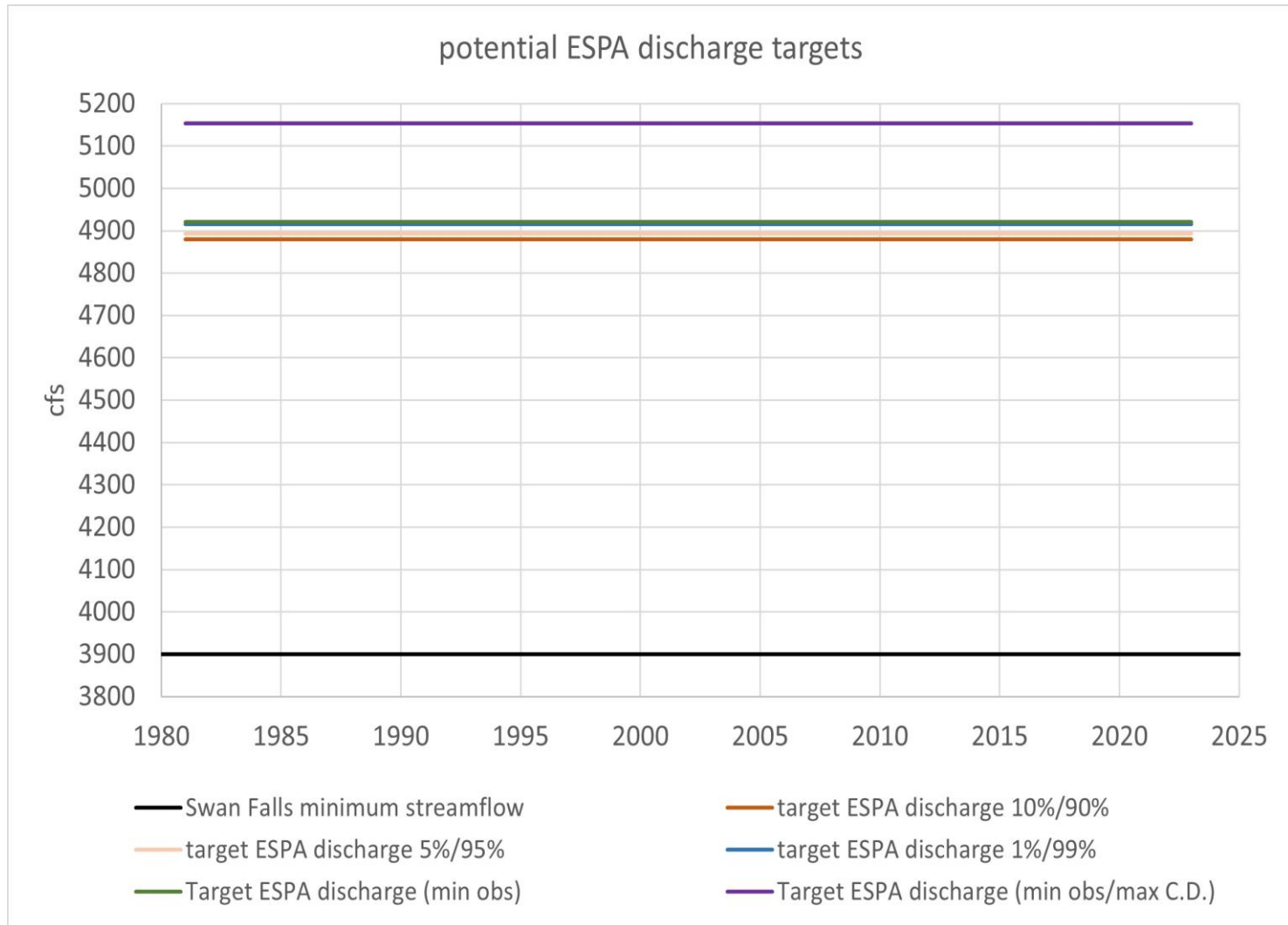
Non-ESPA contribution to Swan Falls AADF



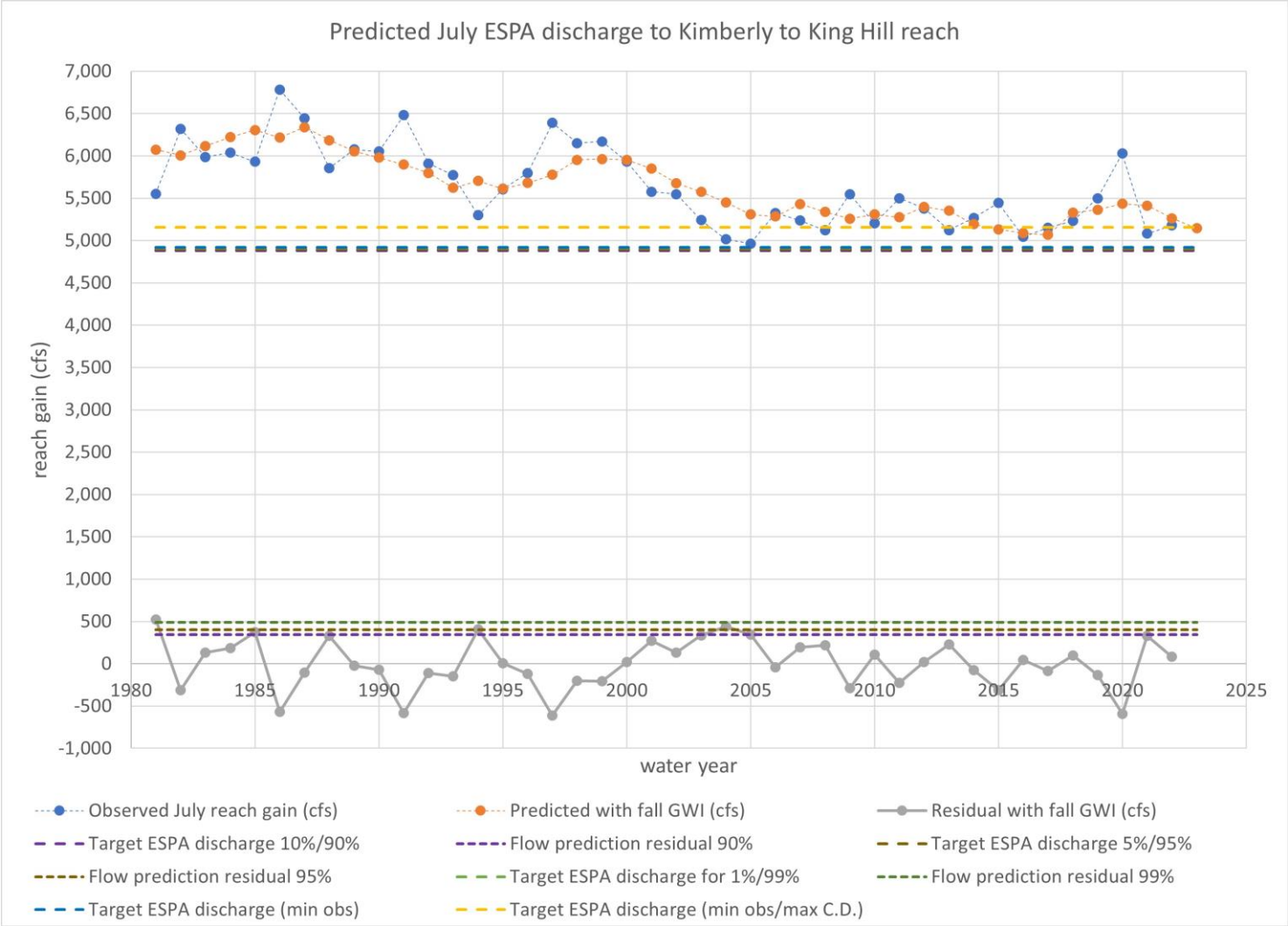
Non-ESPA contribution to Swan Falls AADF



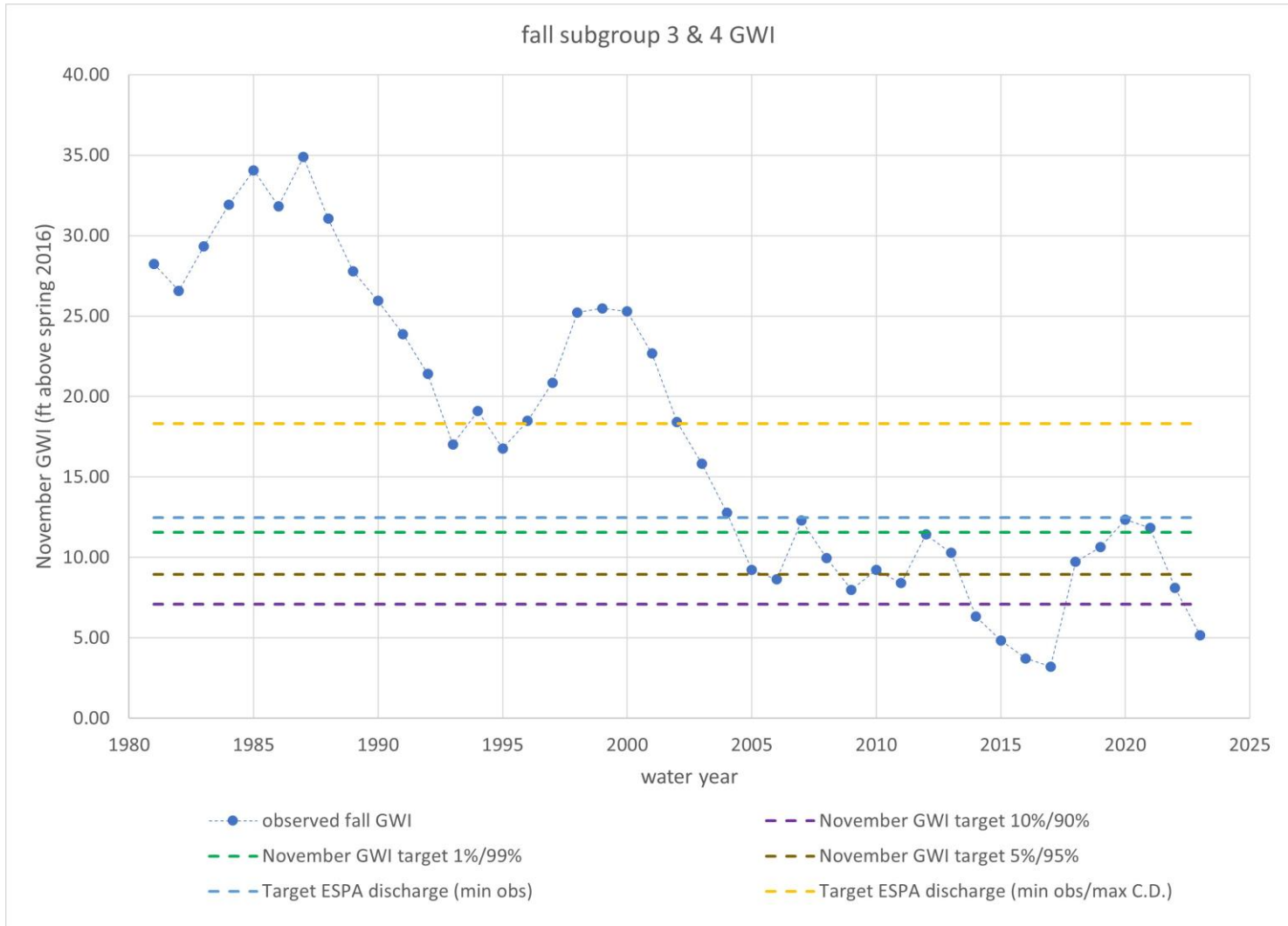
Target for minimum ESPA discharge below Milner



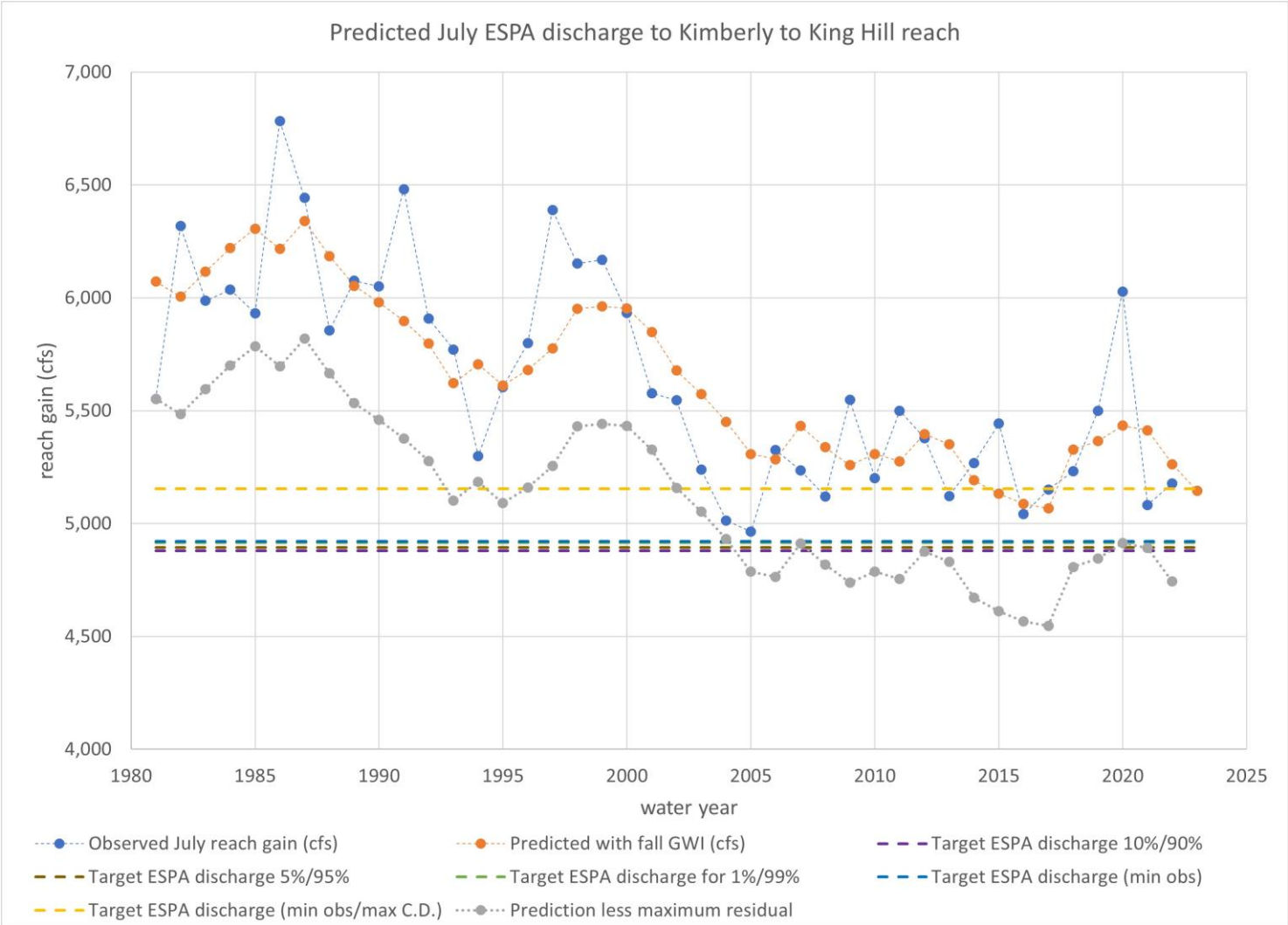
Residuals for prediction of July reach gain from subgroup 3 & 4 fall GWI



Potential targets for minimum fall Subgroup 3 &4 GWI



Years with risk of falling below minimum streamflow based on historic data



Potential targets for minimum fall Subgroup 3 &4 GWI

Case	Non-ESPA less consumptive demand (cfs)	ESPA discharge goal (cfs)	Flow prediction residual (cfs)	Target November GWI (ft)	Historic timeframe
90% exc.	-979	4,879	343	>7.1	~WY2014
95% exc.	-993	4,893	404	>8.9	~WY2005
99% exc.	-1,015	4,915	487	>11.5	~WY2004
Observed minimum	-1,020	4,920	521	>12.5	~WY2004
Observed min non-ESPA, observed max C.D.	-1,254	5,154	521	>18.3	~WY2002

Preliminary opinions

- Too much risk of falling below minimum streamflow
- Too conservative based on historic data
- Target should be evaluated and updated over time to incorporate future changes in water use practices
- Target is the minimum fall GWI to minimize risk of falling below the summer Swan Falls minimum streamflow

Corresponding minimum ESPA GWI and storage

Case	ESPA discharge goal (cfs)	Subgroup 3 & 4 Target November GWI (ft)	ESPA Target November GWI (ft)	ESPA Target for spring storage change from 1912 (AF) (Sy=0.075)
90% exc.	4,879	>7.1	>3.6	>4,400,000
95% exc.	4,893	>8.9	>5.2	>5,100,000
99% exc.	4,915	>11.5	>7.3	>6,200,000
Observed minimum	4,920	>12.5	>8.0	>6,600,000
Observed min non-ESPA, observed max C.D	5,154	>18.3	>12.8	>8,900,000

Preliminary opinions

- Too much risk of falling below minimum streamflow
- Too conservative based on historic data
- Target should be reviewed and updated over time to incorporate future changes in water use practices
- Target is the **minimum** fall GWI to minimize risk of falling below the summer Swan Falls minimum streamflow

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QUESTIONS AND DISCUSSION