MAY ADVISORY COMMITTEE MEETINGS

Scott Valley Groundwater Advisory Committee Meeting

LARRY WALKER ASSOCIATES
science | policy | solutions

Stantec

Agenda

- Recap on sustainable management criteria
- Progress to date, schedule through Fall 2024
- Implementation Project Updates
  - SVID Recharge
  - Ditch Infiltration Studies
  - Additional Projects- Discussion
- Upland Management
- Irrigation Workshop Recap

Timeline – To Date

2023 Q3

- Formation of work groups in August AC Meetings
- Work groups approve draft project scope and schedule
- Final grant awards expected in September

2023 Q4

- October AC Meetings- review of final funding awards
- Detailed scope and schedule for funded projects provided to Advisory Committee

2024 Q1

- February AC Meetings- updates from project work groups, updates depend on individual project schedules
- SGMA Compliance- Annual Report for WY 2023

2024 Q2

- May AC Meetings- update on implementation projects, upland management project discussion

Timeline through Fall 2024

2024 Q3

- Summer sample collection
- Select upland management project and preliminary monitoring design plan
- Continue development of well inventory
- August AC Meetings

2024 Q4

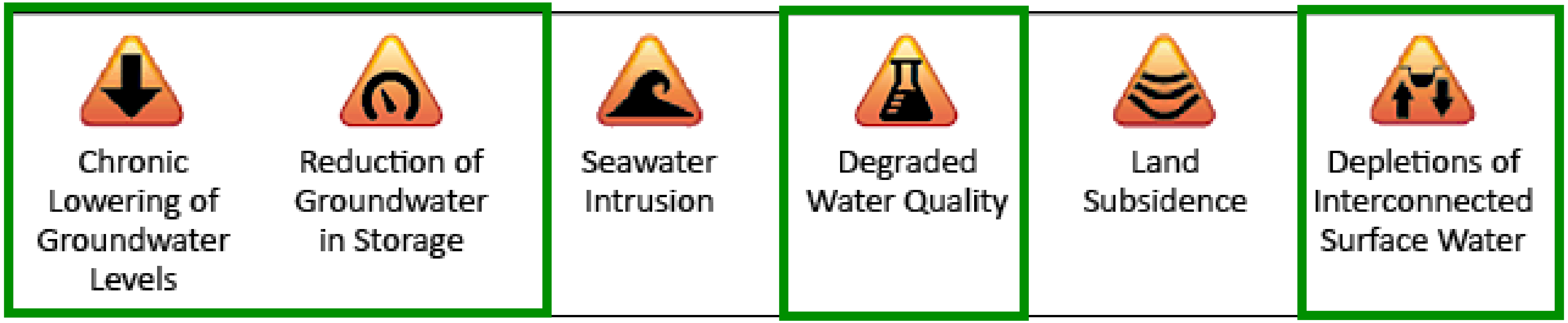
- Preliminary Database Management System (DMS)
- Model scenario results with different management actions
- October AC Meetings

Jan 1	Feb 1	Mar 1	Apr 1	May 1	Jun 1	Jul 1	Aug 1	Sept 1	Oct 1	Nov 1	Dec 1	Dec 31

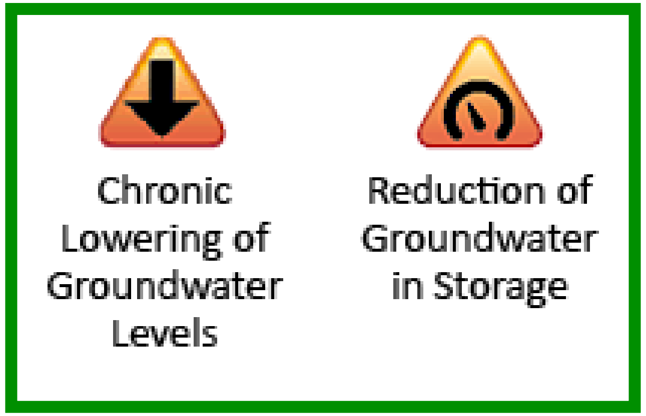
In Progress	Added to Backlog
Complete	Blocked

Implementation Grant Progress *Through February 2024*

#	Component	Notes	Status
1	**SGMA Compliance and GSP Updates**		
1.1	GSP Revisions	Due January 2027	In Progress
1.2	Reporting (Data and Annual Report)	Annual Reports due April 1 of each year	In Progress
1.3	Model Updates and Scenario Evaluation		In Progress
1.4	Data Gaps and Monitoring Expansion and DMS		In Progress
2	**Fee Study and Economic Analysis**		
2.1	Evaluation of Fee/Rate Options and Schedule Development		Not Started
2.2	Parcel scale groundwater use estimate		In Progress
2.3	Economic Analysis		Not Started
3	**Well Inventory**		
3.1	Database Development and Well Risk Assessment		In Progress
3.2	Monitoring Well Construction or Well Instrumentation		Not Started
4	**Irrigation Ditch Recharge Projects**		
4.1	Planning/Permitting, Installation of Monitoring Infrastructure	Diversion permits, diversion infrastructure, flowmeters	In Progress
4.2	Monitoring and Data Analysis, Annual Diversion Reports	Biological monitoring, flow measurements, water quality	In Progress
5	**Upland Management**		
5.1	Project Planning and Environmental Documentation	Develop workplan	Not Started
5.2	Monitoring Design, Data Collection, and Data Analysis	Assess monitoring needs,	Not Started



Sustainable Management Criteria



Minimum/ Maximum Threshold	Measurable Objective	Undesirable Result
Historic maximum depth to water measurement **prior to 2015 with a buffer of 10% of historic max depth or 10 feet**, whichever is smaller.	**75th percentile of the fall measurement range** (i.e., water levels >25% of historic record).	The fall low water level observation in any of the representative monitoring sites in the Basin **falls below the respective minimum threshold for 2 consecutive years**.

Degraded Water Quality

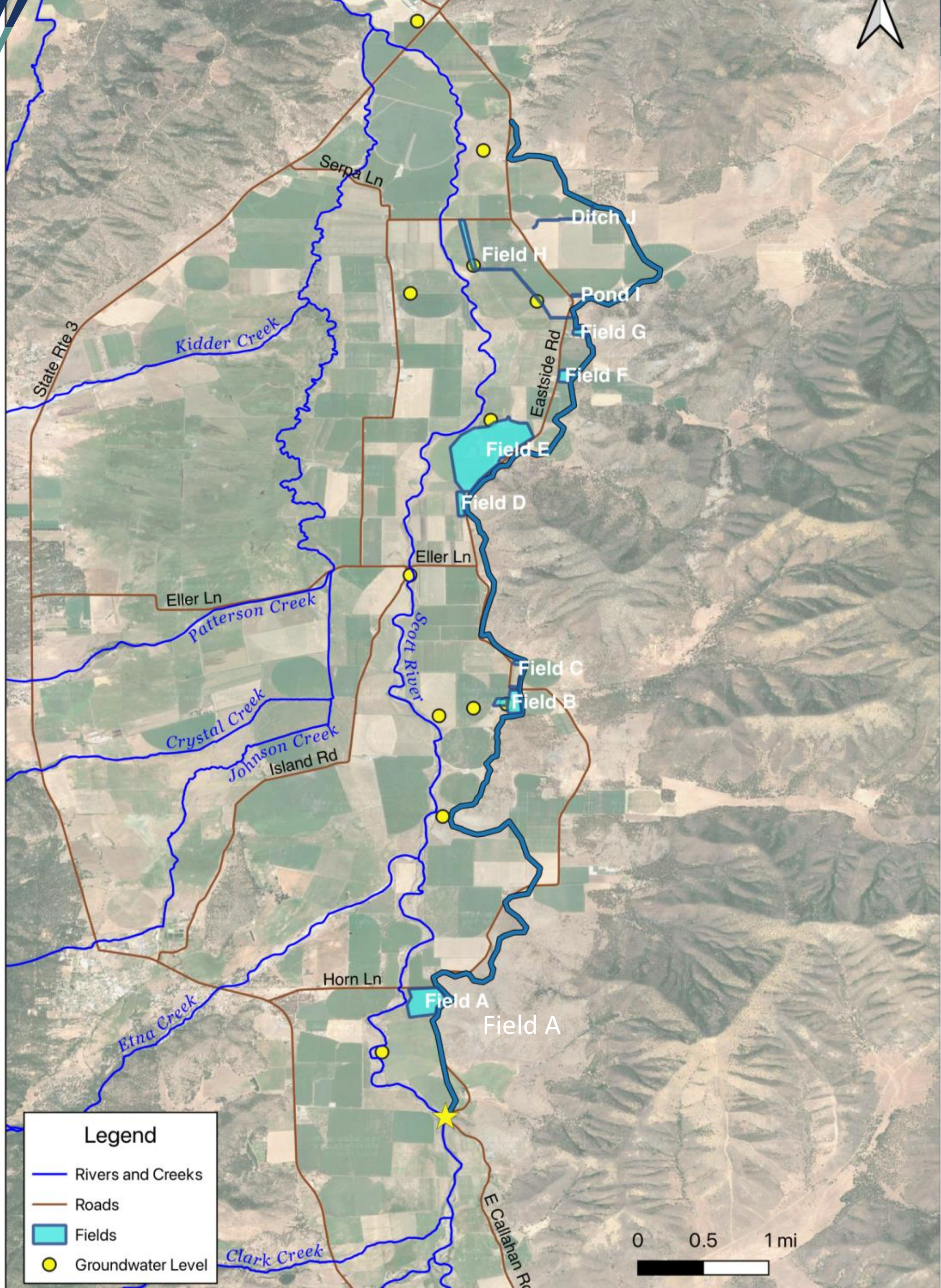
Minimum/ Maximum Threshold	Measurable Objective	Undesirable Result
Nitrate=10 mg/L, specific conductivity= 900 umhos/com	**More than 90%** of wells monitored for water quality maintain their range of water quality measurements measured from 1990 through 2020.	**More than 25% of groundwater quality wells exceed the maximum threshold for concentration** and/or concentrations in over 25% of groundwater quality wells increase by more than 15% per year, on average over ten years.

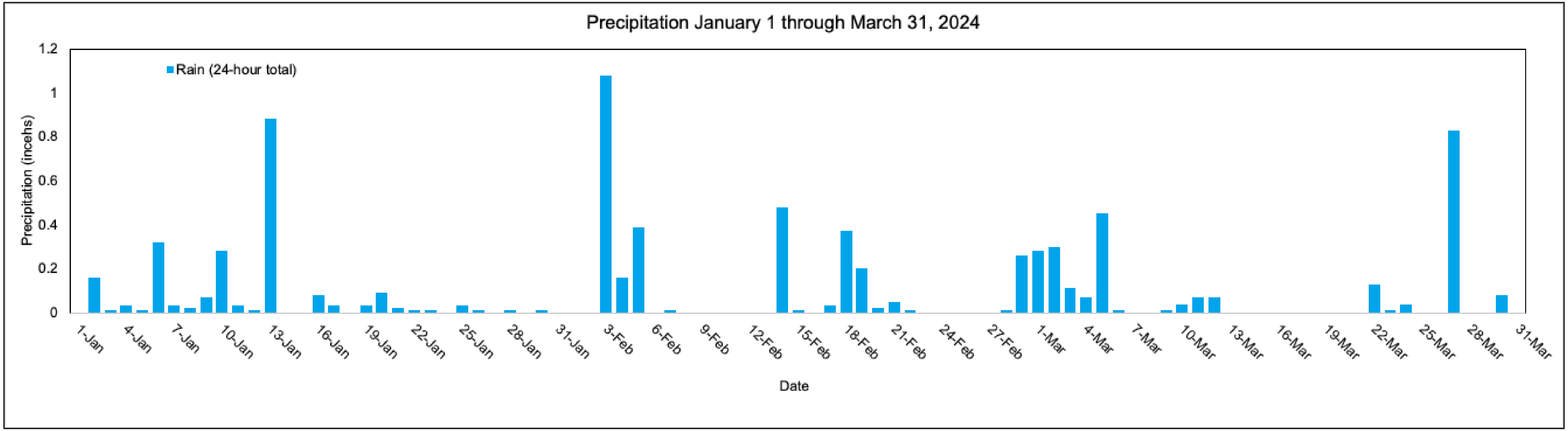
Depletions of Interconnected Surface Water

Minimum/ Maximum Threshold	Measurable Objective	Undesirable Result
Average **15% stream depletion reversal** caused by groundwater pumping from outside the adjudicated zone in 2042 and thereafter.	Average **stream depletion reversal of 20%** or above in 2042 and thereafter.	Ecological stress from **<15% average stream depletion reversal of the depletion** caused by groundwater pumping outside of the adjudicated zone in 2042 and later, as defined by specific reference scenarios with SVIHM.

SVID Recharge 2024

- Water diverted from Young's Dam from January 15, 2024 through March 31st 2024
- Total of **2,783 AF** diverted from Young's Dam
- 10 different locations used in SVID service area to apply water (A through J)
- Total area ~ 260 acres

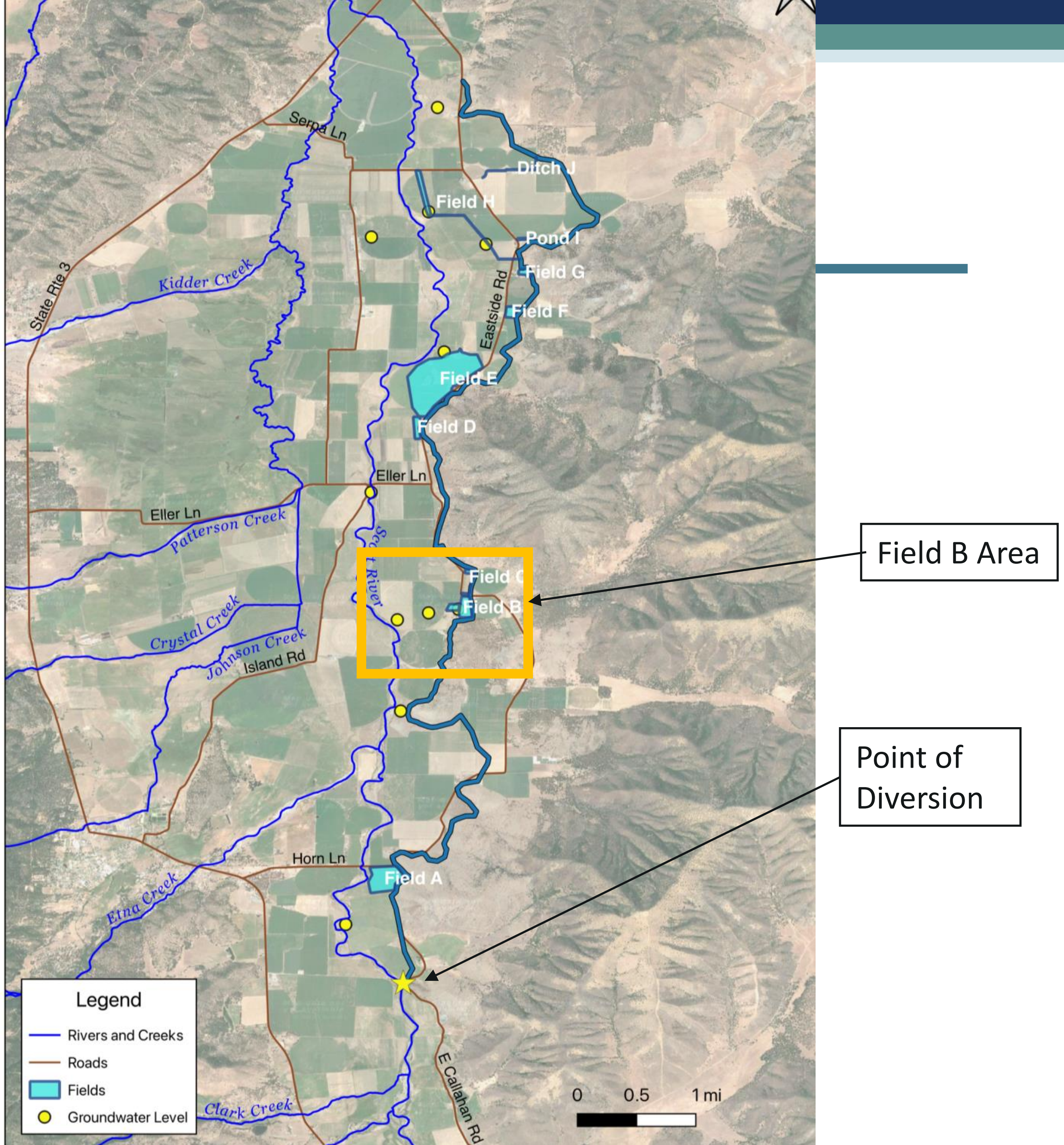


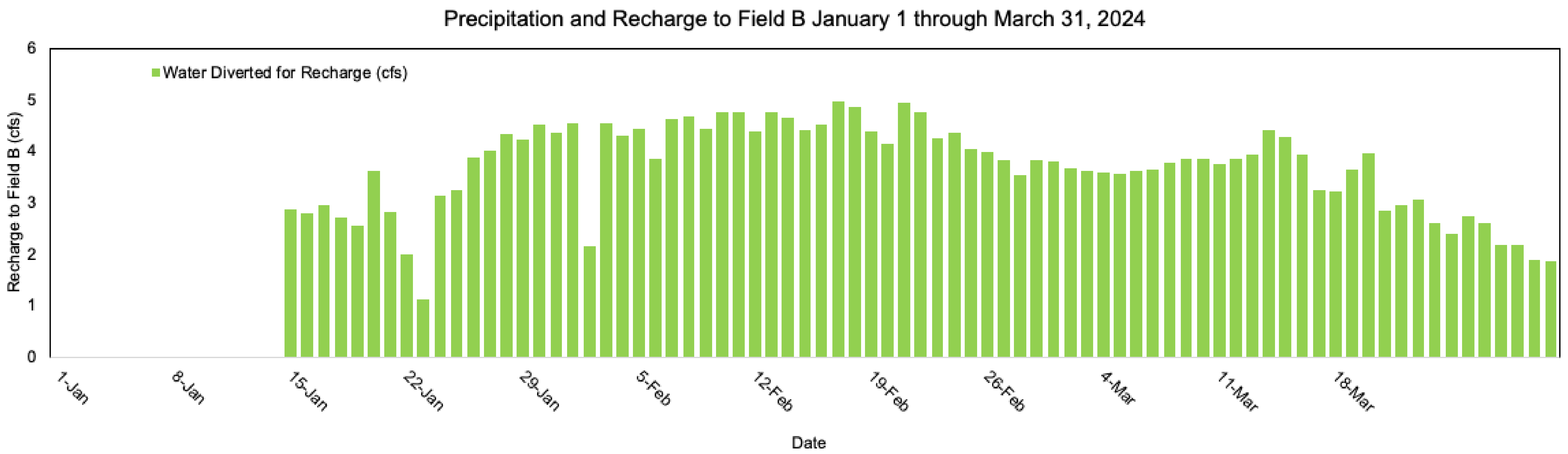


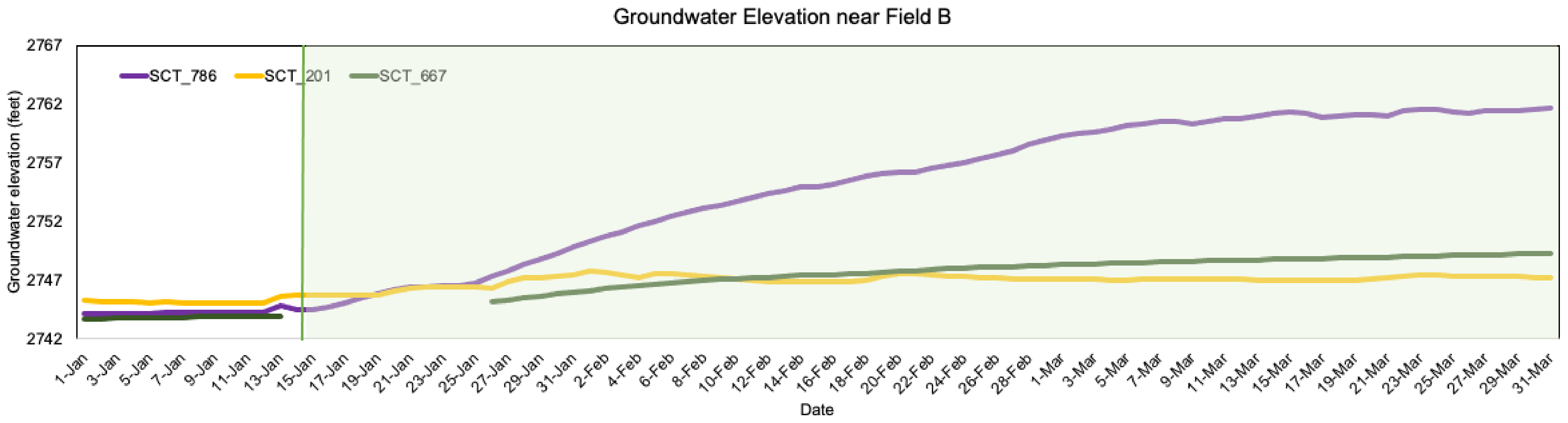
Precipitation January 1 through March 31, 2024
Rain (24-hour total)
Precipitation (incehs)
1.2
1
0.8
0.6
0.4
0.2
0
1-Jan
4-Jan
7-Jan
10-Jan
13-Jan
16-Jan
19-Jan
22-Jan
25-Jan
28-Jan
31-Jan
3-Feb
6-Feb
9-Feb
12-Feb
15-Feb
18-Feb
21-Feb
24-Feb
27-Feb
1-Mar
4-Mar
7-Mar
10-Mar
13-Mar
16-Mar
19-Mar
22-Mar
25-Mar
28-Mar
31-Mar
Date

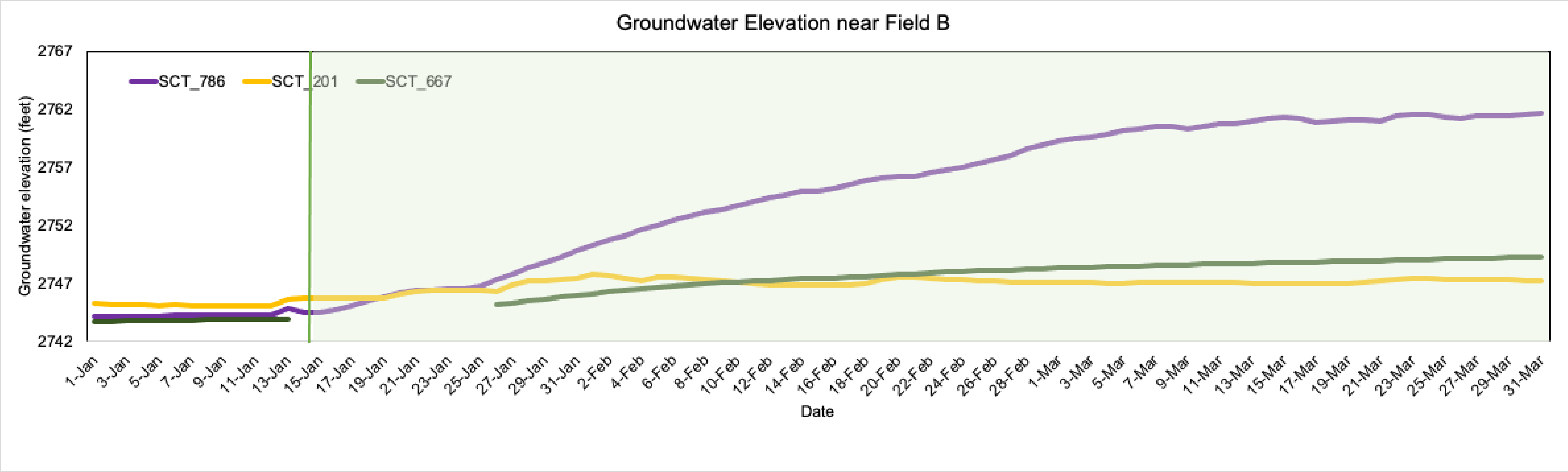
Snapshot of Field B

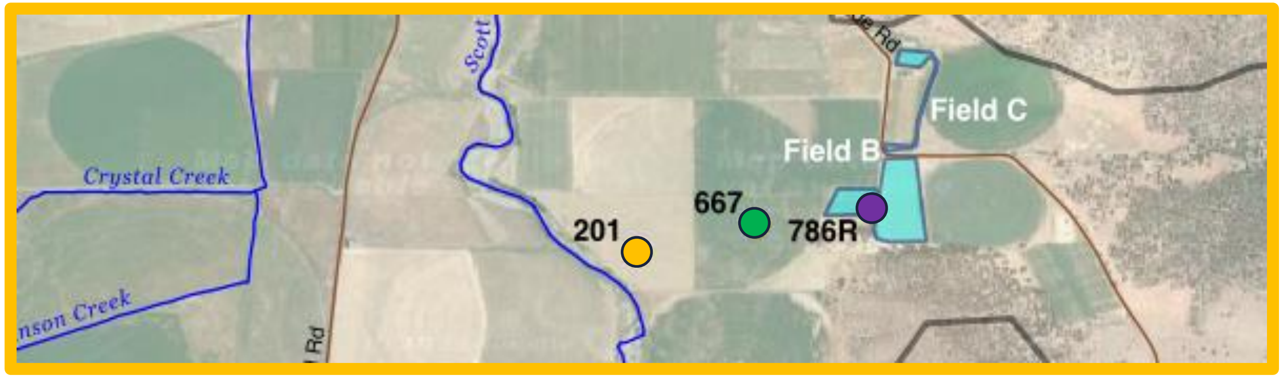
- Transect of wells from field used for recharge to the river
- Longest application period for recharge
  - Full recharge period from January 15 through March 31

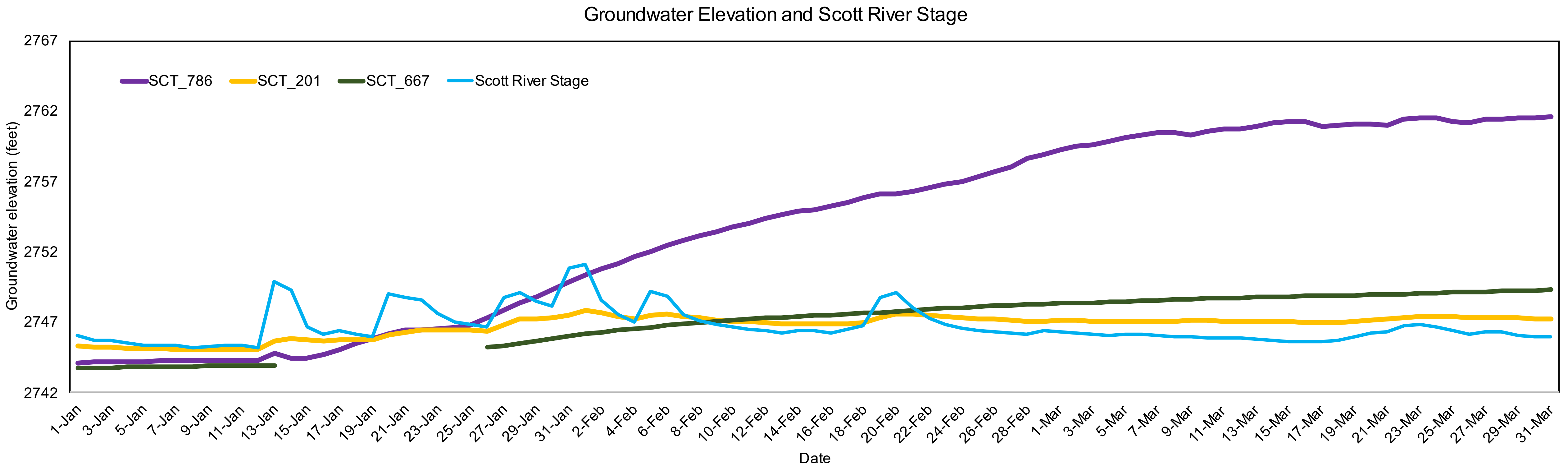



Precipitation and Recharge to Field B January 1 through March 31, 2024
Water Diverted for Recharge (cfs)
Recharge to Field B (cfs)
Date
1-Jan
8-Jan
15-Jan
22-Jan
29-Jan
5-Feb
12-Feb
19-Feb
26-Feb
4-Mar
11-Mar
18-Mar


Groundwater Elevation near Field B
SCT_786
SCT_201
SCT_667
Groundwater elevation (feet)
Date


Groundwater Elevation near Field B
SCT_786
SCT_201
SCT_667
Groundwater elevation (feet)
2767
2762
2757
2752
2747
2742
Date
1-Jan 3-Jan 5-Jan 7-Jan 9-Jan 11-Jan 13-Jan 15-Jan 17-Jan 19-Jan 21-Jan 23-Jan 25-Jan 27-Jan 29-Jan 31-Jan 2-Feb 4-Feb 6-Feb 8-Feb 10-Feb 12-Feb 14-Feb 16-Feb 18-Feb 20-Feb 22-Feb 24-Feb 26-Feb 28-Feb 1-Mar 3-Mar 5-Mar 7-Mar 9-Mar 11-Mar 13-Mar 15-Mar 17-Mar 19-Mar 21-Mar 23-Mar 25-Mar 27-Mar 29-Mar 31-Mar


Field C
Field B
Crystal Creek
Scott
201
667
786R


Groundwater Elevation and Scott River Stage
SCT_786
SCT_201
SCT_667
Scott River Stage
Groundwater elevation (feet)
2767
2762
2757
2752
2747
2742
1-Jan
3-Jan
5-Jan
7-Jan
9-Jan
11-Jan
13-Jan
15-Jan
17-Jan
19-Jan
21-Jan
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27-Jan
29-Jan
31-Jan
2-Feb
4-Feb
6-Feb
8-Feb
10-Feb
12-Feb
14-Feb
16-Feb
18-Feb
20-Feb
22-Feb
24-Feb
26-Feb
28-Feb
1-Mar
3-Mar
5-Mar
7-Mar
9-Mar
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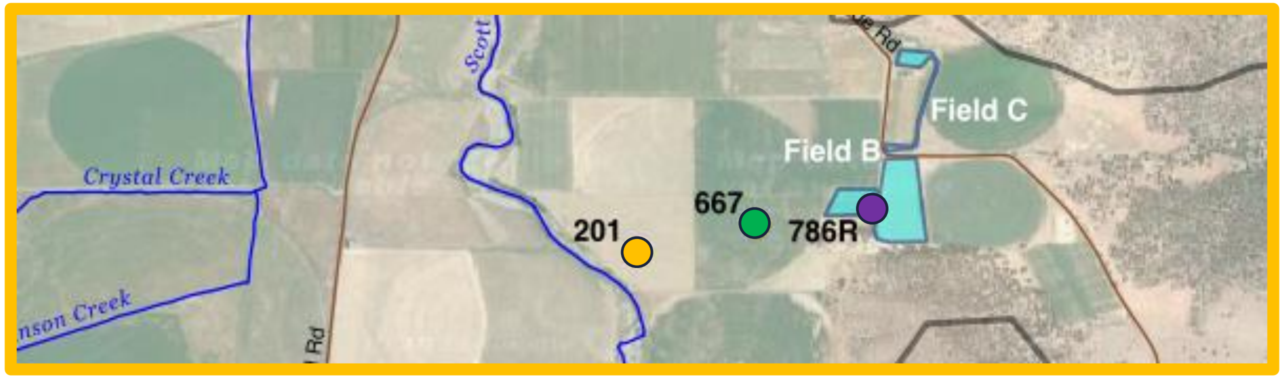
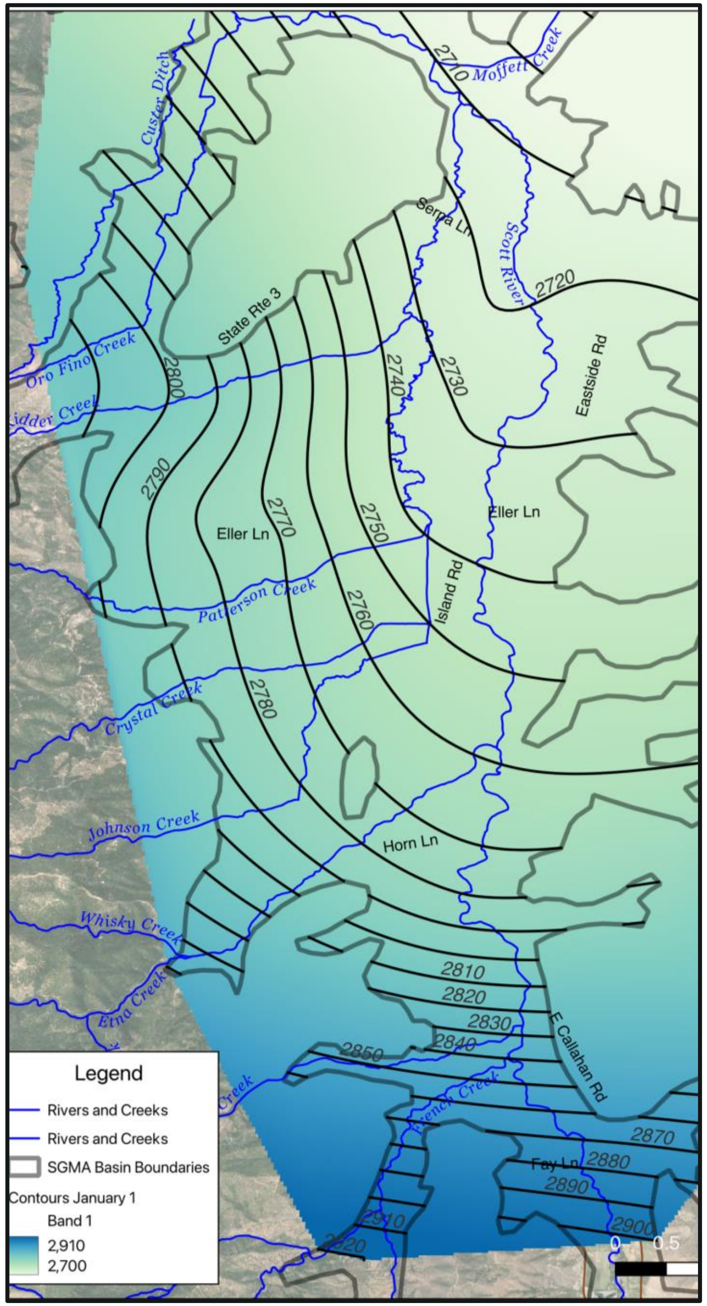
29-Mar
31-Mar
Date

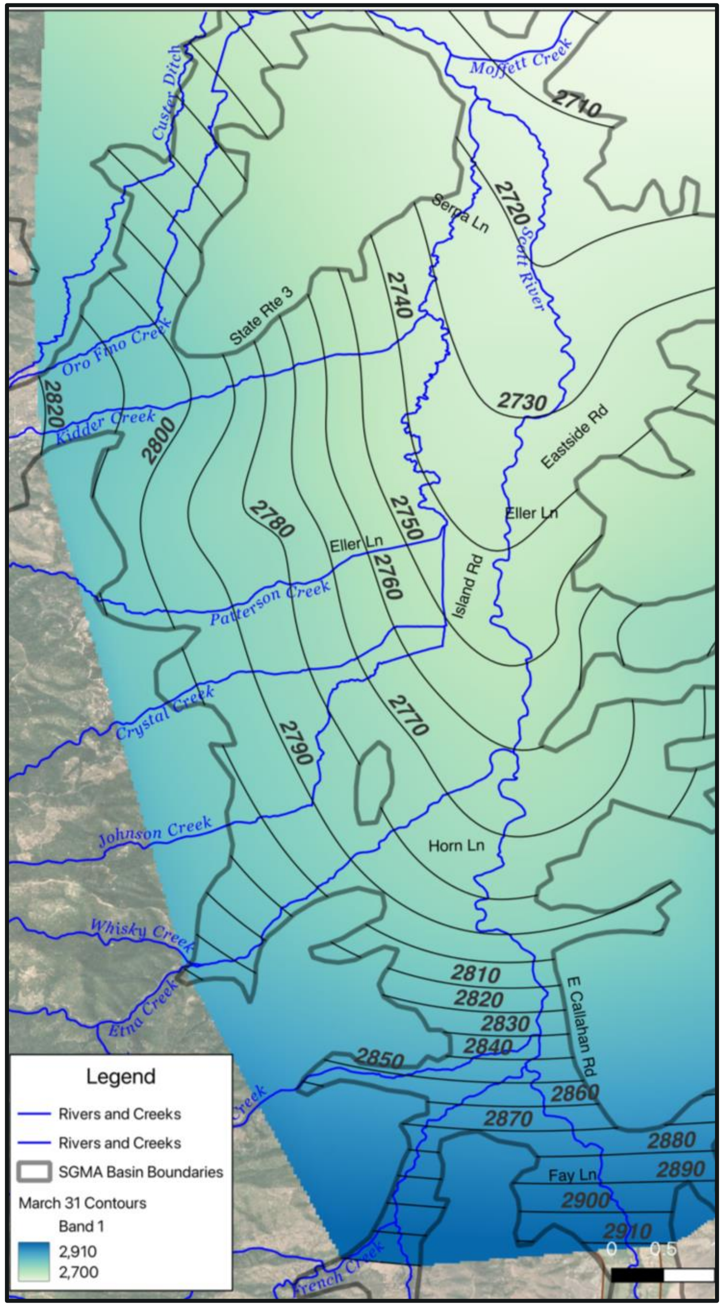

Field C
Field B
Crystal Creek
667
201
786R
Scott



Contour Maps

← Contour map from January 1, 2024 on the left

Contour map from March 31, 2024 on the right →



Connecting Project Implementation with SMCs

Streamflow depletion reversal achieved with different recharge scenarios

Scenario ID	Scenario Depletion Reversal, Sep-Nov '91-'18 (TAF)	Relative Depletion Reversal, Sep-Nov '91-'18
MAR (Managed Aquifer Recharge) in Jan-Mar	13	10%
ILR (In-Lieu Recharge) in the early growing season	12	9%
MAR + ILR	25	19%

Depletion reversal modelled over a 28-year period

Average annual streamflow depletion reversal to achieve minimum threshold and measurable objectives

Minimum threshold = 15% streamflow depletion reversal → **696 AF/year** streamflow depletion reversal to achieve minimum threshold

Measurable Objective= 20% streamflow depletion reversal → **929 AF/year** streamflow depletion reversal to achieve measurable objective

2024 Results- SVID Recharge Project

- Total diverted for recharge from January through March 2024 was **2,783 AF**
- Using 2016 simulation results *"nearly 90% of diverted water resurfaces as downstream streamflow enhancement April through December"*[1]

= 2,505 AF

Minimum threshold = 15% streamflow depletion reversal → **696 AF/year** streamflow depletion reversal to achieve minimum threshold → **360%** of average yearly streamflow depletion reversal to achieve MT

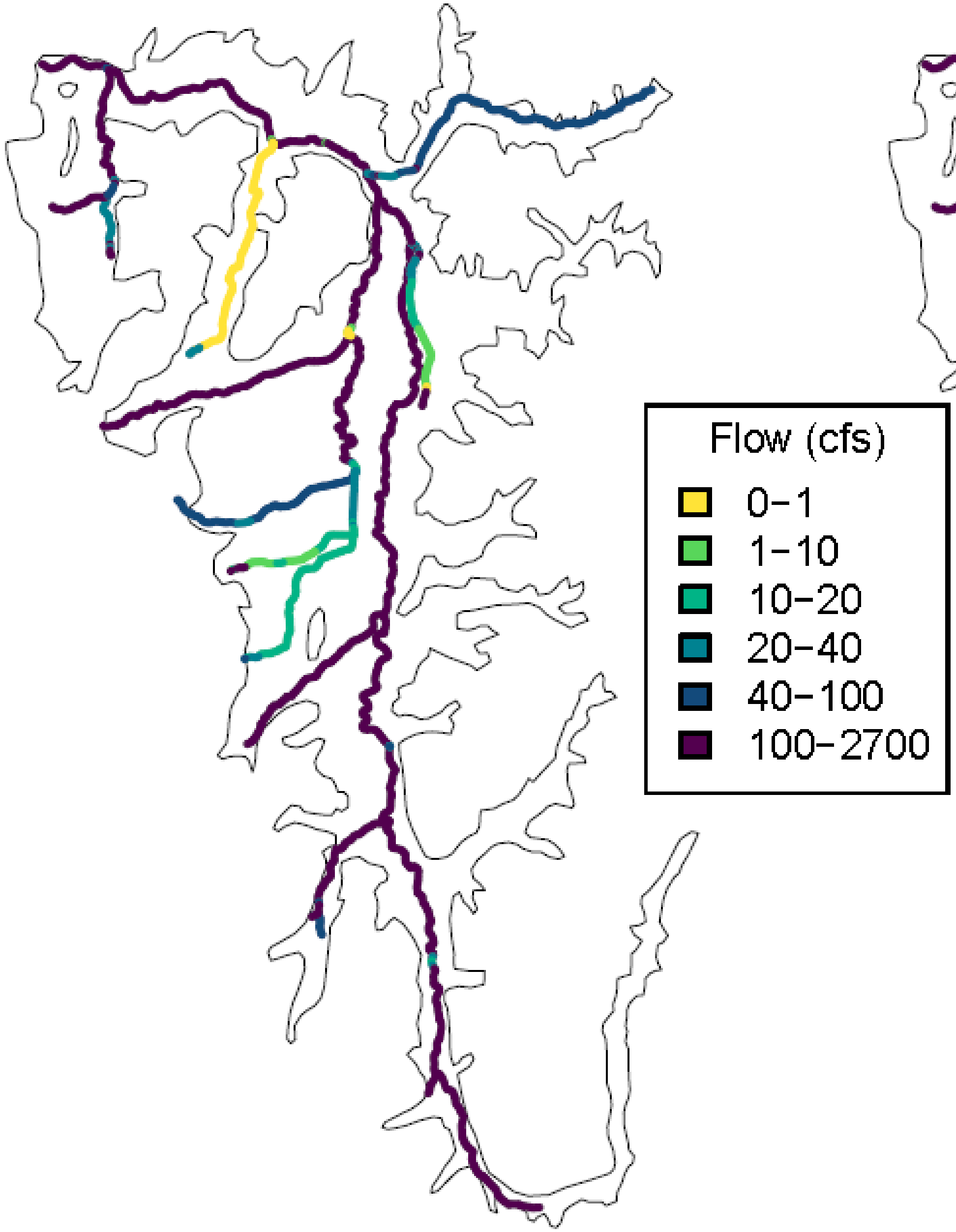
Measurable Objective= 20% streamflow depletion reversal → **929 AF/year** streamflow depletion reversal to achieve measurable objective → **270%** of average yearly streamflow depletion reversal to meet MO

2024 Recharge Implementation

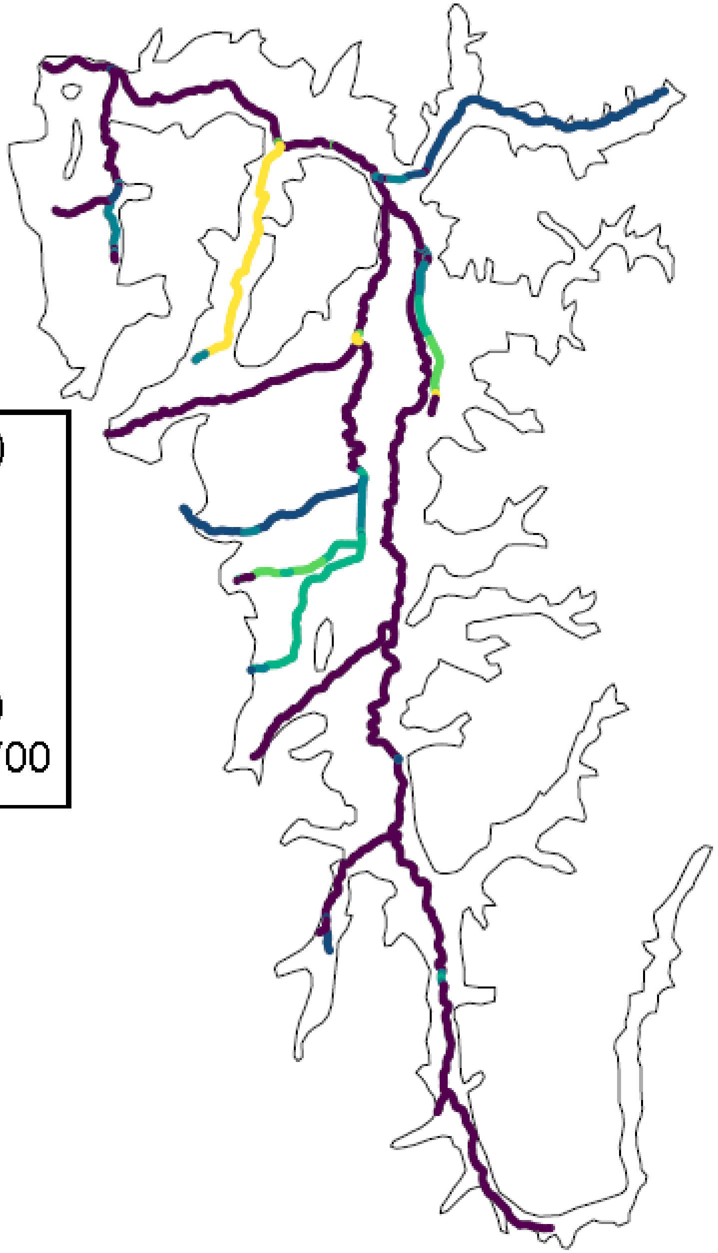
- **360%** of average yearly streamflow depletion reversal to achieve MT
- **270%** of average yearly streamflow depletion reversal to meet MO

[1]Dahlke, H. E., & Morris, J. (2016). Temporary Permit for Diversion and Use of Water Application T032564 Temporary Permit 21364 Summary Report.

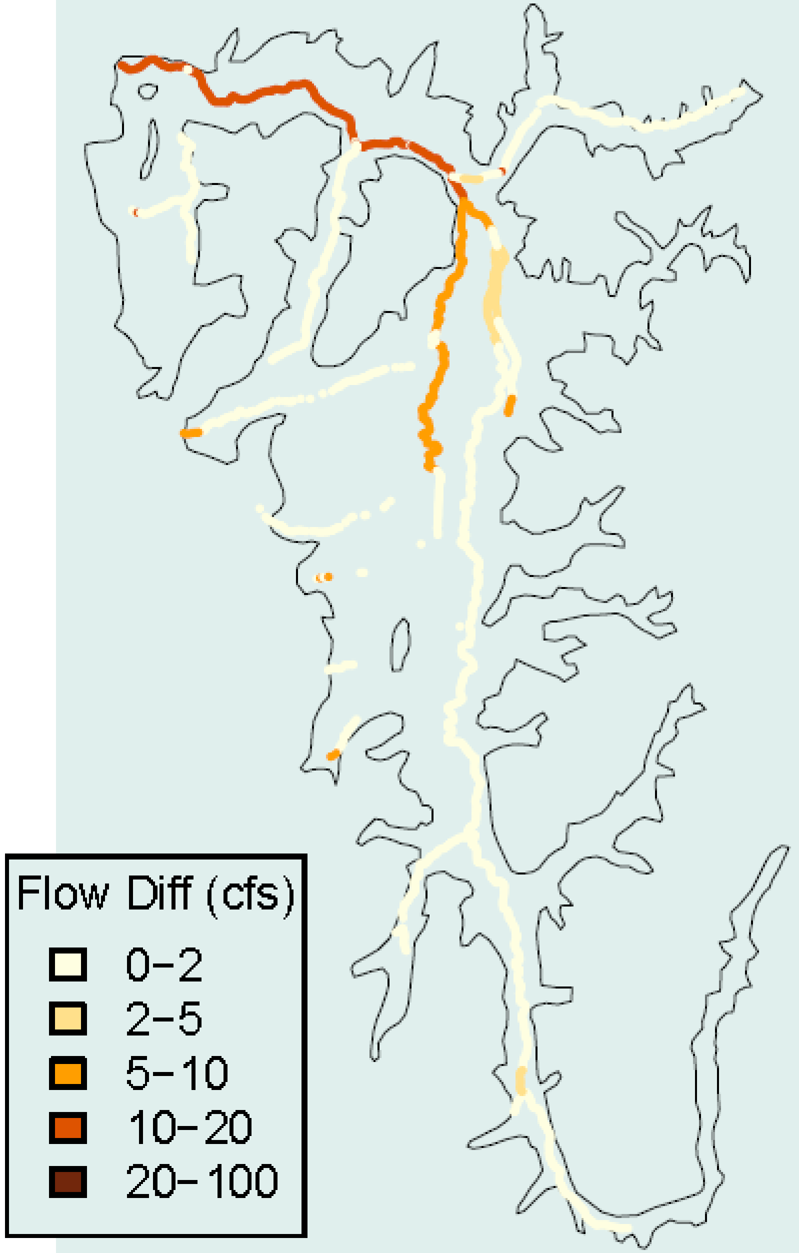
June 1993: Basecase



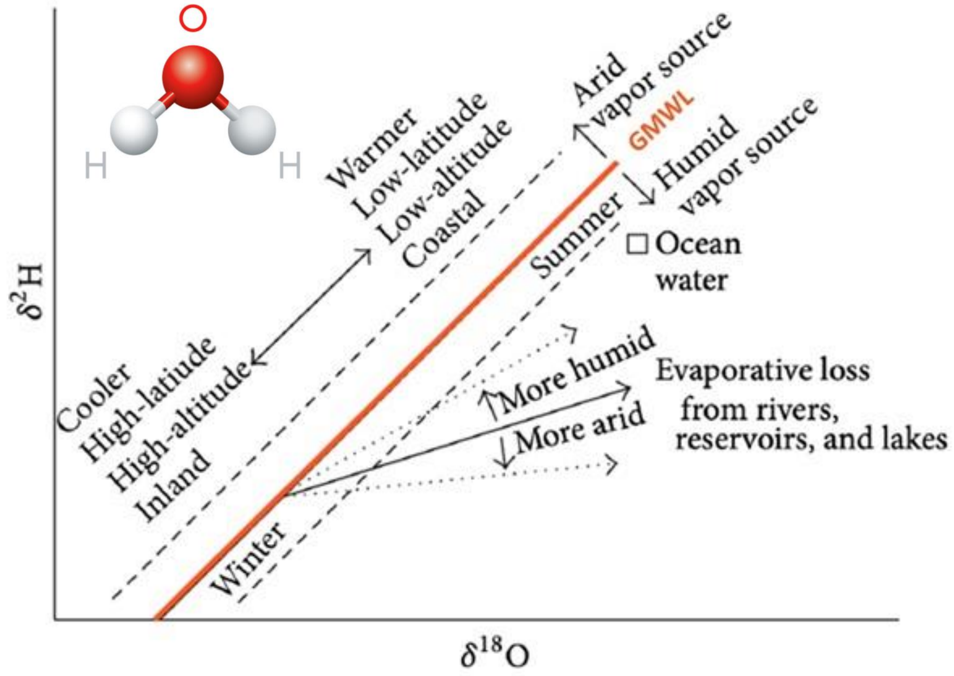
MAR Scenario



MAR minus Basecase Flow Difference



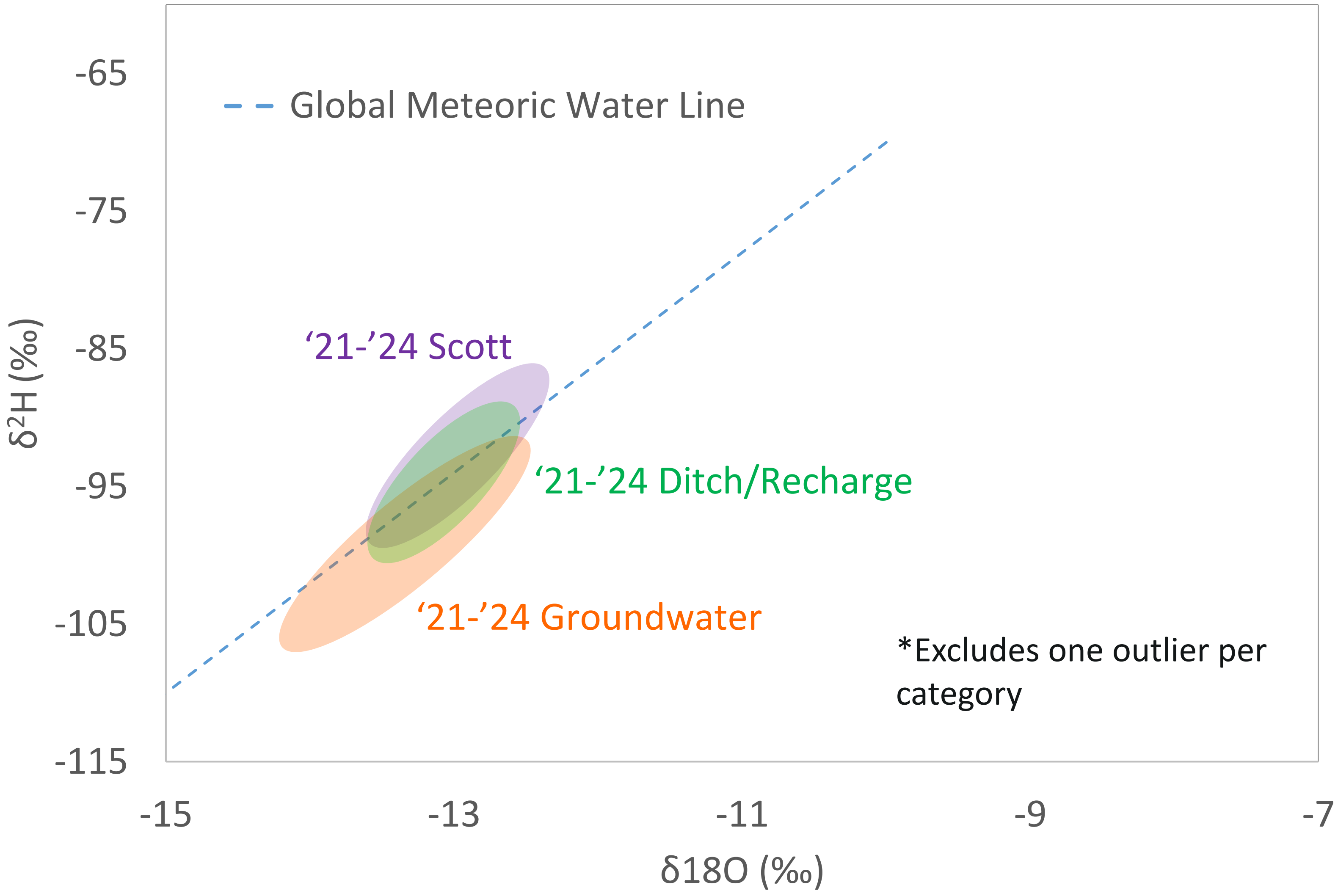
What can geochemistry tell us?



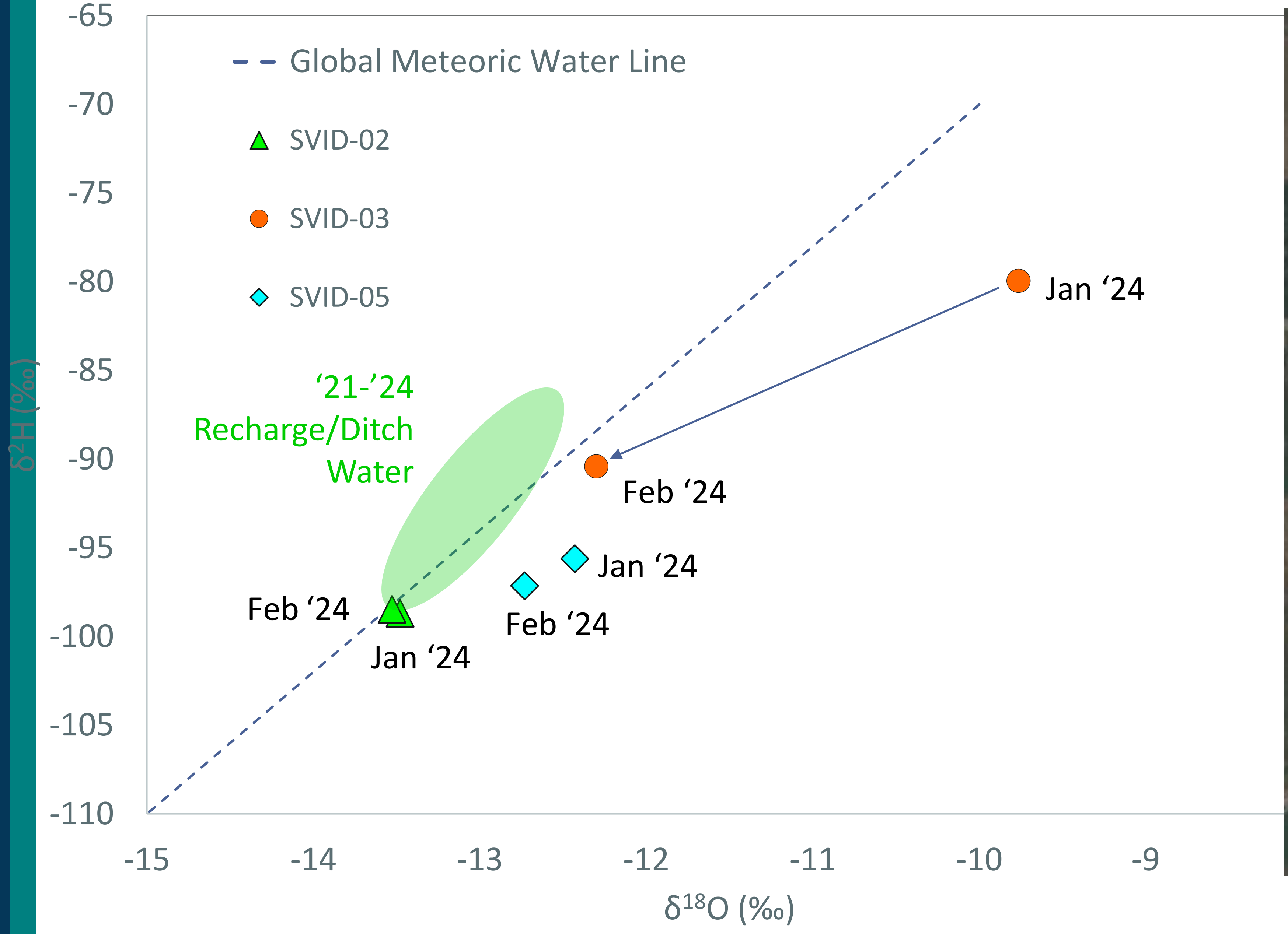
- Water isotopes and major ions
  - **Distinguish water sources**
  - **Identify mixing of different water sources**
- Radon
  - Helps to identify **gaining** and **losing** areas
  - Identify piezometers and shallow wells with very recent recharge
  - Can complement sensor data and other physical (temp, conductivity) and geochemical measurements to help understand streamflow dynamics through time
- Time series can be very informative

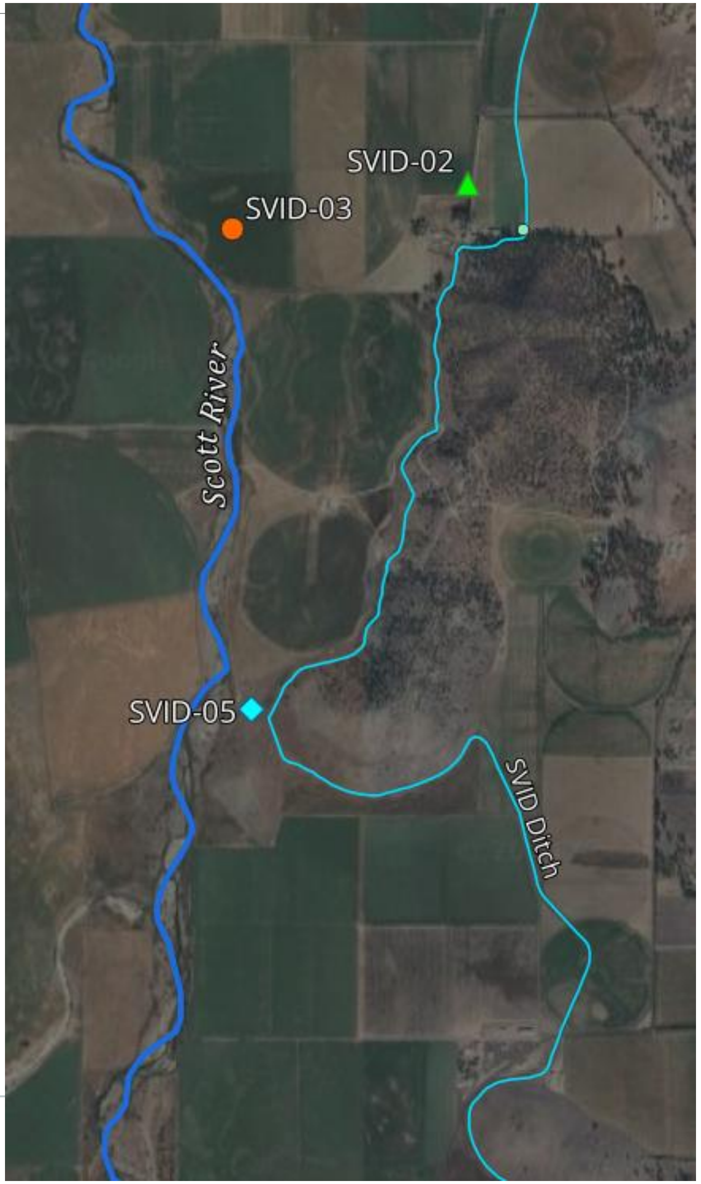
Range of SVID Water Isotope Results 2021-24

- GW has limited overlap with Scott River/Recharge Water
- Sampling in previous years stopped in March/April or earlier
- Longer time series should provide more information



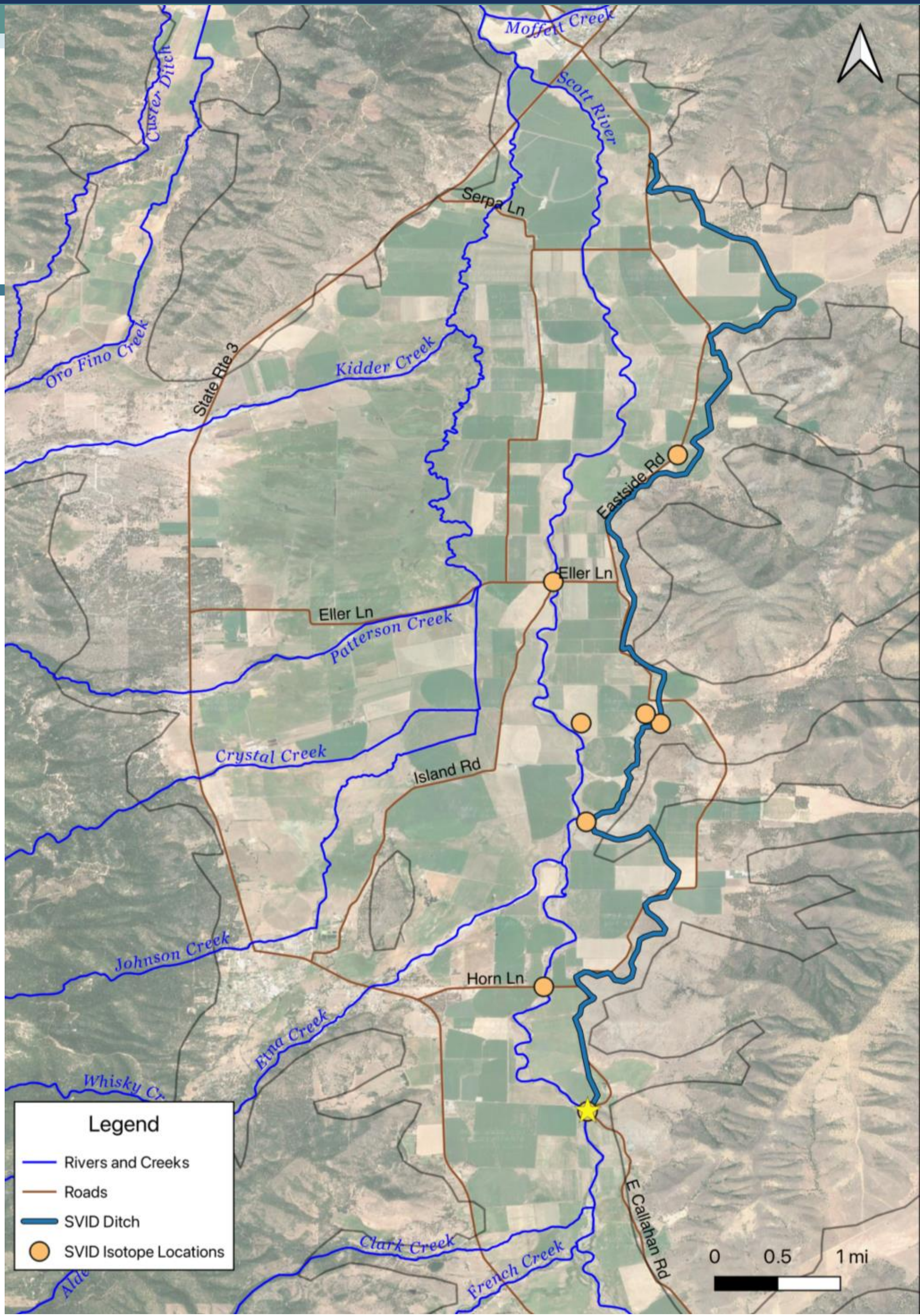
Water Isotope Results for SVID Well Locations Jan – Feb 2024





Geochemistry: TIMESERIES!

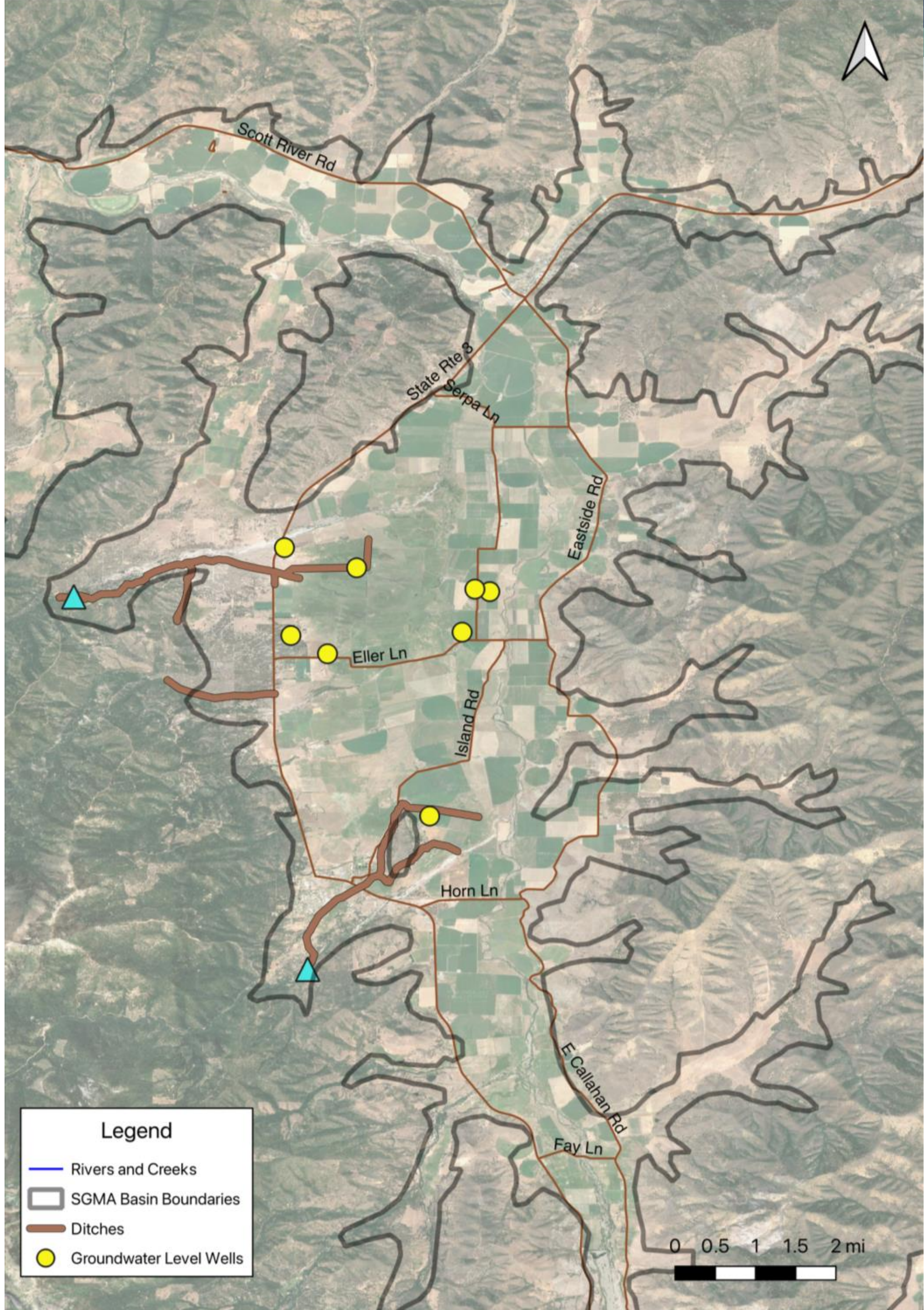
- Water isotopes and major ions
  - **Distinguish water sources**
  - **Identify mixing of different water sources**
- Radon
  - Helps to identify **gaining** and **losing** areas
  - Identify piezometers and shallow wells with very recent recharge
  - Can complement sensor data and other physical (temp, conductivity) and geochemical measurements to help understand streamflow dynamics through time
- Time series can be very informative
  - Track impacts of management actions like recharge



2024: Next Steps

- **Monitoring Updates**
  - Add two temperature sensors in Scott River:
    - Near recharge field
    - Near Point of Diversion
  - Additional shallow piezometer transects
- **Results**
  - Diversion report and conclusions from 2024 recharge season
  - Run scenarios using SVIHM to quantify benefits from actual implementation in 2024
- Permitting
  - 5-Year temporary permit application

Ditch Infiltration Study



Ditch Infiltration Study

- **What role do unlined irrigation ditches play in groundwater recharge in the Basin?**
- Project includes ditches on the westside of Scott Valley (3 areas of focus)
- Monitoring includes:
  - Long-term continuous data collection:
    - flow stations
    - groundwater level monitoring
  - Geochemical sampling to answer localized question of ditch infiltration relationship to perennial pools
- SVIHM to incorporate collected data to help answer this question

Ditch Infiltration Study- Progress and Plan

Work to date

- Locations identified for monitoring instrumentation
- Installation of high-priority flow stations, instrumentation of groundwater wells
- Collection of baseline geochemical samples
- Initial particle tracking using SVIHM

Current Phase

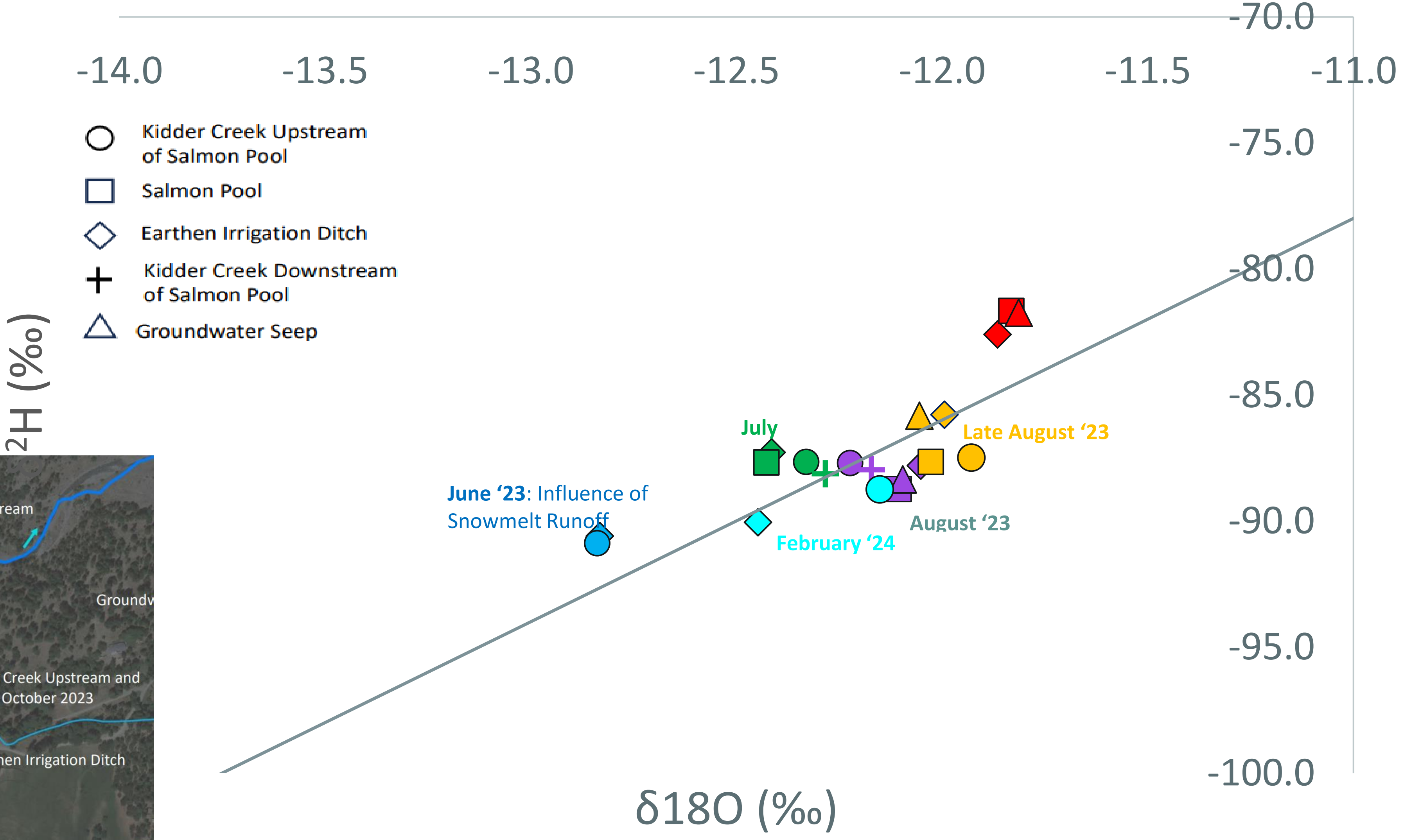
- Review of initial data collection, and monitoring network refinement, as needed
- Continue geochemical sampling throughout summer and fall months

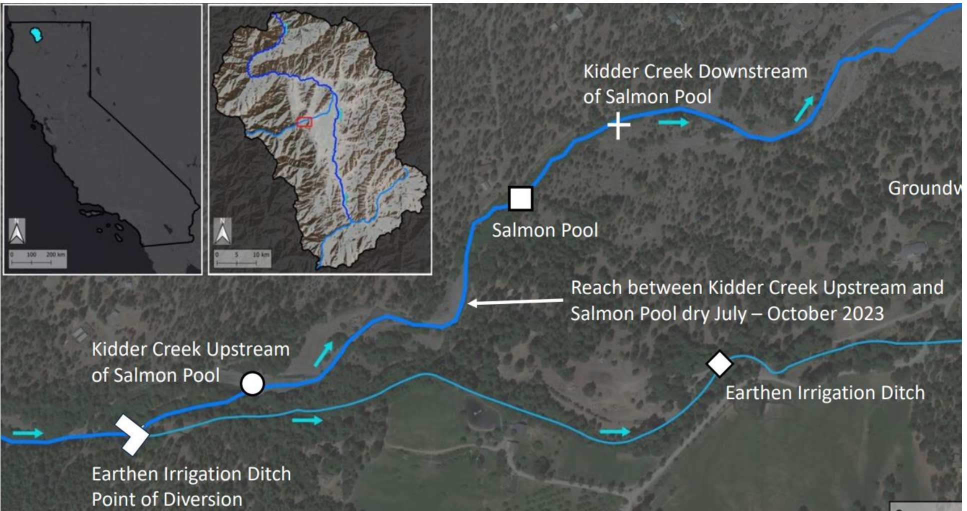
Next Steps

- Discussion

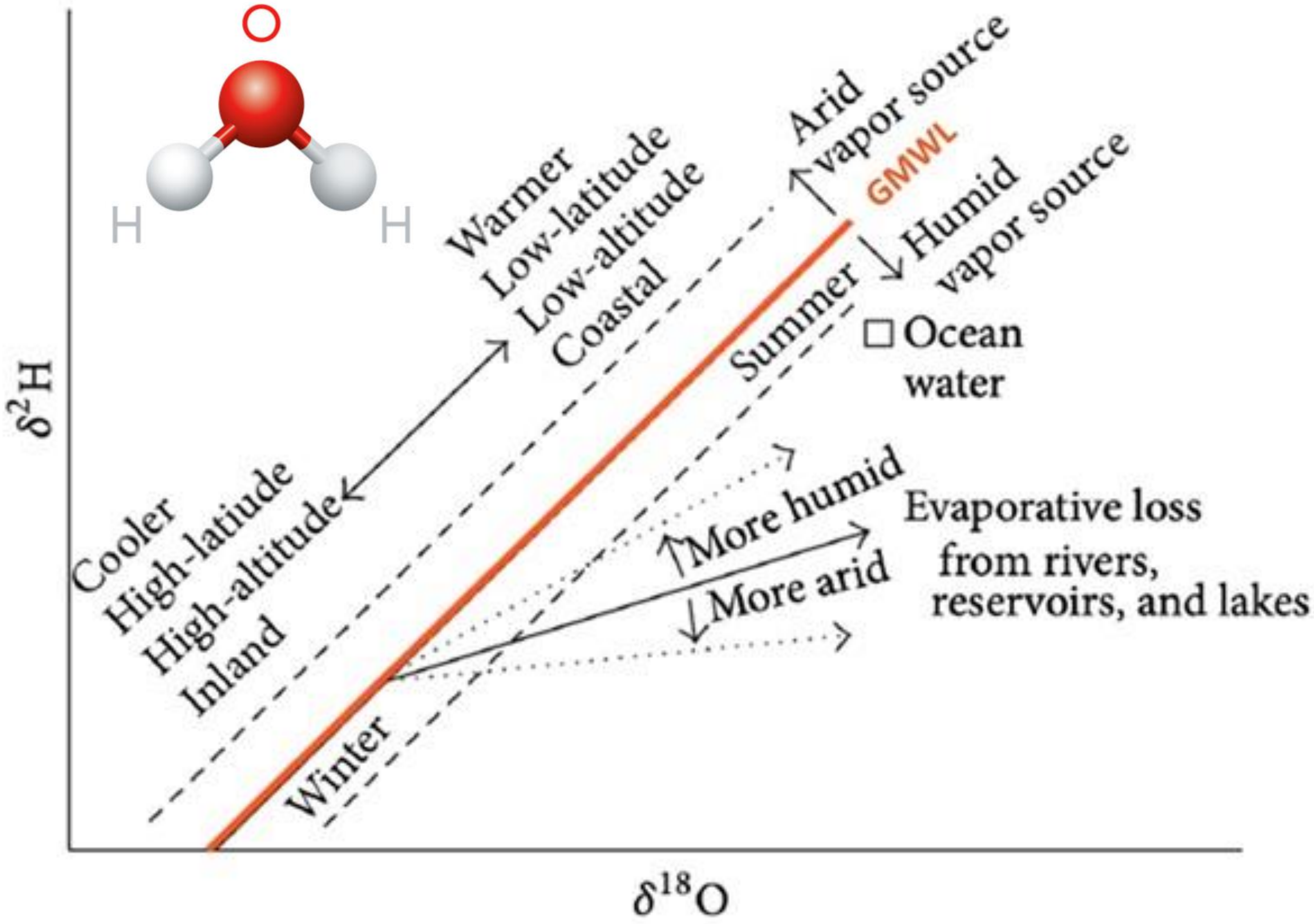
Water Isotope Results for Kidder Creek
June 2023 - February 2024

- 2023: progressive shift in isotopic signature suggesting shift from snowmelt-dominated flow in June to baseflow dominated flow later in the year.
- February 2024: plot within range of previous samples, did not appear to show strong snowmelt influence yet





Reminder!



O
H
H
Warmer
Low-latitude
Low-altitude
Coastal
Arid
vapor source
GMWL
Humid
vapor source
Summer
Ocean
water
Cooler
High-latiude
High-altitude
Inland
More humid
More arid
Evaporative loss
from rivers,
reservoirs, and lakes
Winter
δ²H
δ¹⁸O

Which scenarios should we be looking at?

- Additional groundwater recharge scenarios (with different times and locations)
- Conjunctive use
- In-lieu recharge
- In-lieu recharge using SVID
- Pumping groundwater into the river at critical times

Upland Management

- Identify existing upland management projects and evaluate the impact on water supply (up to 3 projects)
  - Management of upland forest vegetation
- Discussion:
  - **What upland management practices are of most interest ?**
  - **Are there ongoing projects that would be good candidates?**
- Design and install monitoring network to quantify impact to groundwater
- Collect and evaluate data
- Incorporate results into modeling scenarios
- Evaluate watershed responses under differing upland management strategies

Irrigation Workshop Recap

- “Workshop on Efficient Water Management for Forage Crops”
- Conducted Thursday March 14th
- Field visits with irrigation specialist May 21, 22, 23rd
- Link to survey: https://us11.list-manage.com/survey?u=2516c89941f49355f514cefb8&id=3435a2de67&attribution=false

Thank You