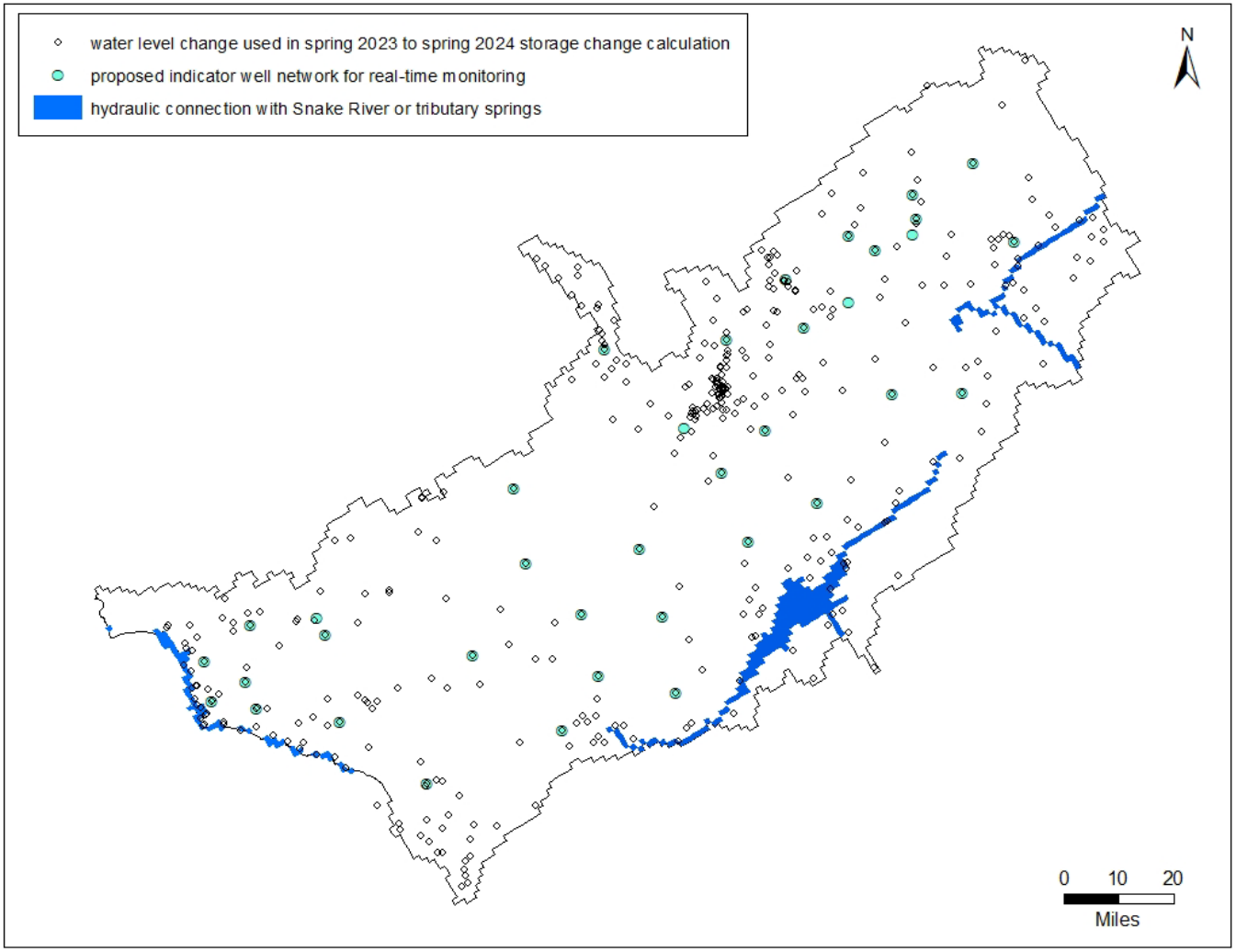
Question 5 draft memorandum, notes for TWG comment discussion

February 11, 2025

Re: Sigstedt comment, page 6



Re: Sigstedt comment, page 6

- measurements from 406 wells were used in Mike McVay's spring 2023-2024 storage change calculation (list provided for TWG)

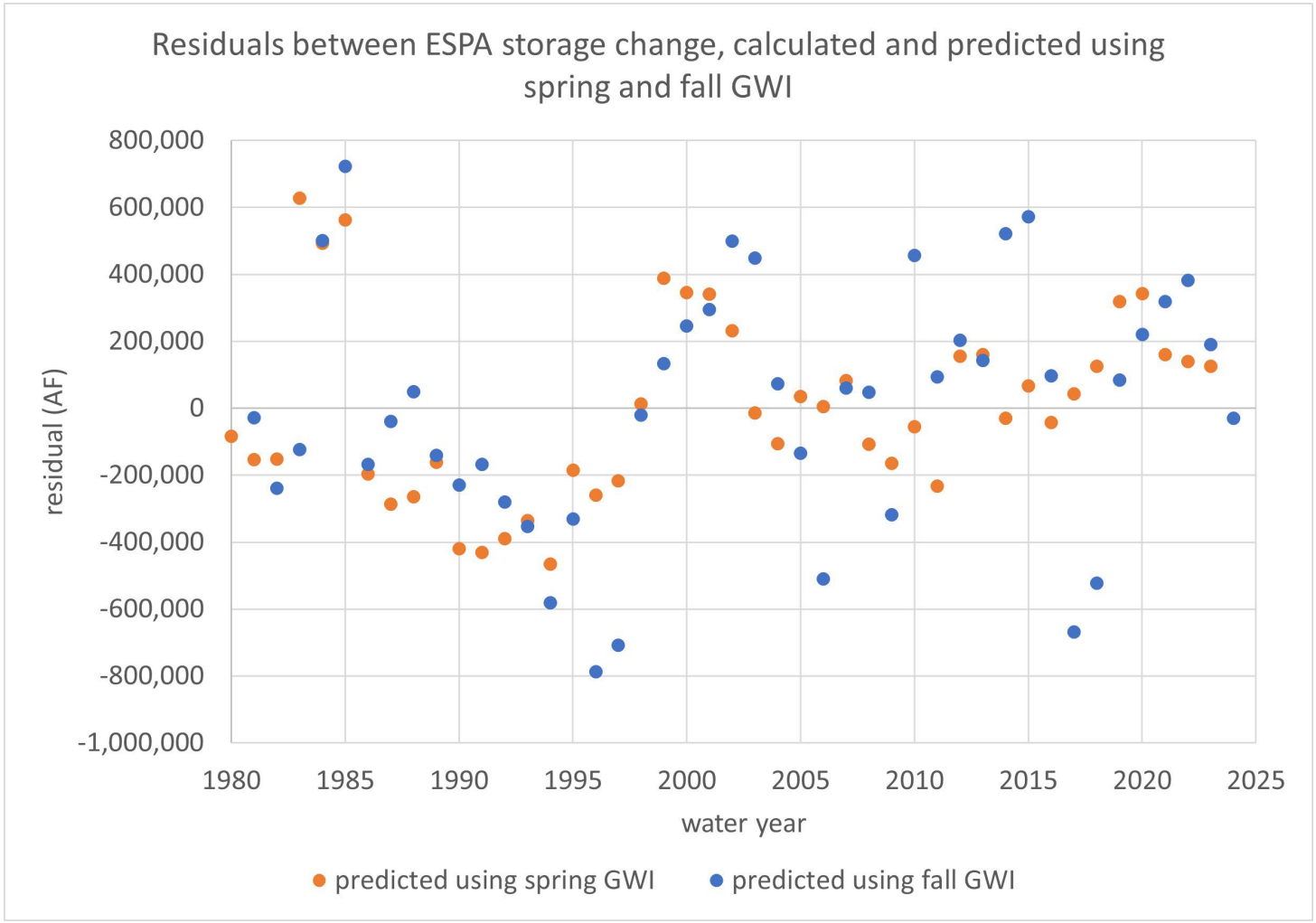
- each well has a different period of record (IDWR database download provided for TWG)

- proposed indicator wells were selected based on:
  - availability of historic measurements (period of record, number of measurements)
  - well use
  - feasibility of equipping with pressure transducer and telemetry
  - INL wells already monitored by USGS with pressure transducers (and in some cases telemetry) - data available from https://waterdata.usgs.gov/state/idaho/
- purpose is to provide real-time or near real-time indicator of aquifer status, not intended to replace the annual storage change calculation

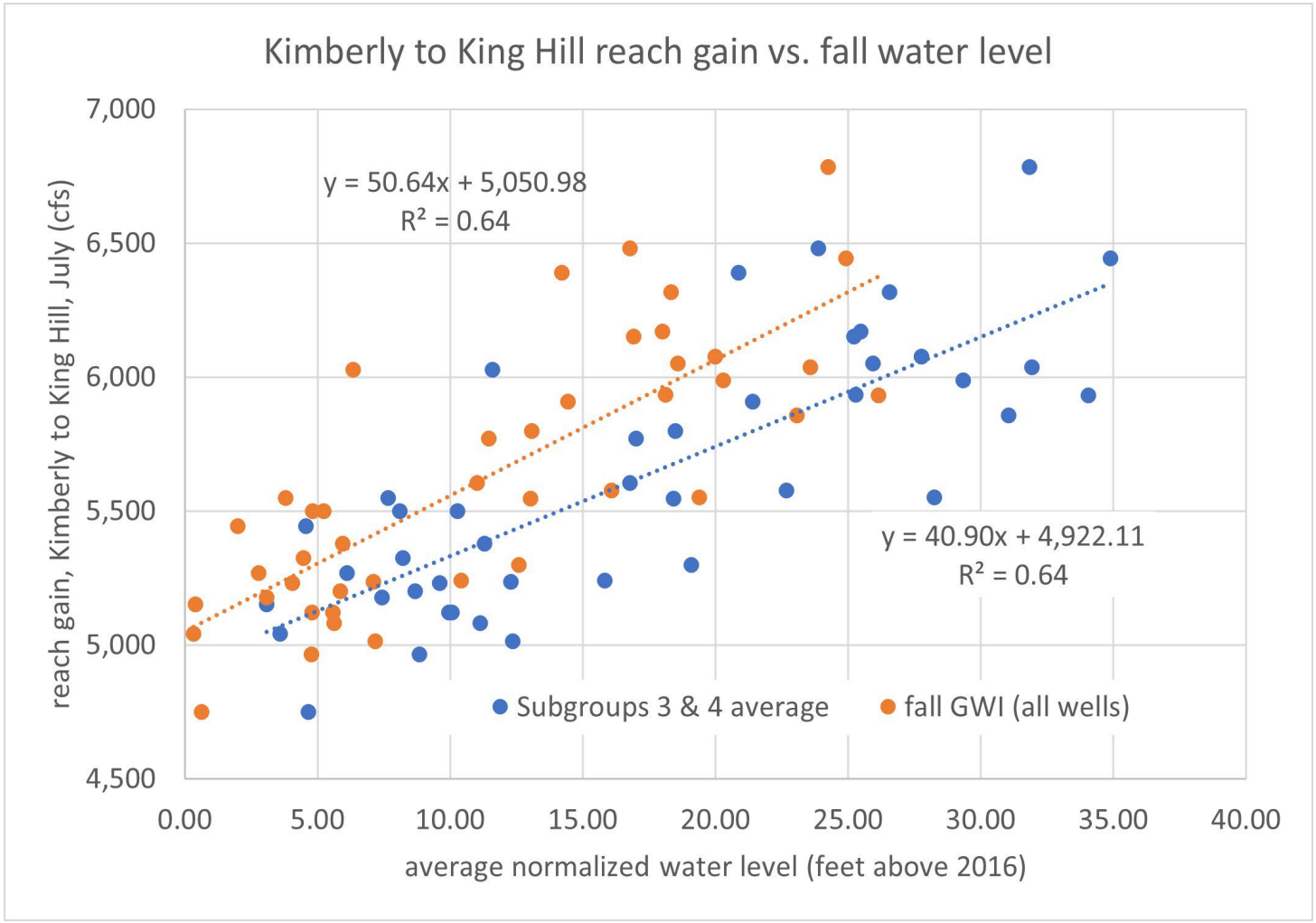
Re: IPCO comment, page 6

- selection of datum for normalizing water levels
  - spring 2016 was selected
    - measurements available for all wells
    - coincides with recent low in calculated spring aquifer storage volume change (not lowest level in all wells)
  - wells vary regarding when lowest measurement occurred
  - selecting a different datum with measurements available for all wells would yield similar results with shift equal to difference in datums

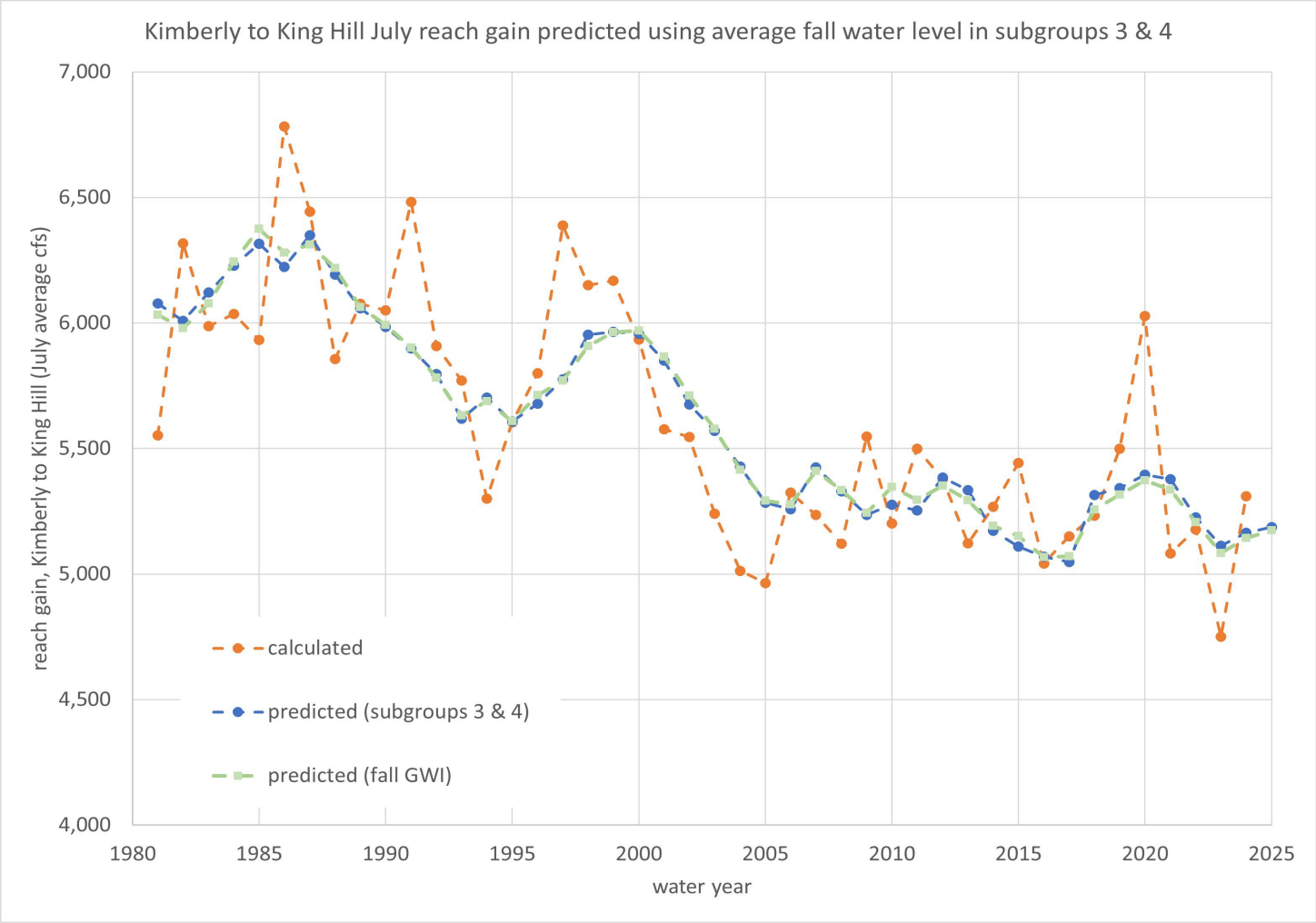
Re: IPCO comment, page 11



Re: IPCO comment, page 16



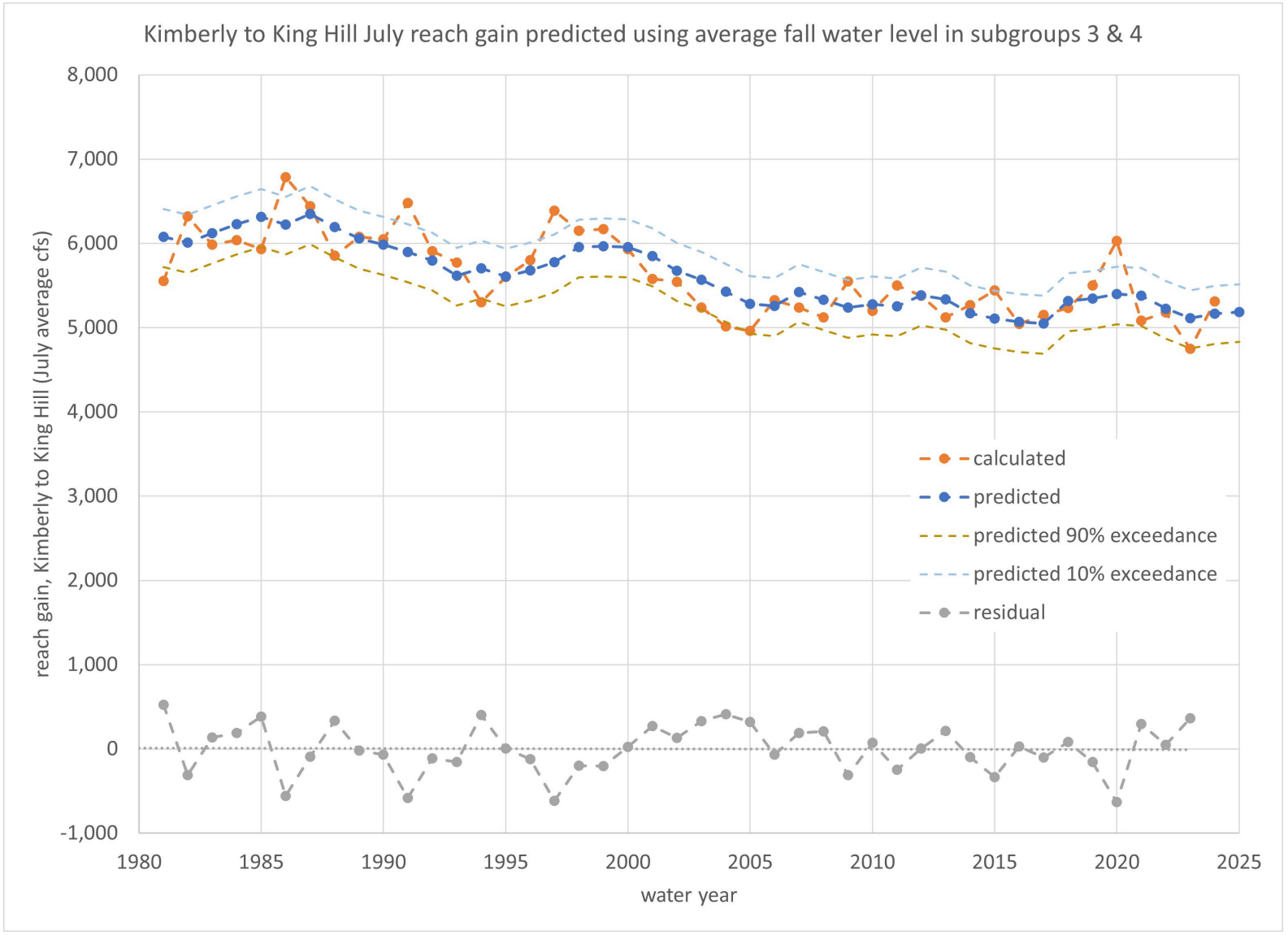
Re: Sigstedt comment, page 20



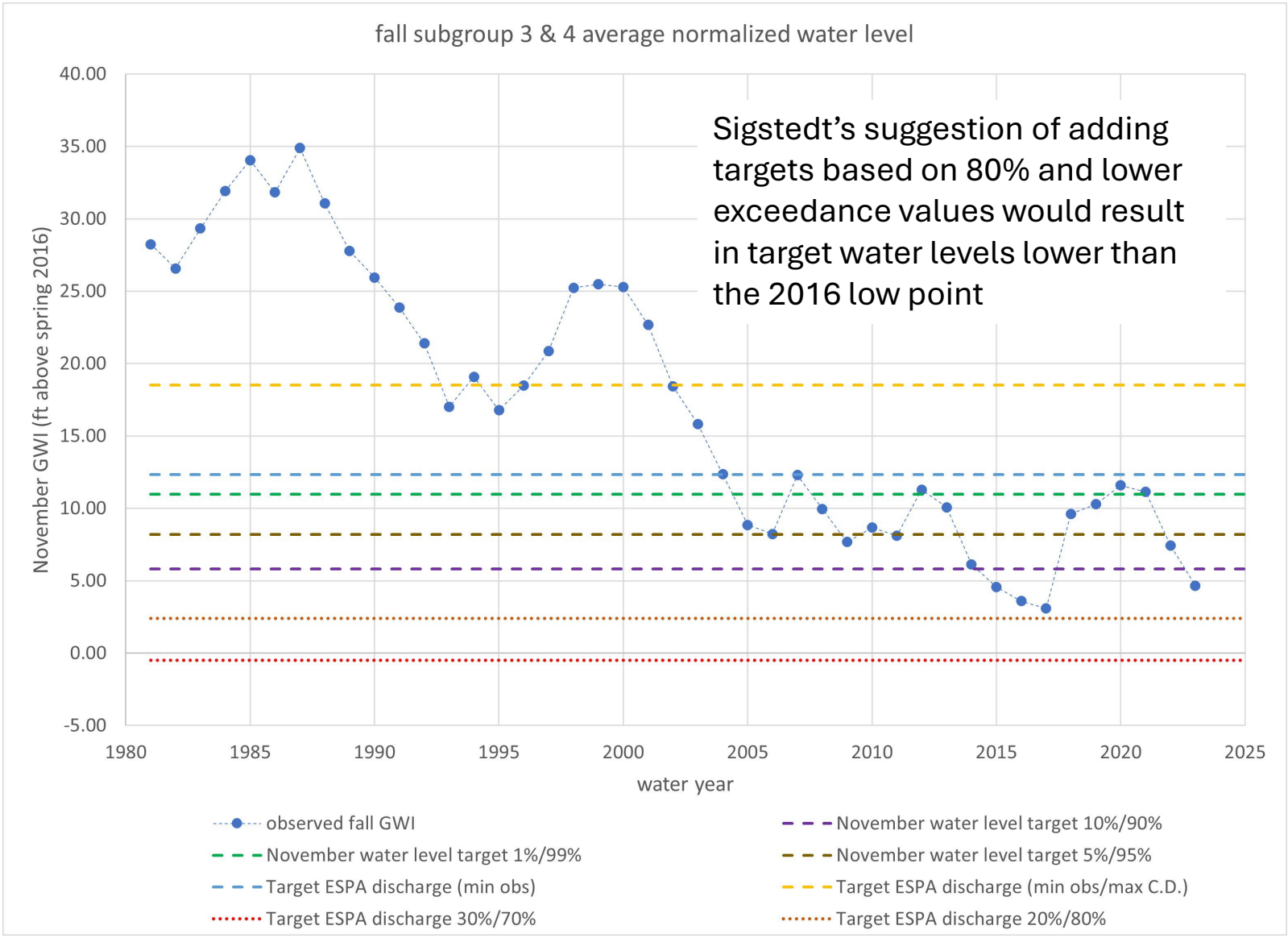
Re: IPCO and Sigstedt comment, page 20

- Is R^2 = 64% acceptable?
  - it may be the best we can do using a correlation method given the reach gain measurement uncertainty and the variability in aquifer recharge that will occur between fall and July
  - residuals from the historic relationship indicate how far off the prediction may be and how likely we are to be within a given range – range is wide (see figure on next slide)
  - TWG members have the opportunity to submit alternate approaches

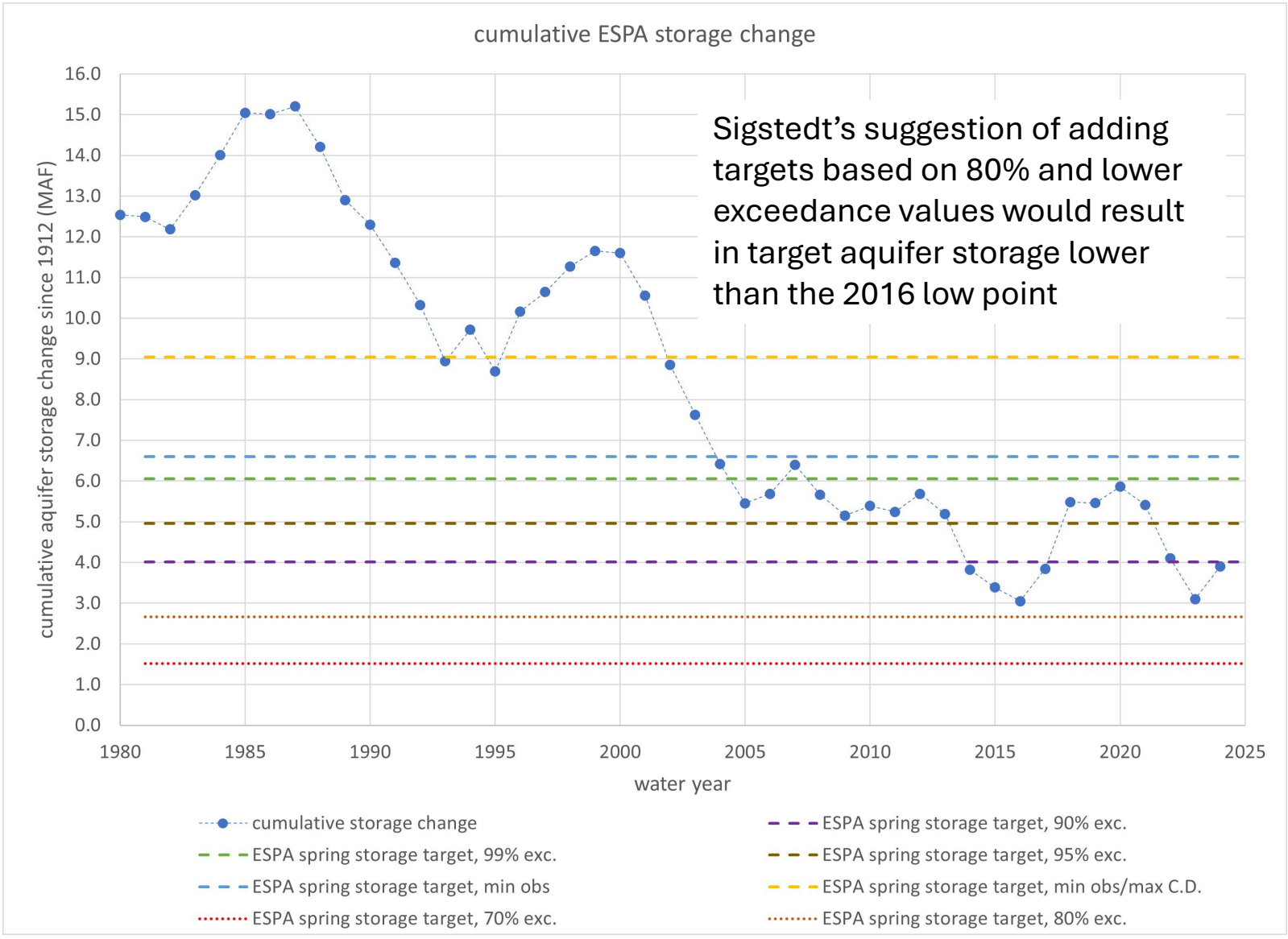
Re: IPCO comments, page 20



Re: Sigstedt comments, pages 22-23



Re: Sigstedt comments, pages 22-23

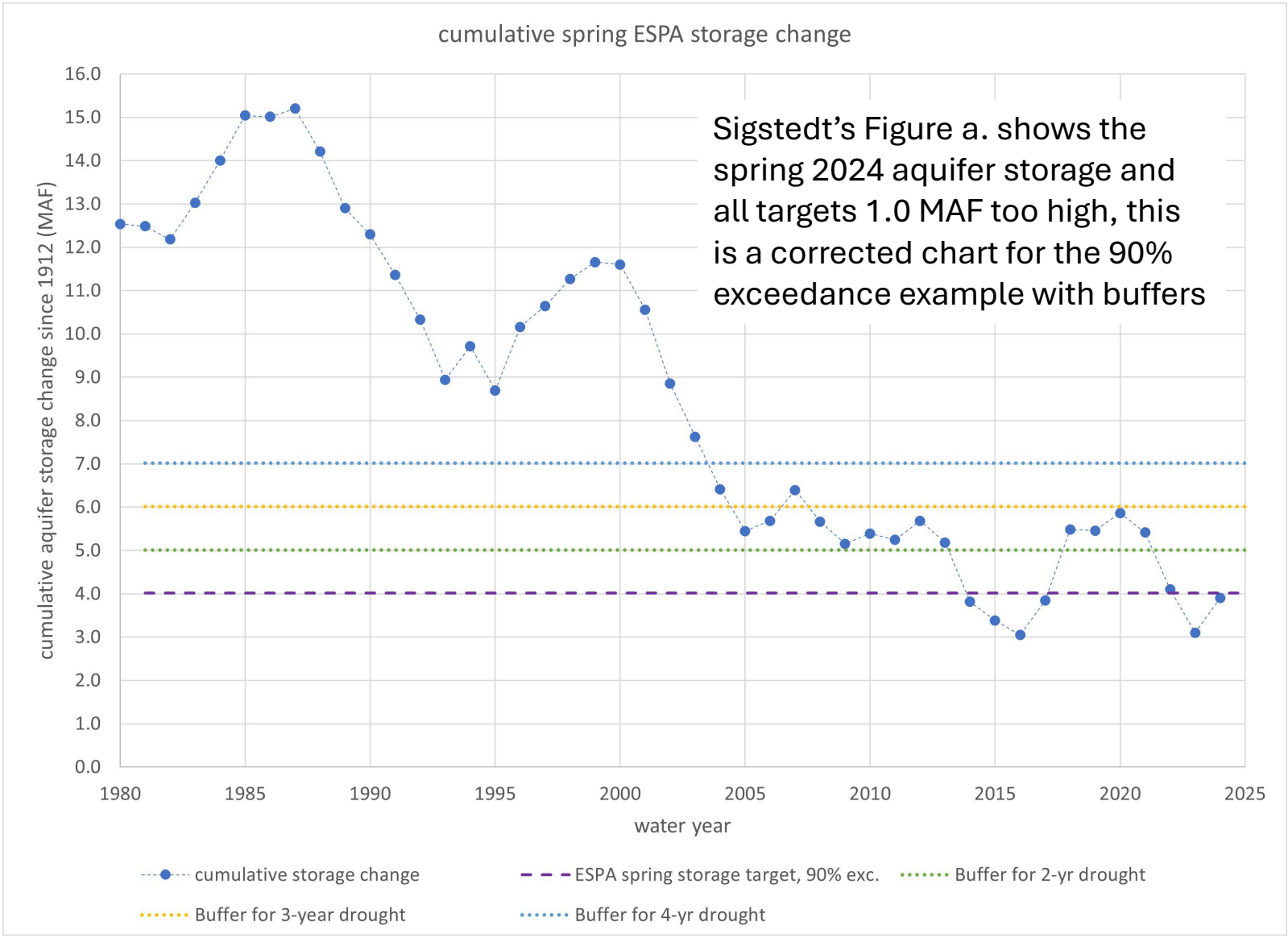


Re: Sigstedt comments, page 23

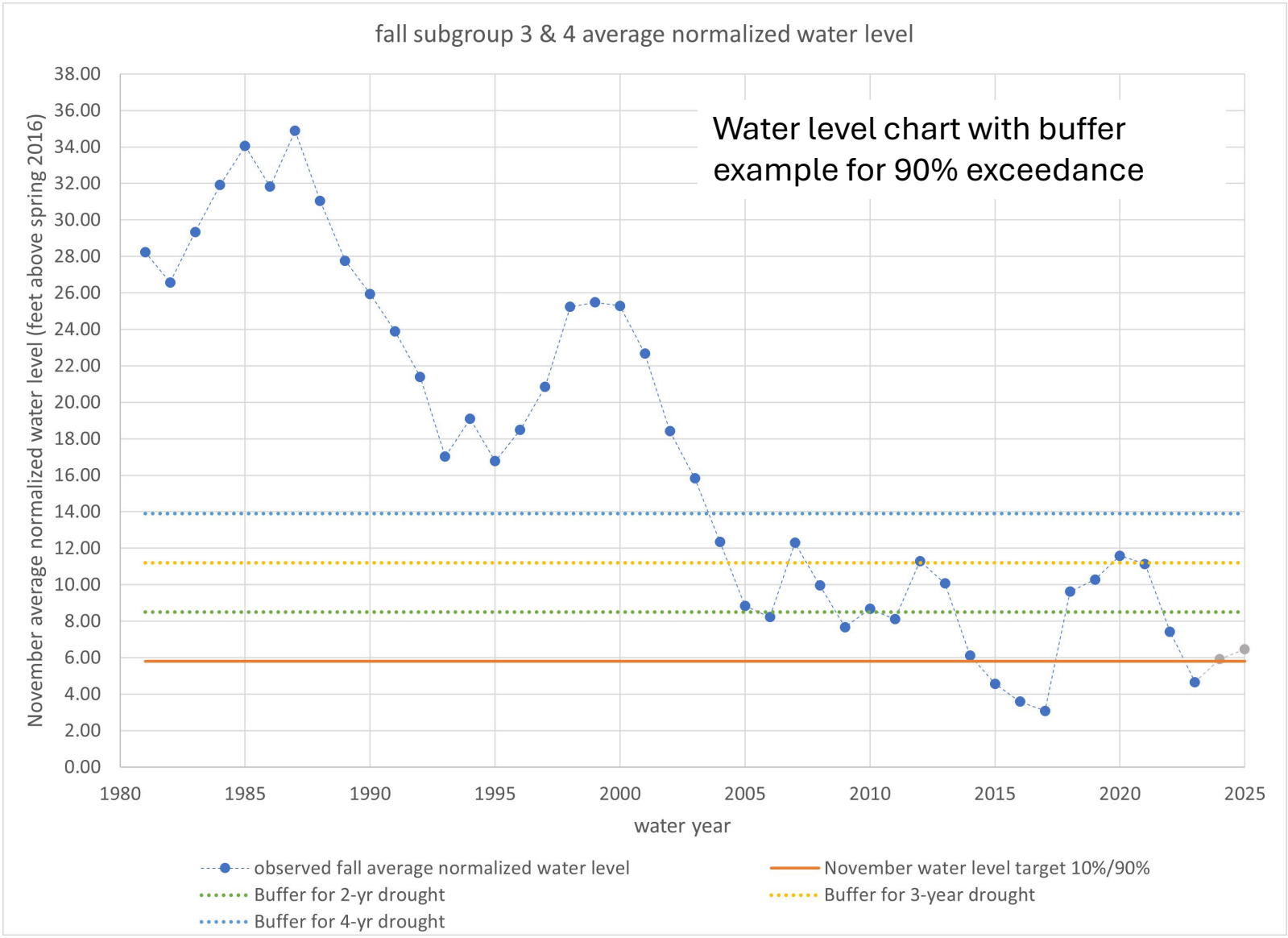
- 2020-2022 drought in Table 7 reflects aquifer management practices similar to current, could add those averages to Table

Table 7. Historic declines in ESPA storage and water levels during recent multi-year droughts				
Drought period	Years	subgroups 3&4 fall water level change (ft)	ESPA fall GWI change (ft)	ESPA storage change (MAF)
1987 - 1992	6	-17.9	-13.4	-6.3
2000 - 2004	5	-16.4	-13.4	-6.2
2012 - 2015	4	-7.7	-5.6	-2.6
2020 - 2022	3	-6.9	-5.7	-2.7
average change during drought years	18 years	-2.7 ft/yr	-2.1 ft/yr	-1.0 MAF/yr
average change 2020 – 2022	3 years	-3.3 ft/yr	--1.9 ft/yr	-0.9 MAF/yr

Re: Sigstedt comments, pages 23-24



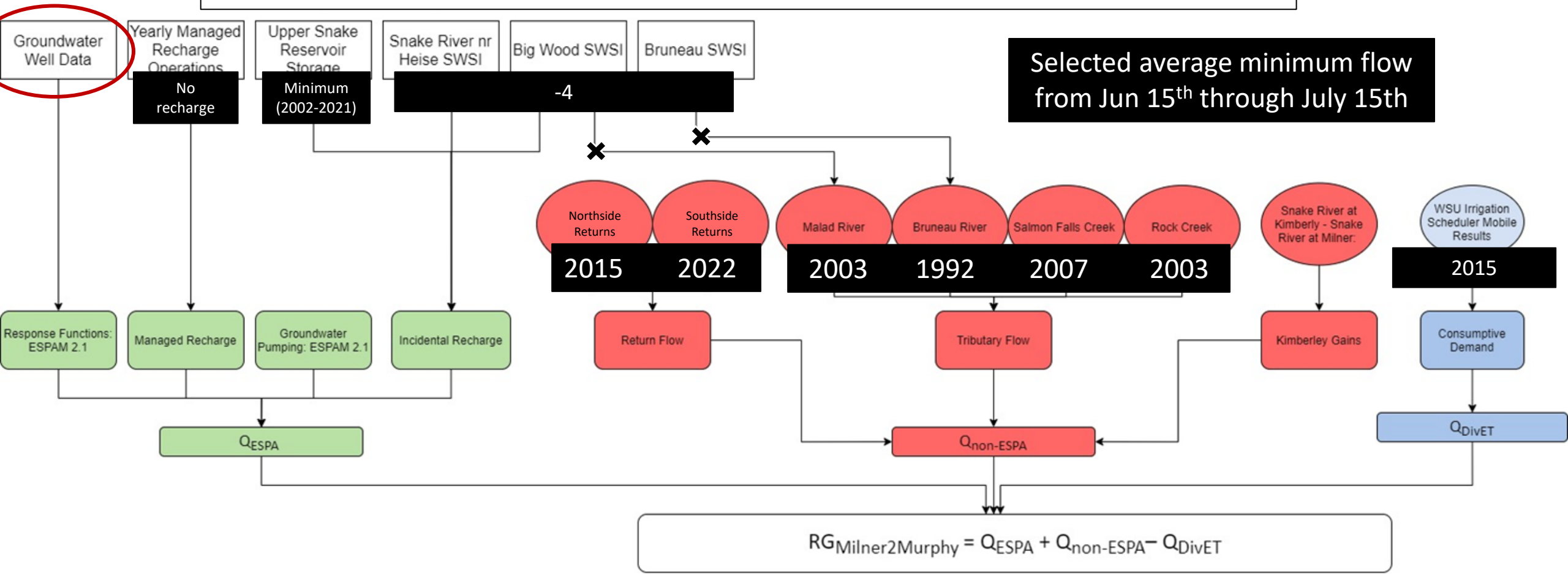
Re: Sigstedt comments, pages 23-24



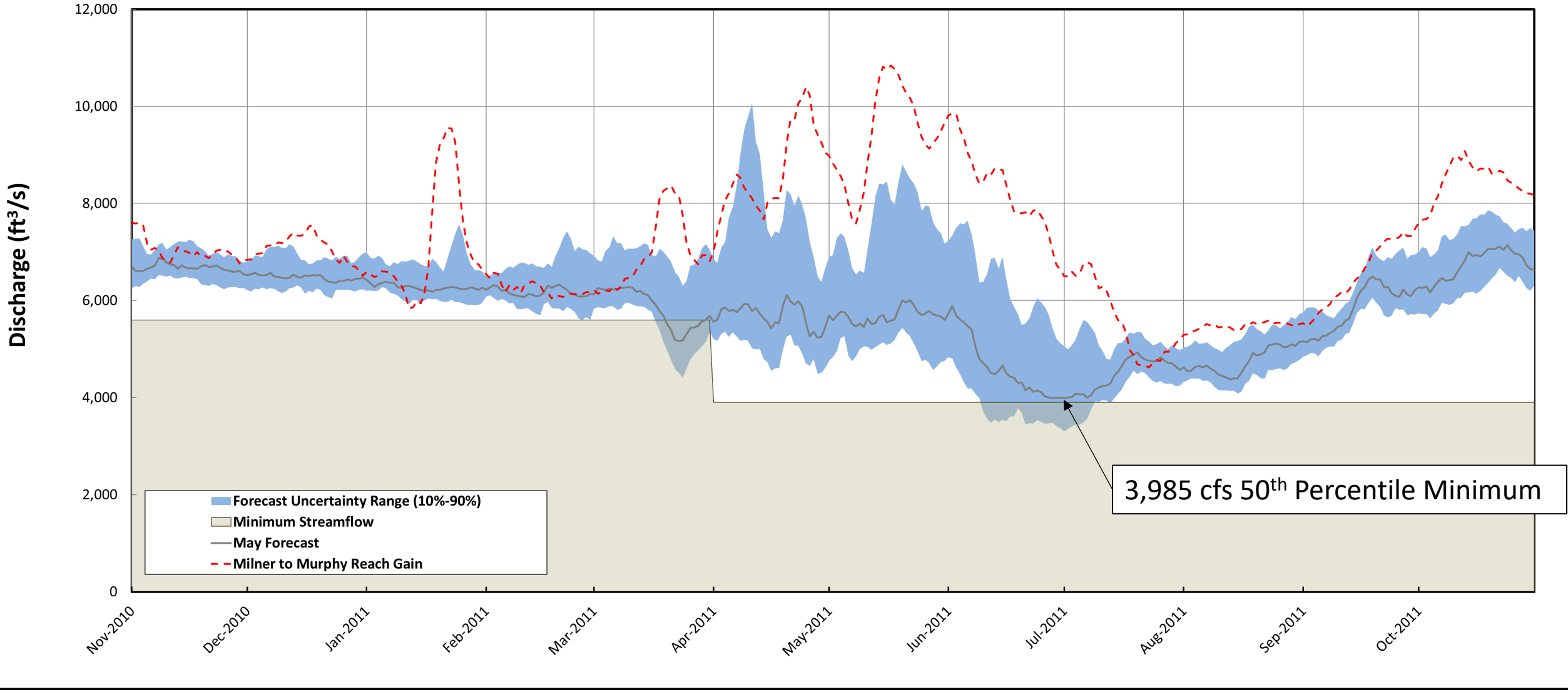
SFIG Q5

- Sophia Sigstedt Comment #5
- referenced March 16th, 2023, presentation
- That analysis used the Spring forecast tool to Hindcast from 2002-2022 for different scenarios
  - Scenario reference was “Minimum years” – lowest individual years
  - Used the 50th percentile and plotted against Spring Water Level head change

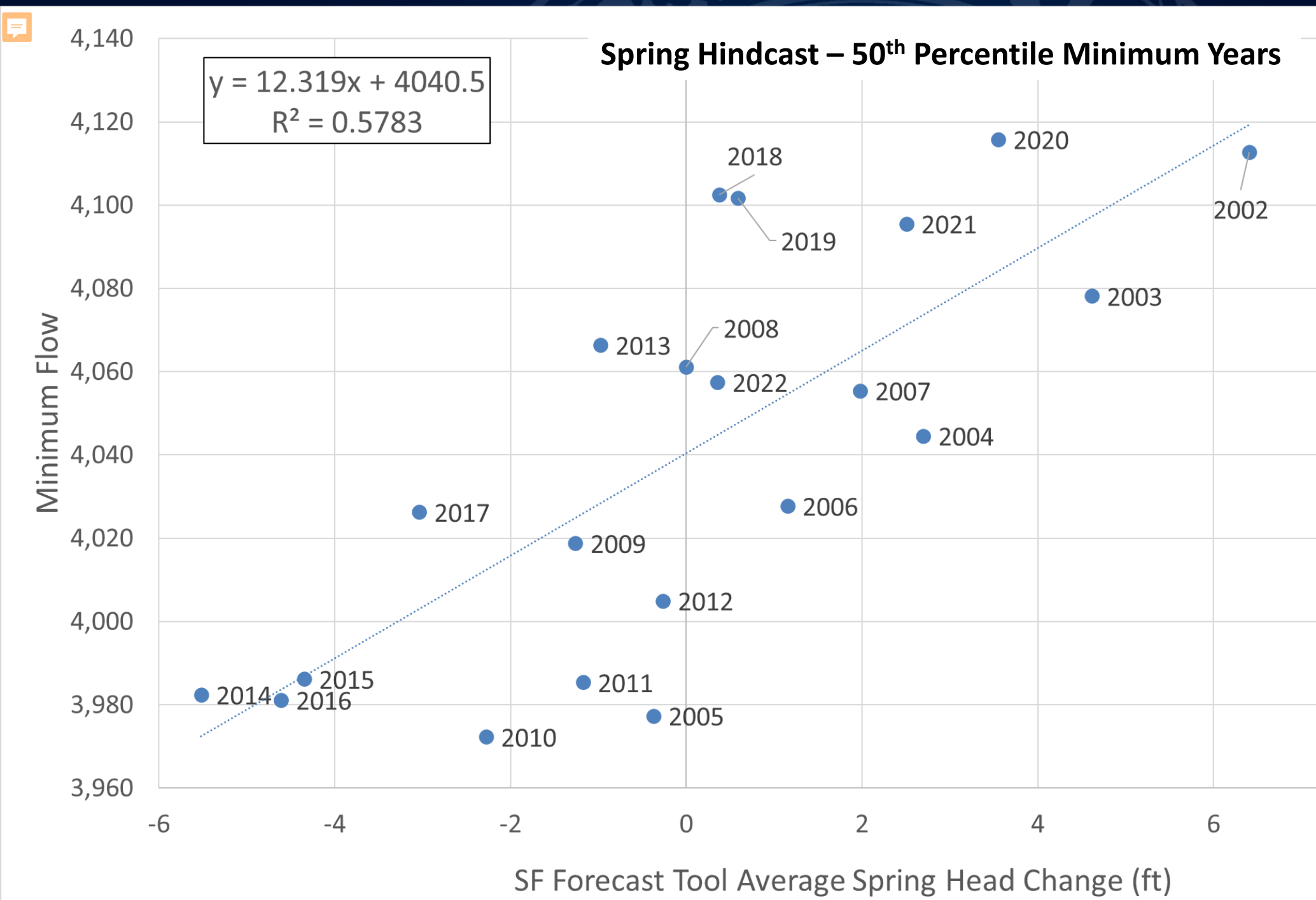
Swan Falls Forecast Tool (SFFT) Inputs



2011 Spring Hindcast – Minimum Years

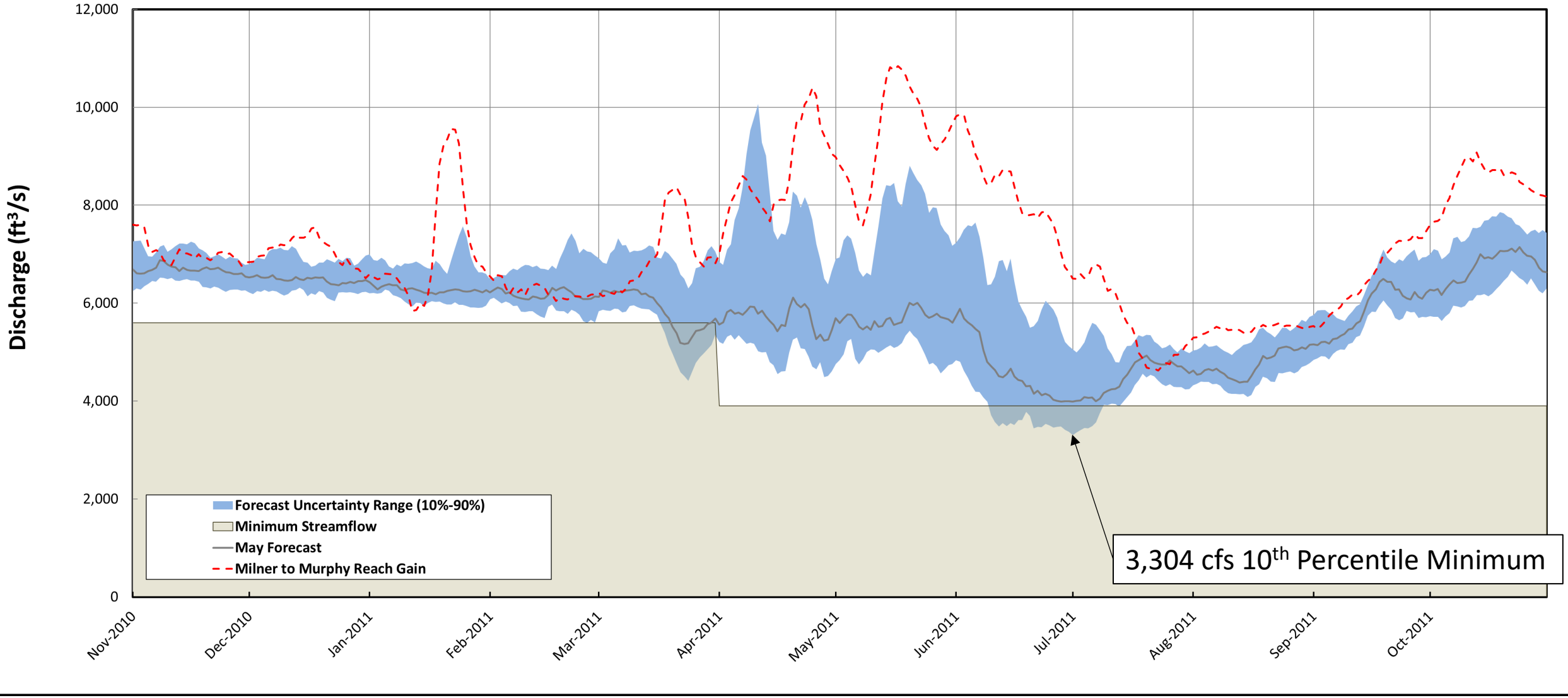


Spring Hindcast – 50th Percentile Minimum Years

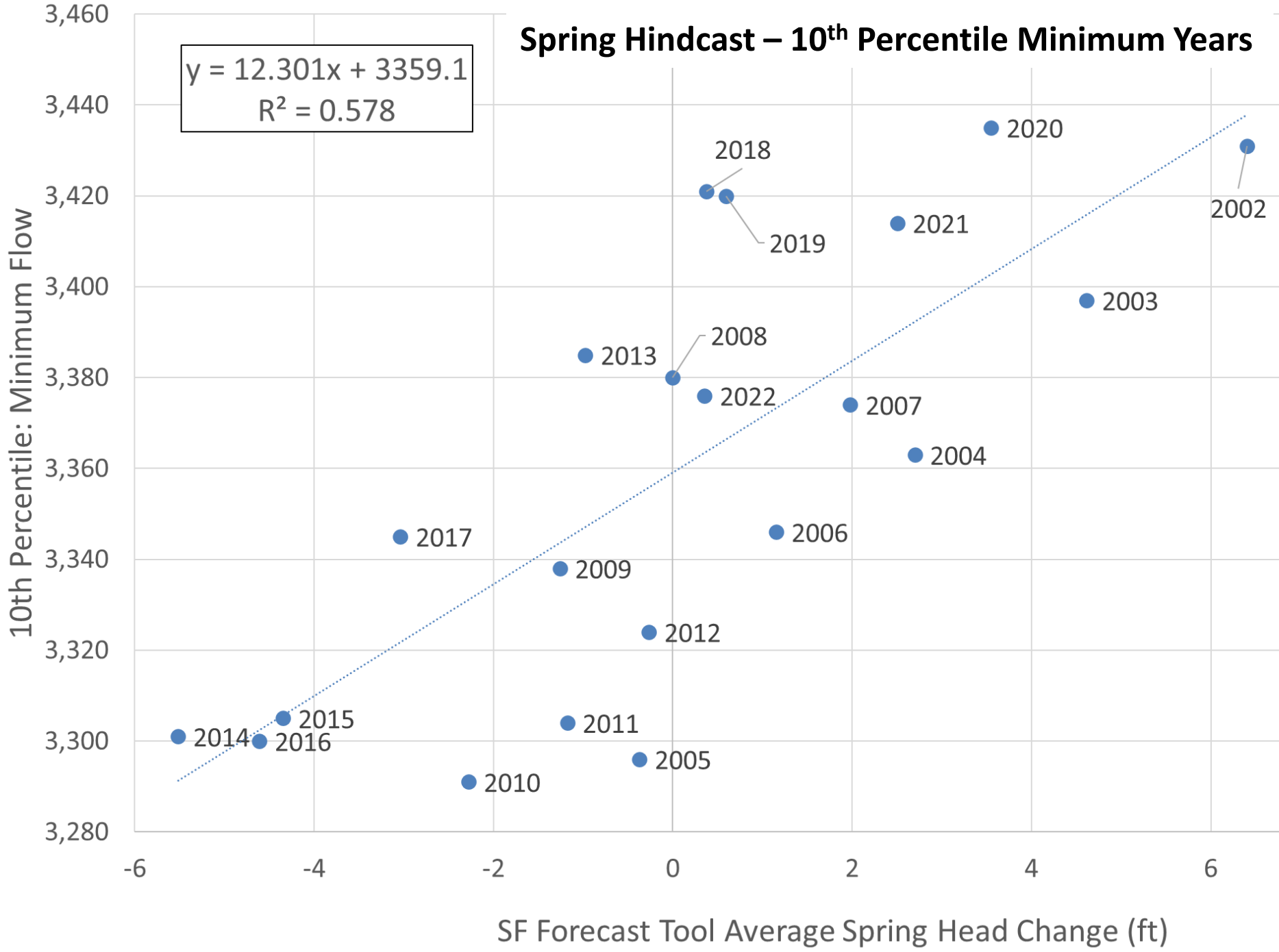


	Spring Water Level Change	Minimum Forecasted Flow (50%)
2002	6.4	4113
2003	4.6	4078
2004	2.7	4045
2005	-0.4	3977
2006	1.2	4028
2007	2.0	4055
2008	0.0	4061
2009	-1.3	4019
2010	-2.3	3972
2011	-1.2	**3985**
2012	-0.3	4005
2013	-1.0	4066
2014	-5.5	3982
2015	-4.3	3986
2016	-4.6	3981
2017	-3.0	4026
2018	0.4	4103
2019	0.6	4102
2020	3.6	4116
2021	2.5	4096
2022	0.4	4057

2011 Spring Hindcast – Minimum Years



Spring Hindcast – 10th Percentile Minimum Years



	Spring Water Level Change	Minimum Forecasted Flow (10%)
2002	6.4	3431
2003	4.6	3397
2004	2.7	3363
2005	-0.4	3296
2006	1.2	3346
2007	2.0	3374
2008	0.0	3380
2009	-1.3	3338
2010	-2.3	3291
2011	-1.2	**3304**
2012	-0.3	3324
2013	-1.0	3385
2014	-5.5	3301
2015	-4.3	3305
2016	-4.6	3300
2017	-3.0	3345
2018	0.4	3421
2019	0.6	3420
2020	3.6	3435
2021	2.5	3414
2022	0.4	3376

SFIG Q5

- Sophia Sigstedt Comment #5
- referenced March 16th, 2023, presentation
- That analysis used the Spring forecast tool to Hindcast from 2002-2022 for different scenarios
  - Scenario reference was “Minimum years” – lowest individual years
  - Used the 50th percentile and plotted against Spring Water Level head change
  - We discussed that Minimum years were probably not the most representative
  - Also discussed how we were going to handle the uncertainty range – ultimately moved on to using a minimum 3-day average of observed values
    - Easier to explain using that minimum 3-day average of observed values and ESPAM 2.2 directly.

IPC Comment

- A range of conditions were analyzed for non-ESPA inflow and consumptive diversion demand between 2002 – 2022 for the month of July
  - Comment: “Does July produce the lowest net change? Do we need to confirm that June or August don’t produce a lower value?”

- Non-ESPA inflow 2002-2022
  - 16 years, July produces the lowest value
  - 4 years, June (>24th) produces the lowest value (Average 81 cfs lower)
  - 1 year, August (1st) produces the lowest value
- Kimberly to King Hill monthly Reach Gain 2002-2022
  - 13 years, July is the lowest
  - 8 years, June is lower (Average 120 cfs lower)