

# **Napa County**

1195 THIRD STREET  
SUITE 310  
NAPA, CA 94559



## **Agenda - Final**

**Thursday, March 12, 2026**

**1:30 PM**

**Board of Supervisors Chambers  
1195 Third Street, Third Floor**

### **Groundwater Technical Advisory Group**

*Mathias Kondolf (Chair)*  
*Miguel Garcia (Vice-Chair)*  
*Albert Filipelli*  
*Monica Cooper*  
*Julie Chambon*

*Brian D. Bordona, Secretary - Director*  
*Chris Apallas, County Counsel*  
*Jamison Crosby, Natural Resources Conservation Manager*  
*Brendan McGovern, Principal Planner*  
*Nick Fetherston, Planner II*  
*Alexandria Quackenbush, Meeting Clerk*  
*Angie Ramirez Vega, Meeting Clerk*  
*Aime Ramos, Meeting Clerk*

### How to Watch or Listen to the Napa County Groundwater Technical Advisory Group Meetings

The Napa County Groundwater Technical Advisory Group will continue to meet the 2nd Thursday of each month. There will be no regular meeting in January, May, June or October. August 19, 2025 will be a special-joint meeting of the GTAG & GSA.

The Groundwater Technical Advisory Group meets at 1195 Third Street, Suite 310, Napa, California 94559. The meeting room is wheelchair accessible. Assistive listening devices and interpreters are available through the clerk of the Groundwater Technical Advisory Group. Requests for disability related modifications or accommodations, aids or services may be made to the Clerk of the Groundwater Technical Advisory Group's office no less than 72 hours prior to the meeting date by contacting (707) 253-4417 or [meetingclerk@countyofnapa.org](mailto:meetingclerk@countyofnapa.org).

The Groundwater Technical Advisory Group realizes that not all County residents have the same ways to stay engaged, so several alternatives are offered. Remote Zoom participation for members of the public is provided for convenience only. In the event that the Zoom connection malfunctions for any reason, the Groundwater Technical Advisory Group reserves the right to conduct the meeting without remote access.

Please watch or listen to the Groundwater Technical Advisory Group meeting in one of the following ways:

1. Attend in-person at the Board of Supervisors Chambers, 1195 Third Street, Napa, Third Floor.
2. Watch on Zoom using the attendee link: <https://countyofnapa.zoom.us/j/89426085834>. Make sure the browser is up-to-date.
3. Listen on Zoom by calling 1-669-900-6833 (Meeting ID: 894-2608-5834).

**If you are unable to attend the meeting in person and wish to submit a general public comment or a comment on a specific agenda item, please do the following:**

1. Email your comment to [meetingclerk@countyofnapa.org](mailto:meetingclerk@countyofnapa.org). Emails will not be read aloud but will still become part of the public record and shared with the Groundwater Technical Advisory Group.
2. Use the Zoom attendee link: <https://Countyofnapa.zoom.us/j/89426085834>. Make sure the browser is up-to-date. When the Chair calls for the item on which you wish to speak, click "raise hand". Please limit your remarks to three minutes.
3. Call the Zoom phone number: 1-669-900-6833. (Meeting ID: 894-2608-5834). When the Chair calls for the item on which you wish to speak, press \*9 to raise hand. Please limit your remarks to three minutes.

**\*\*Please note that phone numbers in their entirety will be visible online while speakers are speaking\*\***

For more information, please contact us via telephone at (707) 253-4417 or send an email to [meetingclerk@countyofnapa.org](mailto:meetingclerk@countyofnapa.org).

ANY MEMBER OF THE AUDIENCE DESIRING TO ADDRESS THE COMMITTEE:

**ON A MATTER ON THE AGENDA**

Please proceed to the podium when the matter is called and, after receiving recognition from the Chair, give your name and your comments or questions. In order that all interested parties have an opportunity to speak, please be brief and limit your comments to the specific subject under discussion. Time limitations shall be at the discretion of the Chair or Committee, but is generally limited to three minutes.

**ON A MATTER NOT ON THE AGENDA**

Public comment is an opportunity for members of the public to speak on items that are not on the agenda but are within the subject matter jurisdiction of the Committee. Public comment is limited to three minutes per speaker, subject to the discretion of the Chair. Comments should be brief and focused, and speakers should be respectful of one another who may have different opinions. Please remember this meeting is being recorded and broadcasted live via ZOOM. The County will not tolerate profanity, hate speech, abusive language, or threats. Also, while public input is appreciated, the Brown Act prohibits the Committee from taking any action on matters raised during public comment that are not on the agenda.

1. **CALL TO ORDER; ROLL CALL**
2. **PUBLIC COMMENTS AND RECOMMENDATIONS**  
(The Committee invites comments and recommendations from the public concerning issues relevant to the charge of the Technical Advisory Group. Anyone who wishes to speak to the Technical Advisory Group on such a matter, if it is not on the agenda, may do so at this time. At the discretion of the Chair, individuals will be limited to a three-minute presentation. No action will be taken by the Technical Advisory Group as a result of any item presented at this time.)
3. **APPROVAL OF MINUTES**
  - A. The Secretary of the committee requests approval of the minutes from the December 11, 2025 TAG meeting. [26-399](#)  
**Attachments:** [Draft Minutes December 11, 2025 TAG](#)
4. **REPORTS AND ANNOUNCEMENTS**
5. **ADMINISTRATIVE ITEMS**

- A. Miguel A. Garcia PhD, Senior Project Manager, Agriculture, Resource Conservation District of Napa County, will make a presentation to the TAG on a regional soil health and water storage assessment in dry-farmed vineyards funded by the California Department of Water Resources to better understand and promote dry-farming practices for water conservation and climate resilience. [26-401](#)

**Attachments:** [Dry-Farmed Vineyards Presentation](#)

- B. Technical Advisory Group (TAG) members will receive a presentation on Project 1 of GSP Implementation: Managed Aquifer Recharge, including an update on the feasibility study development underway. In addition, the TAG will also receive an update on a vineyard replant modeling scenario that assesses the potential benefit over a 30-year period associated with extending the timeframe for vineyard replants in Napa Valley. The results of a preliminary modeling approach to assess recharge opportunities will also be presented. This is intended to spur discussion and questions, and provide feedback to staff and participants. [26-414](#)

**Attachments:** [Recharge Feasibility Analysis Presentation](#)

- C. Dr. Bachand will provide information on the development and implementation of the Alexander Valley On-Farm Recharge Initiative. Phase 1 of a multi-phase project, led by the Dry Creek Rancheria of Pomo Indians, is underway to utilize nearly 3,000 acres of active or fallow vineyards for recharge from diverting high flows off the Russian River. [26-404](#)

**Attachments:** [Alexander Valley On-Farm Recharge Initiative Presentation](#)  
[Fact Sheet on Alexander Valley On-Farm Recharge Initiative](#)

**6. FUTURE AGENDA ITEMS**

**7. ADJOURNMENT**

I HEREBY CERTIFY THAT THE AGENDA FOR THE ABOVE STATED MEETING WAS POSTED AT A LOCATION FREELY ACCESSIBLE TO MEMBERS OF THE PUBLIC AT THE NAPA COUNTY ADMINISTRATIVE BUILDING, 1195 THIRD STREET, NAPA, CALIFORNIA ON MARCH 9, 2026 BY 12:30 PM. A HARDCOPY SIGNED VERSION OF THE CERTIFICATE IS ON FILE WITH THE COMMITTEE CLERK AND AVAILABLE FOR PUBLIC INSPECTION.

AIME RAMOS (By e-signature)  
Aime Ramos, Committee Clerk



Napa County  
Board Agenda Letter

1195 THIRD STREET  
SUITE 310  
NAPA, CA 94559  
www.napacounty.gov  
Main: (707) 253-4580

---

Groundwater Technical Advisory Group **Agenda Date:** 3/12/2026

**File ID #:** 26-399

---

**TO:** Technical Advisory Group for the Napa County Groundwater Sustainability Agency  
**FROM:** Brian Bordona - Director of Planning, Building and Environmental Services  
**REPORT BY:** Jamison Crosby, Natural Resources Conservation Manager  
**SUBJECT:** TAG Minutes from December 11, 2025

---

**RECOMMENDATION**

The Secretary of the committee requests approval of the minutes from the December 11, 2025 TAG meeting.

**ENVIRONMENTAL IMPACT**

ENVIRONMENTAL DETERMINATION: The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

**BACKGROUND AND DISCUSSION**

The TAG held its meeting on December 11, 2025. Minutes were prepared and are ready for the committee's approval.



## Draft - Meeting Minutes

### Technical Advisory Group

Julie Chambon  
Monica Cooper  
Albert Filipelli (*Chair*)  
Miguel Garcia (*Vice-Chair*)  
Mathias Kondolf

Brian D. Bordona, Director  
Chris Apallas, County Counsel  
Jamison Crosby, Natural Resources Manager  
Brendan McGovern, Principal Planner  
Nick Fetherston, Planner II  
Alexandria Quackenbush, Meeting Clerk  
Angie Ramirez-Vega, Meeting Clerk  
Aime Ramos, Meeting Clerk

---

Thursday, December 11, 2025

1:30 PM

Board of Supervisors Chambers  
1195 Third Street, Third Floor

---

**1. CALL TO ORDER / ROLL CALL**

Group Members Present: Chair Albert Filipelli, Matt Kondolf, Miguel Garcia, Julie Chambon

Absent: Monica Cooper

**2. PUBLIC COMMENTS AND RECOMMENDATIONS**

(1) Public comment was heard.

**3. APPROVAL OF MINUTES**

Motion made by Member Kondolf to approve minutes for the September 11, 2025, meeting as presented, seconded by Member Garcia.

Vote: Carried 4-0-0

Yes: Chambon, Garcia, Filipelli, Kondolf

No: N/A

**4. REPORTS AND ANNOUNCEMENTS**

Jamison Crosby made the announcements below:

- The request for qualifications for the Certification Pilot Program was released on October 20<sup>th</sup> and the deadline to submit is December 12<sup>th</sup>, 2025.
- Napa County Board of Supervisors/Groundwater Sustainability Agency approved a resolution to adopt fees for groundwater users in the Napa Valley Subbasin.

Brendan McGovern provided an update on the CalSIP Stream Gage Improvement Grant.

Member Garcia reported that the Napa RCD has been involved with the California Sustainable Winegrowing Alliance on a dry farming study.

## 5. ADMINISTRATIVE ITEMS

- A.** Elect officers (Chair and Vice-Chair) for 2026 for the Technical Advisory Group (TAG).  
Motion made by Chair Filipelli and seconded by Member Chambon to elect Member Kondolf as Chair and Miguel Garcia as Vice-Chair.  
Vote: Carried 4-0-0  
Yes: Chambon, Garcia, Filipelli, Kondolf  
No: N/A
- B.** In this item the Technical Advisory Group (TAG) will review the proposed draft 2026 TAG meeting calendar for discussion and decision. The calendar proposes a schedule of meetings and topics for 2026 TAG meetings.  
Motion made by Member Kondolf and seconded by Chair Filipelli to approve the 2026 TAG meeting calendar, as presented.  
Vote: Carried 4-0-0  
Yes: Chambon, Garcia, Filipelli, Kondolf  
No: N/A
- C.** The TAG will receive an update on the use of satellite and land-based remote sensing data for analysis of evapotranspiration and information that can be used to refine vineyard water use estimates for Napa Valley Subbasin integrated hydrologic modeling purposes.  
Dr. Andrew McElrone, USDA scientist, gave a presentation.  
(1) Public comment was heard.  
Chair Filipelli initiated a discussion.  
No action was taken.
- D.** Andrew Fisher, Professor at University of Santa Cruz, and Lisa Lurie, Executive Director of the Resource Conservation District of Santa Cruz County will make a presentation to the TAG on an innovative groundwater sustainability approach being implemented by the Pajaro Valley Groundwater Management Agency that incentivizes growers to capture and infiltrate surplus stormwater.  
Lisa Lurie, Executive Director of the Resource Conservation District of Santa Cruz County and Andrew Fisher, Professor at University of Santa Cruz gave a presentation.  
(3) Public comments were heard.  
Chair Filipelli initiated a discussion.  
No action was taken.
- E.** Technical Advisory Group (TAG) members will receive a presentation on Project 1 of GSP Implementation: Managed Aquifer Recharge, including an update on the feasibility study underway. The TAG will also receive an update on current vineyards following in Napa Valley. This is intended to spur discussion, questions and provide feedback to staff and participants.  
Duncan MacEwan, ERA and Nick Newcomb, LSCE gave a presentation.  
Chair Filipelli initiated a discussion.  
(2) Public comments were heard.  
No action was taken.

**6. FUTURE AGENDA ITEMS**

None.

**7. ADJOURNMENT**

Meeting adjourned at 4:35 P.M.

---

AIME RAMOS, Meeting Clerk



# Napa County

## Board Agenda Letter

1195 THIRD STREET  
SUITE 310  
NAPA, CA 94559  
www.napacounty.gov  
Main: (707) 253-4580

---

Groundwater Technical Advisory Group **Agenda Date:** 3/12/2026

**File ID #:** 26-401

---

**TO:** Technical Advisory Group for the Napa County Groundwater Sustainability Agency  
**FROM:** Brian D. Bordona, Director of Planning, Building and Environmental Services  
**REPORT BY:** Jamison Crosby, Natural Resources Conservation Manager  
**SUBJECT:** Presentation on Soil Health and Water Storage Assessment in Dry-Farmed Vineyards

---

### **RECOMMENDATION**

Miguel A. Garcia PhD, Senior Project Manager, Agriculture, Resource Conservation District of Napa County, will make a presentation to the TAG on a regional soil health and water storage assessment in dry-farmed vineyards funded by the California Department of Water Resources to better understand and promote dry-farming practices for water conservation and climate resilience.

#### Procedure

Staff introduces.  
Questions and answers with the TAG.  
Public comments.

### **BACKGROUND AND DISCUSSION**

Dry farming has long been practiced in California and plays a critical role in supporting agricultural resilience under conditions of increasing water scarcity and climate variability. This presentation summarizes findings from a regional soil health and water storage assessment conducted across 15 dry-farmed vineyards in Napa, Sonoma, and Mendocino Counties. The project seeks to evaluate how soil management practices influence soil health and the capacity of vineyard soils to store and supply water throughout the growing season without in-season irrigation.

Soil pits were sampled during the 2025 growing season to assess physical, chemical, and biological indicators of soil function, including organic matter, aggregate stability, and plant-available water. Various vineyard management practices were assessed from reduced- or no-till systems with organic inputs to more intensively tilled operations, allowing comparison of how disturbance and soil stewardship practices affect water storage and soil resilience.

Results indicate that most fields functioned within or above expected soil health and water-holding ranges relative to soil texture. Subsoil horizons consistently served as late-season moisture reserves, supporting vines through the dry season. Overall, the findings demonstrate that well-managed dry-farmed soils can function as effective natural water reservoirs, reinforcing the role of soil health in agricultural resilience and long-term

groundwater sustainability.

### **ENVIRONMENTAL IMPACT**

ENVIRONMENTAL DETERMINATION: The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

### **SUPPORTING DOCUMENTS**

- A. Presentation on Soil Health and Water Storage Assessment in Dry-Farmed Vineyards (Dr. Miguel Garcia, Napa RCD)

# Soil Health and Water Storage Assessment in Dry-Farmed Vineyards

Miguel A. García PhD, CCA

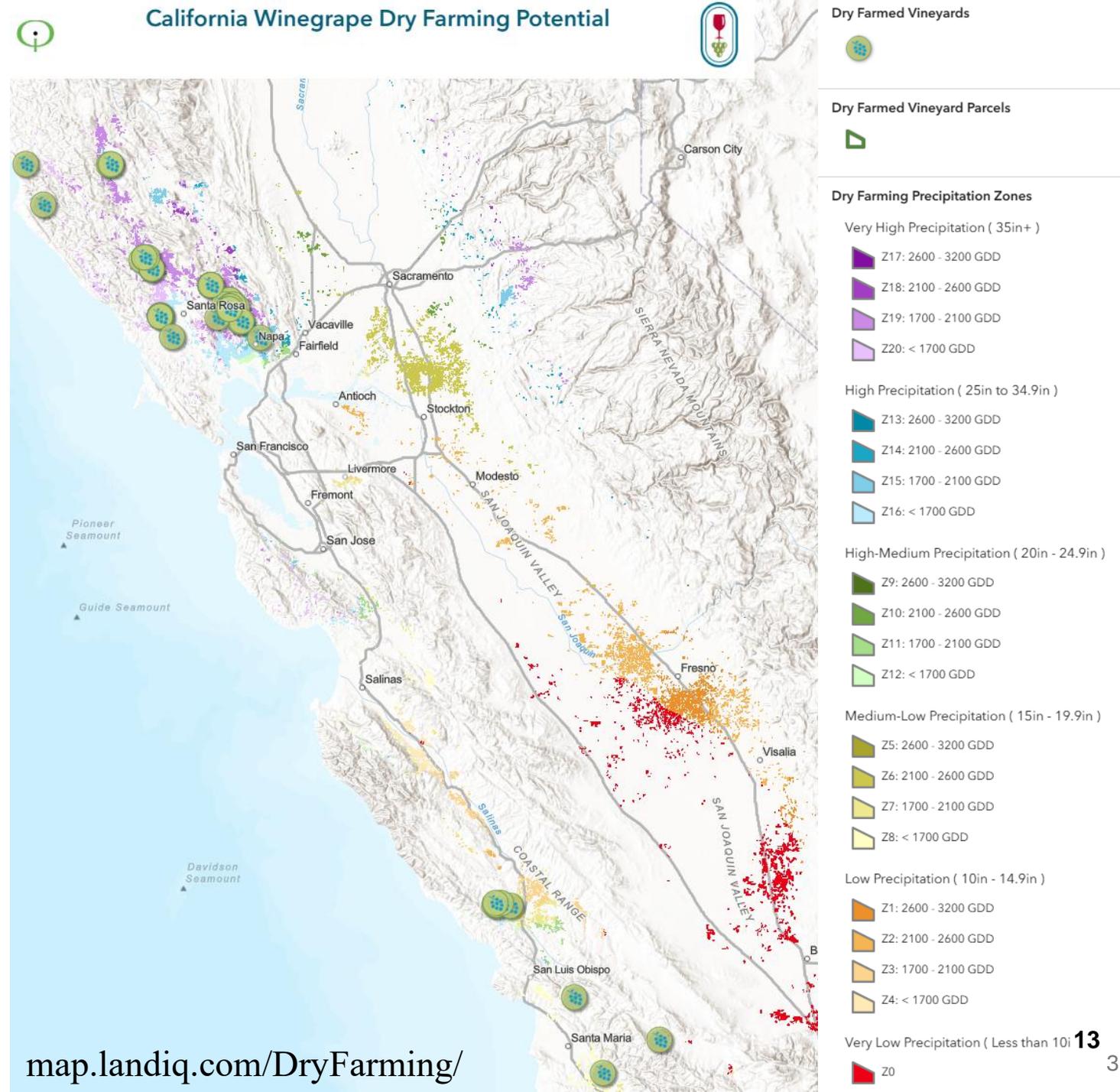


Dry farming offers a management strategy that strengthens agricultural resilience in the face of increasing water scarcity and climate uncertainty.



## Why Dry Farming Matters Now

- Dry farming has a long historical presence in California agriculture.
- Many vineyards across the state continue to operate successfully without in-season irrigation.
- Climate change is increasing temperature extremes, drought frequency, and variability in water availability across California.
- Growers face increasing uncertainty around irrigation water reliability and long-term water security.
- Dry farming offers a management approach that supports **climate adaptation and system resilience**.
- Reduces dependence on irrigation while encouraging deeper rooting and more self-sufficient vines.





## The Knowledge Gap

- There is limited site-specific data on:
  - Soil health in dry-farmed vineyard systems.
  - The soil characteristics that influence how water is stored and mobilized in dry-farmed vineyards.

## Project Goals

- Better understand how different dry-farming management approaches influence soil health.
- Evaluate how soil health affects the soil's ability to:
  - Store and move water efficiently through the soil profile.
- Characterize how soil moisture is:
  - Stored during winter.
  - Depleted and redistributed through the growing season.





- 15 dry-farmed vineyards across Napa, Sonoma, and Mendocino Counties.
- 2 fields per vineyard.

## Soil Pit Sampling

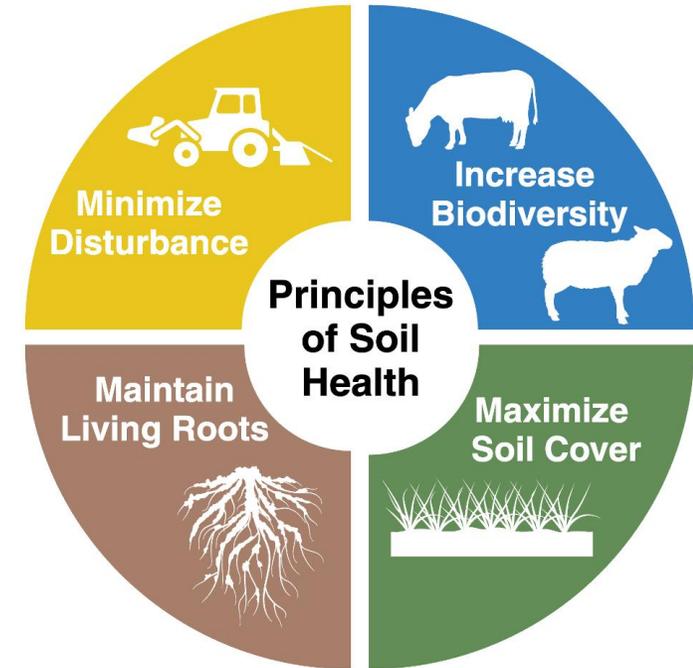
- Soil pit sampling was used to evaluate:
  - Soil physical, chemical, and biological properties.
  - Soil moisture levels and changes throughout the season.
- Soil sampling occurred three times during the 2025 growing season:
  - Around budbreak
  - During veraison
  - After harvest
- At each field:
  - Three soil pits were excavated.
  - Pits extended to a depth of five feet.
  - Each pit was sampled in one-foot depth increments.



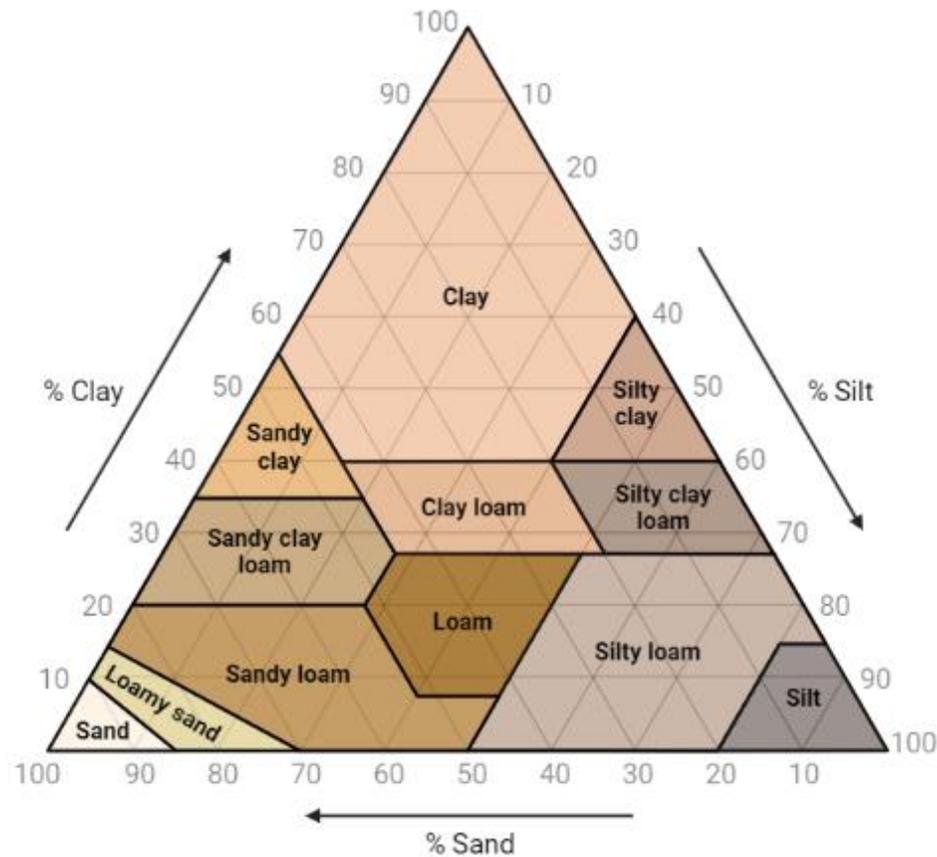


## Soil Management Across Participating Vineyards

- Management spans a wide spectrum from no-till to heavily tilled systems.
- Tillage supports weed control, cover crop incorporation, and moisture management.
- Reduced- or no-till vineyards:
  - Leave prunings and cover crop residues on the soil surface.
  - Minimize soil disturbance.
- Compost use differs widely:
  - No compost in some vineyards.
  - Annual applications of 2 to 3 tons per acre in others.
- This range of practices creates a management gradient that helps evaluate how:
  - Disturbance intensity and organic inputs influence soil carbon, biological activity, soil structure, and water storage



## Soil texture

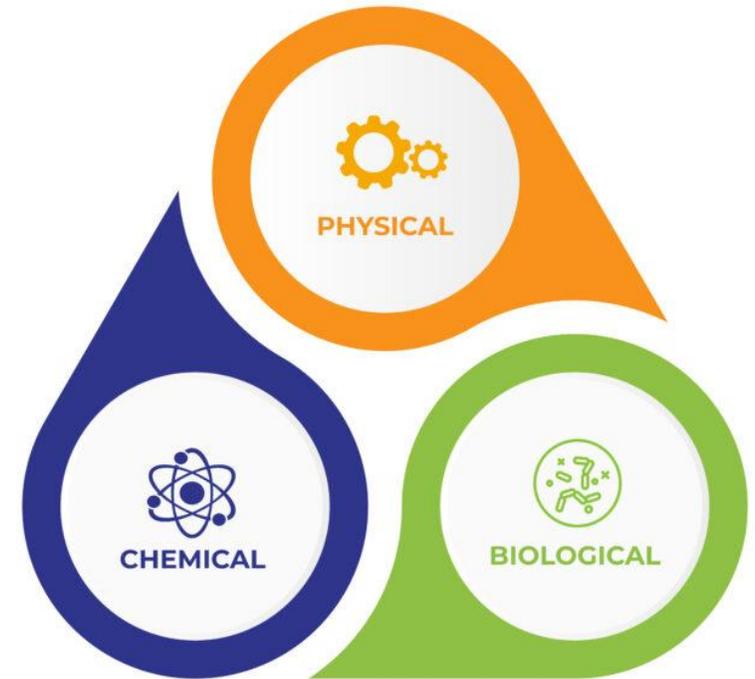


- Soil texture: proportions of sand, silt, and clay in a soil.
- Serves as a foundational characteristic shaping nearly all aspects of soil function.
- Soil texture across the vineyards in this project ranges from coarse sandy loam and loamy sand profiles to finer-textured loam, sandy clay loam, clay loam, and occasional sandy clay layers.
- Many vineyards show layered profiles, where coarser surface soils overlie finer-textured subsoils, or vice versa.
- These transitions strongly influence both infiltration and water storage.

## Soil health indicators

- Organic matter and total carbon: the long-term buildup of plant residues. Influence water-holding capacity, biological activity, aggregation, and overall fertility.
- Active carbon (POX-C), soil respiration and potential mineralizable nitrogen: show how much carbon is available to fuel microbes and how effectively the soil can release nutrients to crops over time.
- Aggregate stability: reflects whether soil particles form strong, stable clumps that resist erosion and improve infiltration.
- Cation exchange capacity (CEC): provides insight into the soil's ability to retain nutrients.

**Together, these indicators offer a holistic view of soil function and resilience.**



## Soil Health Patterns and Role of Management

- Most fields scored within or above expected ranges for soil health; only a minority scored lower.

- Two key questions:
  - **Do management practices drive differences in soil health?**
  - **Do lower soil health scores limit water movement and storage?**

- Tillage is a major factor in many lower-scoring fields, but not all tilled fields score poorly.

- Frequent disturbance:

- Breaks down soil aggregates.
- Accelerates loss of organic carbon.
- Reduces long-term organic matter stability.

- Weaker aggregate stability often overlaps with more intensive disturbance.

- However, compost inputs and high cover crop biomass can offset some tillage effects.

Soil health indicators in reference to expected values by soil texture or regional averages.

Soil health indicator	Below	Within	Above
Organic Matter (%)	3	17	10
Total Carbon (%)	4	18	8
POX-C (ppm)	5	11	14
CEC (meq/100g)	9	17	4
Aggregate Stability (%)	4	9	17
Soil Respiration (ppm-C/day)	2	6	22
PMN (mg N/kg soil)	8	10	12

Depth (ft)	Available Water (in-H <sub>2</sub> O/in-soil)	Expected Available water (in-H <sub>2</sub> O/in-soil)	Total Available Water (in-H <sub>2</sub> O)	Field Capacity (%)	Moisture at Bloom (%)	Per. Wilting Point (%)	Moisture after harvest (%)
1	0.16	0.10-0.13	1.92	17.6	14.0	5.5	4.9
2	0.14	0.07-0.10	1.69	15.5	17.1	4.8	4.7
3	0.14	0.10-0.13	1.73	18.3	21.2	7.3	11.4
4	0.15	0.10-0.13	1.84	20.1	16.6	8.5	11.3
5	0.16	0.10-0.13	1.93	20.9	21.7	8.7	10.5
<b>Total available water</b>			9.11				

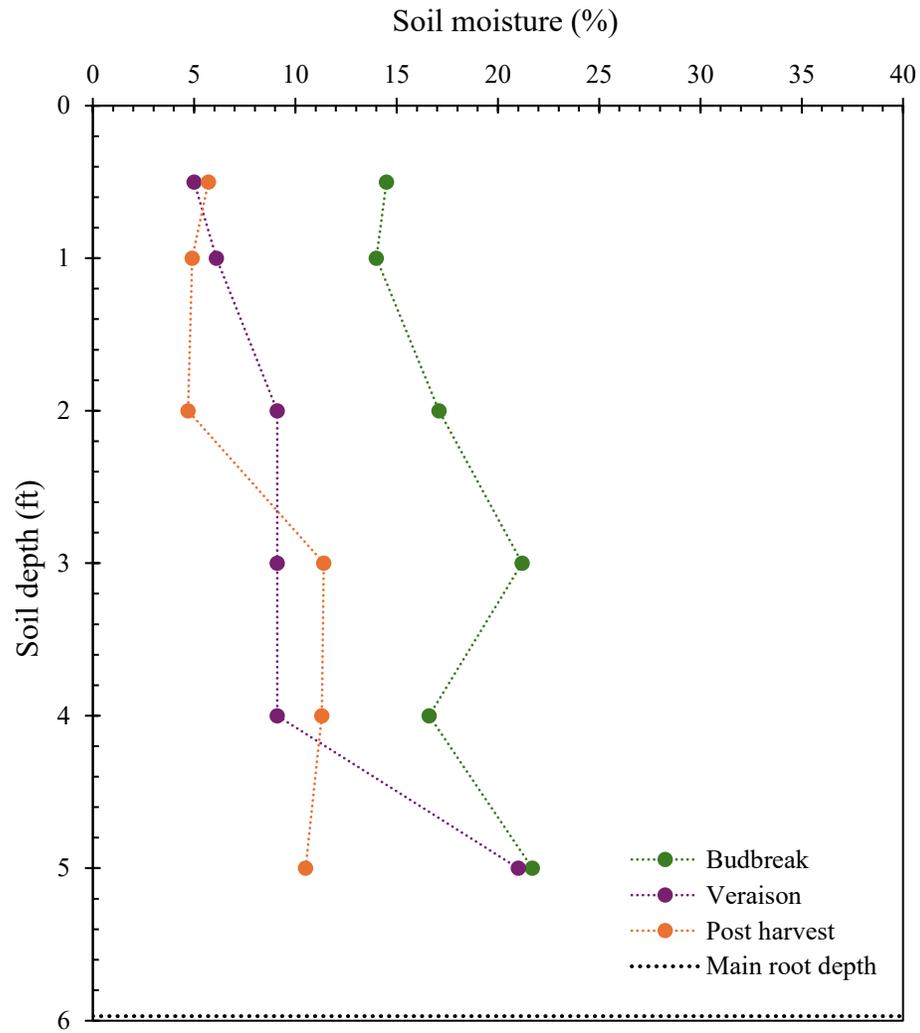
## Water storage

- All fields show plant-available water within or above expected ranges based on soil texture.
- Soils are functioning at or above their inherent physical potential for water storage.
- Across the five-foot rooting zone, total available water is generally sufficient to support vines through the dry season.
- Winter rainfall does not always fully recharge soils to field capacity.
- Some fields retain residual plant-available moisture after harvest, while others approach lower extraction limits

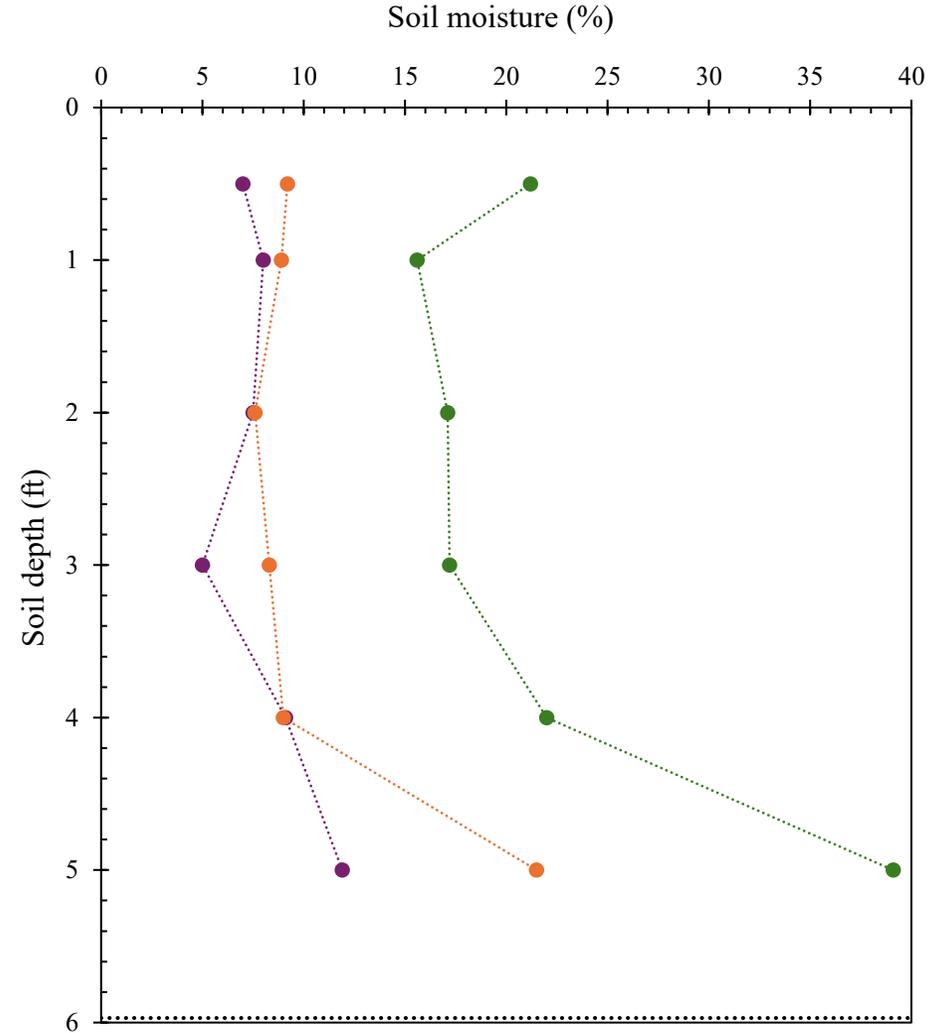
### Available water results in reference to expected values by soil texture.

Soil depth	Below	Within	Above
1 ft	0	8	22
2 ft	0	6	24
3 ft	0	14	16
4 ft	0	14	16
5 ft	0	10	19

# Soil moisture throughout the season



Vineyard 1 Field 1



Vineyard 1 Field 2

## Typical Seasonal Pattern in Dry-Farmed Vineyards

- Clear, repeated pattern across sites:

- Upper horizons dry first as canopy demand increases
- Deeper layers retain moisture longer and act as the late-season reservoir

### End-of-Season Moisture Patterns

- Two general patterns by harvest:

- Some fields approach or fall below the permanent wilting point, indicating strong late-season water use and higher stress.
- Other fields retain moisture in deeper layers, providing a late-season buffer.

### Water Redistribution Within the Profile

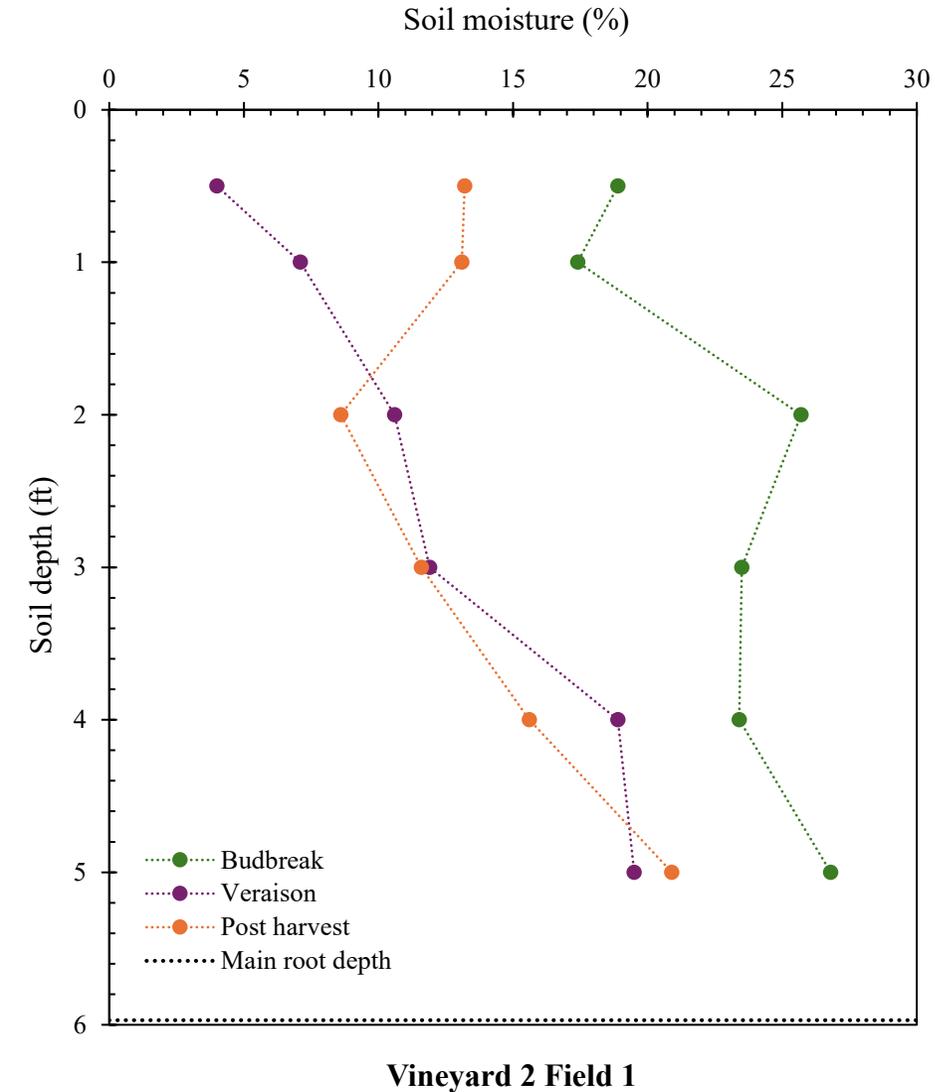
- Some sites show slight internal moisture increases at certain depths late in the season.

- Occurs even with minimal rainfall.

- Likely due to:

- Passive water movement along moisture gradients.
- Hydraulic redistribution by roots.
- Reduced transpiration near senescence.

- Suggests deep water can move upward and remain available in the root zone.



## Regional Dry-Farming Soil Assessment Overview

- The majority of fields function within or above expected soil health ranges with stronger biological activity, carbon levels, and aggregation linked to organic inputs and reduced disturbance.
- Soils often began the season below full saturation, highlighting the role of winter rainfall and infiltration.
- Subsoil horizons act as the late-season water reserve.
- Many systems operate near stored water limits by harvest.
- Overall, soils function as effective natural water reservoirs, reinforcing the value of dry farming in aligning production with natural water cycles.



# Thanks!

Miguel A. García, PhD, CCA  
Regenerative Ag Project Manager  
Napa Resource Conservation District  
miguel@naparcd.org  
951-892-6712

Soil sampling and picture credits:





# Napa County

## Board Agenda Letter

1195 THIRD STREET  
SUITE 310  
NAPA, CA 94559  
www.napacounty.gov  
Main: (707) 253-4580

---

Groundwater Technical Advisory Group **Agenda Date:** 3/12/2026

**File ID #:** 26-414

---

**TO:** Technical Advisory Group for the Napa County Groundwater Sustainability Agency  
**FROM:** Brian D. Bordona, Director of Planning, Building and Environmental Services  
**REPORT BY:** Jamison Crosby, Natural Resources Conservation Manager  
**SUBJECT:** Presentation on Napa Valley Subbasin Recharge Feasibility Analysis

---

### **RECOMMENDATION**

Technical Advisory Group (TAG) members will receive a presentation on Project 1 of GSP Implementation: Managed Aquifer Recharge, including an update on the feasibility study development underway. In addition, the TAG will also receive an update on a vineyard replant modeling scenario that assesses the potential benefit over a 30-year period associated with extending the timeframe for vineyard replants in Napa Valley. The results of a preliminary modeling approach to assess recharge opportunities will also be presented. This is intended to spur discussion and questions, and provide feedback to staff and participants.

#### Procedure

Staff introduces.

Questions and answers with the TAG.

Public comments.

### **BACKGROUND AND DISCUSSION**

The Napa County Groundwater Sustainability Agency (NCGSA) is implementing the Water Conservation (WC) and Groundwater Pumping Reduction (GPR) Workplans (March 2024). The WC Workplan identified a suite of water conservation practices and the GPR Workplan developed an implementation plan to achieve measurable groundwater pumping reductions and overall water savings in the Napa Valley Subbasin (Subbasin). GPR implementation includes a voluntary, incentive-driven program for growers and other water users/industries in the Subbasin to adopt and expand water conservation practices. Mandatory measures are also included if the voluntary incentive-driven programs are insufficient.

An overview of current vineyard replants and idle land was presented to the TAG in December 2025. Current wine industry market conditions have prompted shifts in planting and replanting in the Subbasin following the 2024 harvest, which may influence the adoption of an extended vineyard replant program and potential recharge sites. An analysis was developed to review current winegrape market conditions impacting growers' decisions and document vineyards that have come out of production in 2025.

Napa Valley Subbasin Groundwater Sustainability Plan (GSP) implementation includes GSP Project #1: Managed Aquifer Recharge. Preliminary efforts have been implemented to evaluate on-farm practices to increase infiltration (recharge) and prepare a recharge feasibility study.

During the March meeting, the TAG will receive additional updates on the status of the preliminary phases of the Recharge Feasibility Analysis. Components of the recharge feasibility analysis include economic, technical, and financial investigations. NCGSA and its consultant team have been refining datasets and developing groundwater model data and inputs to evaluate the four recharge scenarios. Data development includes additional field-level information on vineyard characteristics, water use, and the age distribution of vineyards across a 40-year period considering typical replanting practices.

A presentation on modeling results will include (1) an evaluation of replanting management strategies on groundwater pumping, (2) an evaluation of recharge suitability to better identify locations in the Subbasin where recharge may optimize the enhancement of low flows, and (3) a description of next steps regarding recharge scenario modeling and project implementation. NCGSA staff and consultants have continued to discuss recharge with growers and potential partners to inform the analysis.

### **ENVIRONMENTAL IMPACT**

ENVIRONMENTAL DETERMINATION: The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

### **SUPPORTING DOCUMENTS**

- A. Presentation on Groundwater Pumping Reduction Workplan Update and Recharge Feasibility Study (Duncan MacEwan, ERA; and Nick Watterson, LSCE).



# Napa Valley Subbasin Groundwater Pumping Reduction Workplan Update and Recharge Feasibility Study

Napa County GSA TAG Meeting  
March 12, 2026

# Overview

1. GPR Workplan Implementation
2. Recharge Feasibility Study
3. Next Steps

# GPR Workplan Implementation

## *Guiding Framework*

- Focus on voluntary actions that achieve groundwater benefits for the Subbasin
- Assess the costs and benefits of alternative actions and focus on those that are most cost-effective
- Leverage existing programs and opportunities to generate value from a suite of voluntary actions
- Include adaptive management to adjust the program as data and sustainability indicators evolve
- Mandatory measures if voluntary programs do not achieve measurable reductions in groundwater pumping (e.g., mandatory metering/reporting)

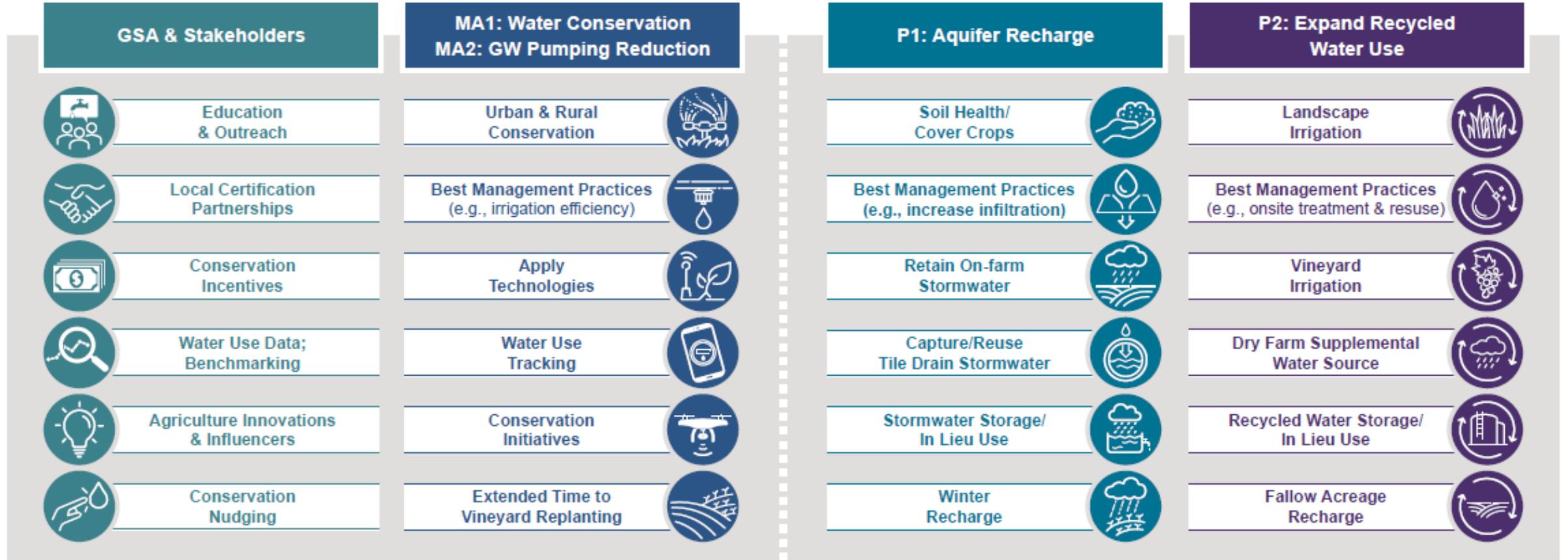
Groundwater  
Pumping  
Reduction



Groundwater  
Replenishment/  
Other GSP  
Projects

## Program Components & Voluntary Actions

(Individual Choice to Participate in Some or All)



Sustainability Goal Achieved through  
Collective Community Actions?

YES

Local Control  
Continue Voluntary Efforts

NO

State Control  
Mandatory Measures



# GSP PROJECT #1: MANAGED AQUIFER RECHARGE

# Recharge Investigation



## *Study Overview*

- Increase groundwater recharge
  - Target SGMA benefits (e.g., ISW and GDE)
  - Application of BMPs (e.g., stormwater retention)
  - Link to other GPR programs (extending replant, certification, other water conservation practices)
- Assessment of recharge opportunities
  - Technical (water supply, land use, infrastructure needs)
  - Economic (costs, benefits, return on investment, comparison to other PMAs)
  - Financial (funding mechanism)

# Working Draft TOC

1. Overview
2. Recharge Opportunities
  - Recharge Scenarios (Four Scenarios)
3. Technical and Legal
  - Water Rights for Recharge
  - Existing Water Right Utilization in Subbasin
  - Obtaining New Water Right
  - On-Farm Infrastructure and Management Considerations
  - GSP and Effects on ISW/GDE and Other SMC
4. Economic Feasibility
  - Environmental
  - Capital and O&MR Costs
  - Economic Benefits and Benefit-Cost Assessment
5. Financial Feasibility
  - Cost Recovery and Funding Strategy
  - Recharge Crediting Concept
6. Summary
7. References

# Recharge Scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<i>Name</i>	Extended Replant Recharge	Direct On-Farm Recharge	Pumping Reduction Recharge	Multibenefit Recharge
<i>Description</i>	Increase recharge on idle vineyard	On-farm recharge that may include Ag-MAR or basins	Use existing pond or reservoir for storage to reduce pumping	Recharge on lands near significant streams
<i>Duration</i>	< 5 years	Longer	Annual	Longer/permanent
<i>Capital</i>	Limited to standard replanting work, light earthwork/berms	Flood-MAR or recharge basins	Limited	Earthwork and infrastructure
<i>Water Right Pathway</i>	Temporary underground storage	Temporary underground storage	Existing rights	Temporary underground storage
<i>Administration</i>	GSA or individuals	GSA	Individuals	GSA

# Recharge Feasibility Study

## *Preliminary Activities: Feasibility Study*

- Analysis underway across multiple components, including economic, technical, and financial
- Ongoing grower and partner discussions for existing activities, feasibility, infrastructure, costs, experience and knowledge
- Developing necessary datasets and refining modeling and analyses

# Replant Scenario (Methods)

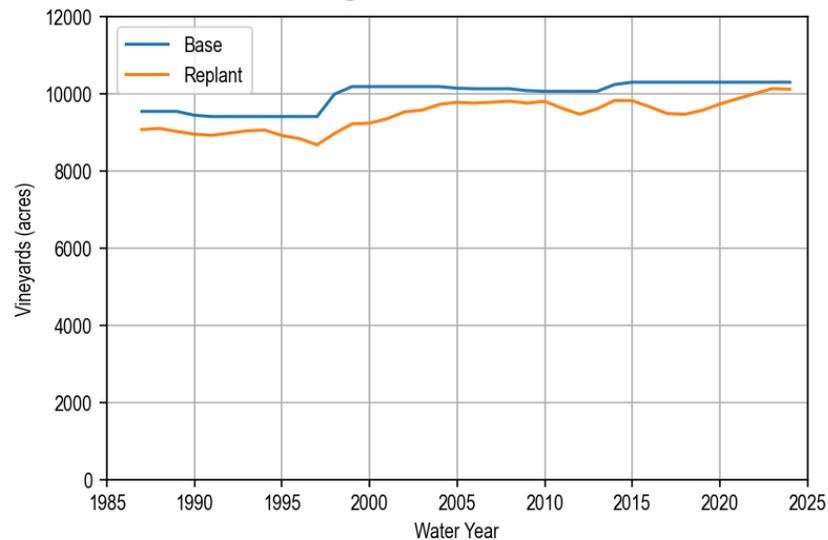
## Approach

- Increase period vineyards are idle before replanting by 2 years as a demand reduction strategy

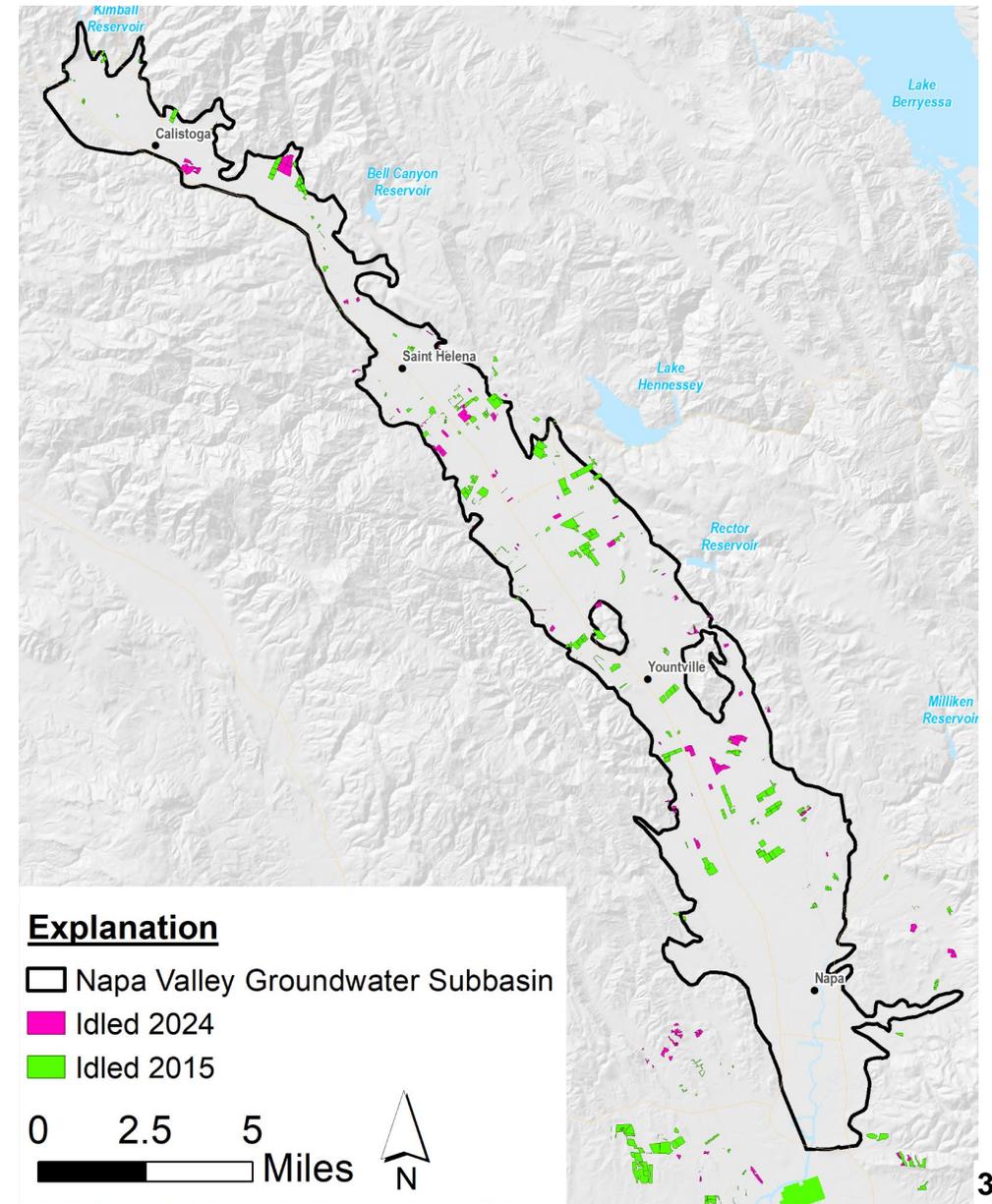
## Determining Vineyard Age

- Current vineyard age determined using the Napa County Assessors information (2024)
- Assumed a 30-year replant cycle to determine vineyard age

## Total Vineyard Acreage in Subbasin 1984 though 2024



## Idled Fields in Model Year 2015 & 2024

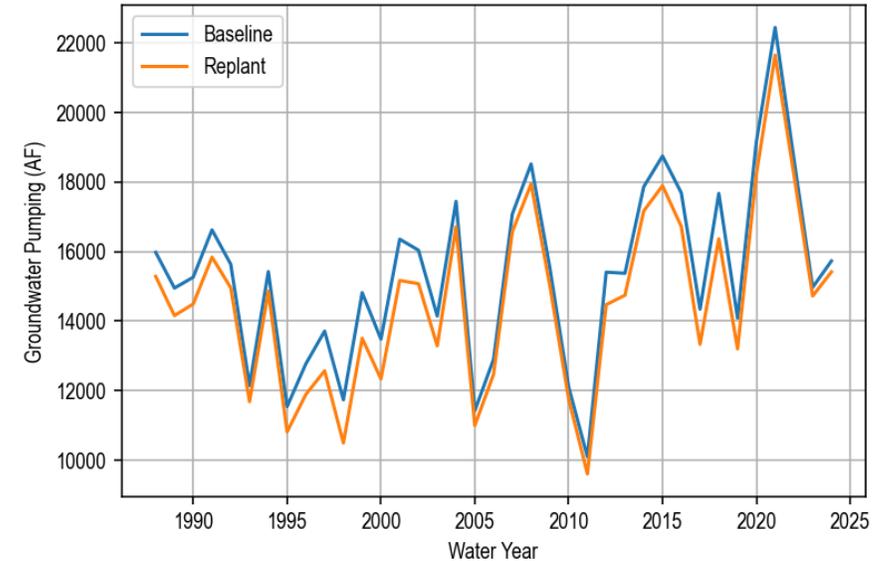


# Replant Scenario (Pumping Reduction)

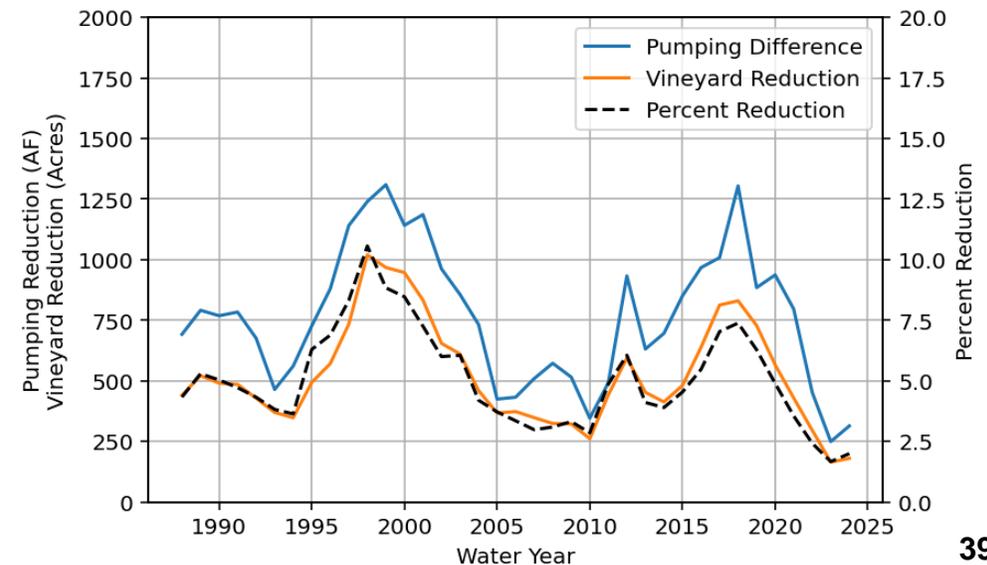
## Results

- Amount of vineyards idled in the scenario varies from 200 to 1,000 acres by year
- The resulting pumping reduction ranges from 250 to 1,250 acre feet
- Percent reduction ranges from 2.5 to 10%

Total Subbasin Pumping (1988-2024)



Total Subbasin Pumping Reduction (1988-2024)



# Replant Scenario (Streamflow)

## Results (Oak Knoll Gage)

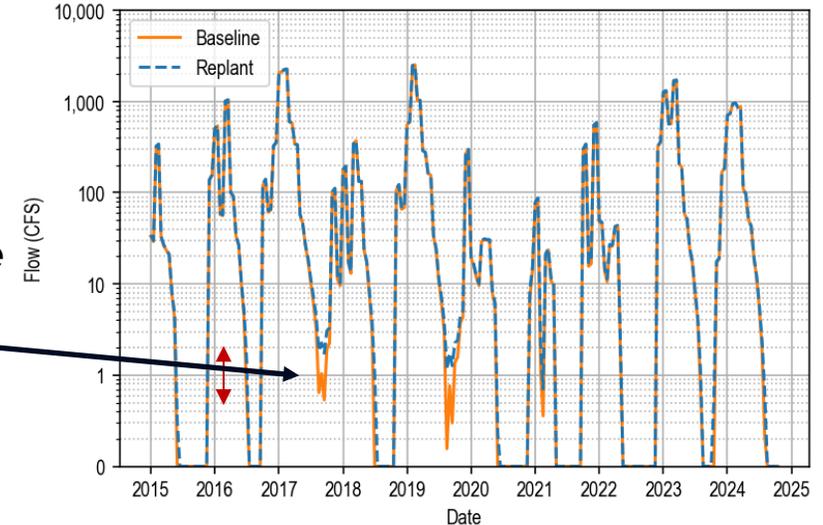
- Oak Knoll gage near the southern Subbasin boundary is where most of the pumping reduction will be accrued.
- Low flows increase by about 1 cfs
- Period where the stream is not dry increases by about 2%

## Streamflow benefits are roughly commensurate with pumping reduction

- Pumping reduction is about 2.2 acre-feet per day on average or 1.1 cfs

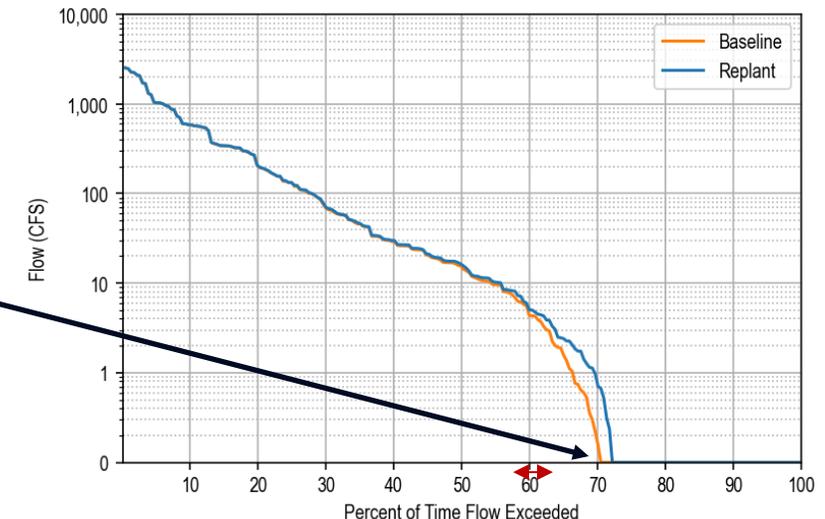
Simulated Streamflow at Oak Knoll (2015 – 2024)

1 cfs increase in low flows when they occur



Simulated Flow Duration Curve at Oak Knoll (2015 – 2024)

~2% increase in amount of time there is flow



# Discussion

- Are there any specific questions and feedback on the Replant Scenario update presented?

# Recharge Scenarios (Objectives & Background)

## Objectives

- Leverage model to evaluate recharge favorability with respect to low flows

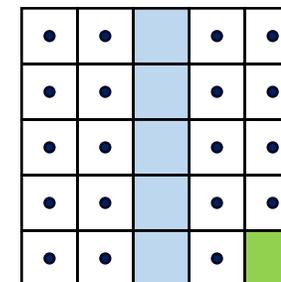
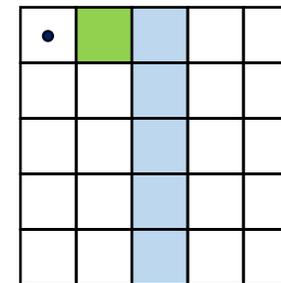
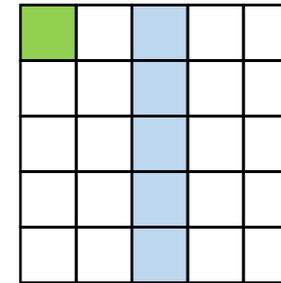
## Methods (Capture Fraction Method)

- Numerical method to evaluate spatial and temporal relationships between pumping and recharge and streamflow and riparian ET (Leake et al., 2008 & 2010)
- Method involves adding pumping or recharge to one cell in the model domain and evaluating the response in streams
- By iterating through all cells in a subregion, you can map the response with respect to location.

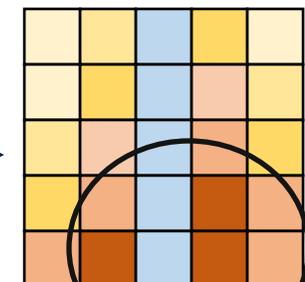
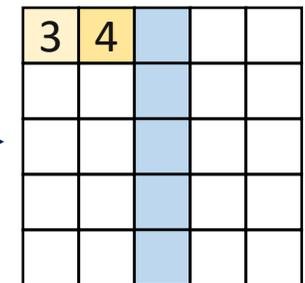
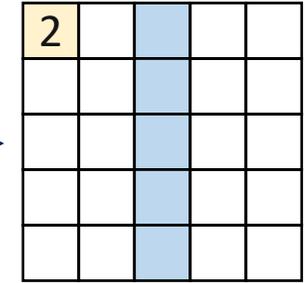
## Assumptions

- Used Water Year 2017
- Applied 20 AF of water distributed from December through March (5 AF per month)
- Consistent with Streamlined Recharge Permit time frame

Iteratively add  
20 AF of  
recharge  
to one cell  
(December-  
March)



Map volume of  
recharge  
captured by  
stream over  
certain period in  
time



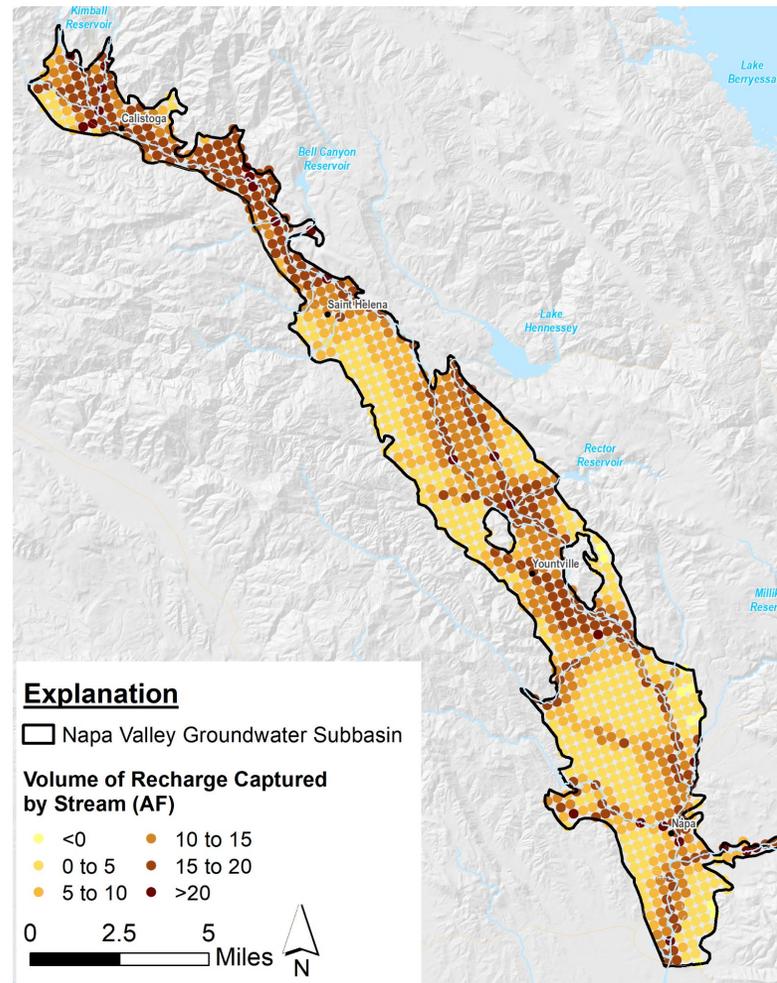
More  
Favorable

# Recharge Scenarios (Results)

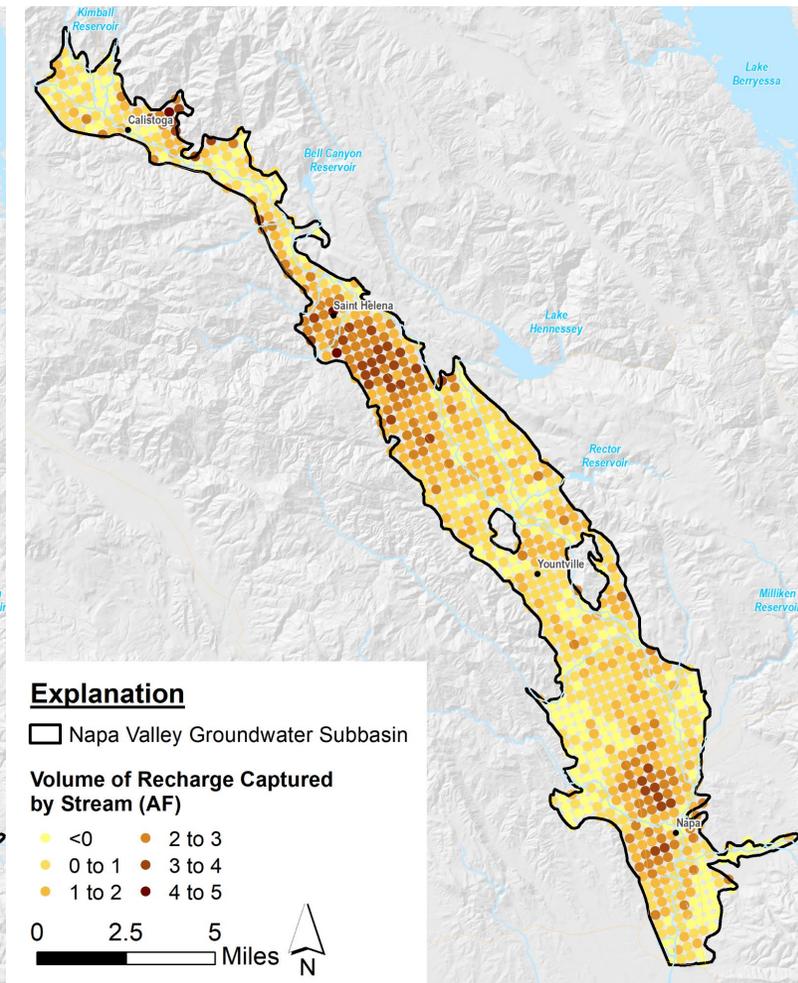
## Results

- Recharge near streams tends to get captured sooner when flows are still high.
- Recharge captured by streams during low flows is generally smaller (less than 5 AF).
- Other sources of capture (root groundwater uptake, drains)
- Some water may also stay in groundwater storage and doesn't make it to the stream during the year evaluated.
- Likely need to evaluate multiple years following recharge to evaluate full benefits
- Small volume of water challenging to evaluate using a regional model (noisy)

### High Flows (December-May)



### Low Flows (June-October)



# Discussion

- Are there any specific questions and feedback on the preliminary analysis of Recharge opportunities?

# Next Steps

- Continue Recharge Feasibility Investigation
  - Replant
    - Augment scenarios to include recharge on idled parcels
  - Recharge
    - Experiment with methods to minimize noise, improve confidence and evaluate additional metrics (groundwater storage and GDEs)
    - Investigate site specific hydrogeology and feasibility (e.g., water availability, conveyance)
- Pumping Reduction and Recharge Opportunities
  - Continue investigating water availability (underutilized water rights)
  - Outreach to growers to evaluate feasibility and pursue partnerships



# Napa County

## Board Agenda Letter

1195 THIRD STREET  
SUITE 310  
NAPA, CA 94559  
www.napacounty.gov  
Main: (707) 253-4580

---

Groundwater Technical Advisory Group **Agenda Date:** 3/12/2026

**File ID #:** 26-404

---

**TO:** Technical Advisory Group for the Napa County Groundwater Sustainability Agency  
**FROM:** Brian D. Bordona, Director of Planning, Building and Environmental Services  
**REPORT BY:** Jamison Crosby, Natural Resources Conservation Manager  
**SUBJECT:** Presentation on Alexander Valley On-Farm Recharge Initiative

---

### **RECOMMENDATION**

Dr. Bachand will provide information on the development and implementation of the Alexander Valley On-Farm Recharge Initiative. Phase 1 of a multi-phase project, led by the Dry Creek Rancheria of Pomo Indians, is underway to utilize nearly 3,000 acres of active or fallow vineyards for recharge from diverting high flows off the Russian River.

#### Procedure

Staff introduces.

Questions and answers with the TAG.

Public comments.

### **BACKGROUND AND DISCUSSION**

The Dry Creek Rancheria of Pomo Indians has been leading the development and implementation of the Alexander Valley On-Farm Recharge Initiative. At full-buildout, the Initiative envisions typical recharge of the local aquifer with 6,000 - 7,000 acre-feet annually employing approximately 3,000 acres of vineyards and their associated irrigation infrastructure. Under Phase 1 of this multi-phase project, the 2-year pilot studies are nearing completion with the goals of informing current and future Initiative operations, and design and construction of Pilot-At-Scale recharge sites are nearing completion. Dr. Phil Bachand will discuss the regional water reliability factors driving the concept, the process of implementing the vision, lessons learned from the pilot studies, monitoring and measurement approaches and technology, stakeholder engagement and leadership, and key program governance and energy challenges (see Attachment A). More information is provided in the attached fact sheet (Attachment B).

### **ENVIRONMENTAL IMPACT**

**ENVIRONMENTAL DETERMINATION:** The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

### **SUPPORTING DOCUMENTS**

- A. Presentation on Implementation of the Alexander Valley On-Farm Recharge Initiative (Phil and Sandra Bachand of Bachand Associates)

B. Fact Sheet: Alexander Valley On-Farm Recharge Initiative



# Considering On-Farm Recharge (OFR) to support Water Resources

Philip Bachand, Ph.D.

Bachand & Associates

Davis, CA

[Philip@bachandassociates.com](mailto:Philip@bachandassociates.com)

[www.bachandassociates.com](http://www.bachandassociates.com)

530-574-3376

# Motivations and....

## **Motivations**

- Climate Change / Drought Resilience
- Risk Management
- Regulatory

## **Cons**

- Costs
- Risks of Outcomes
- Regulatory

# Conceptual OFR Recharge Model

- Perched groundwater mounding
- Some movement to deeper aquifer if not confined
- Raised groundwater level increases stream baseflows
- Raised groundwater level can reduce irrigation demand through capillary rise

Pre - Recharge

Key

- Groundwater
- ▼ Perched Water Table
- ▼ Deep Water Table
- Lower Water Content
- Higher Water Content
- || Field Boundaries
- 🌳 Field with Recharge Applied

Post - Recharge

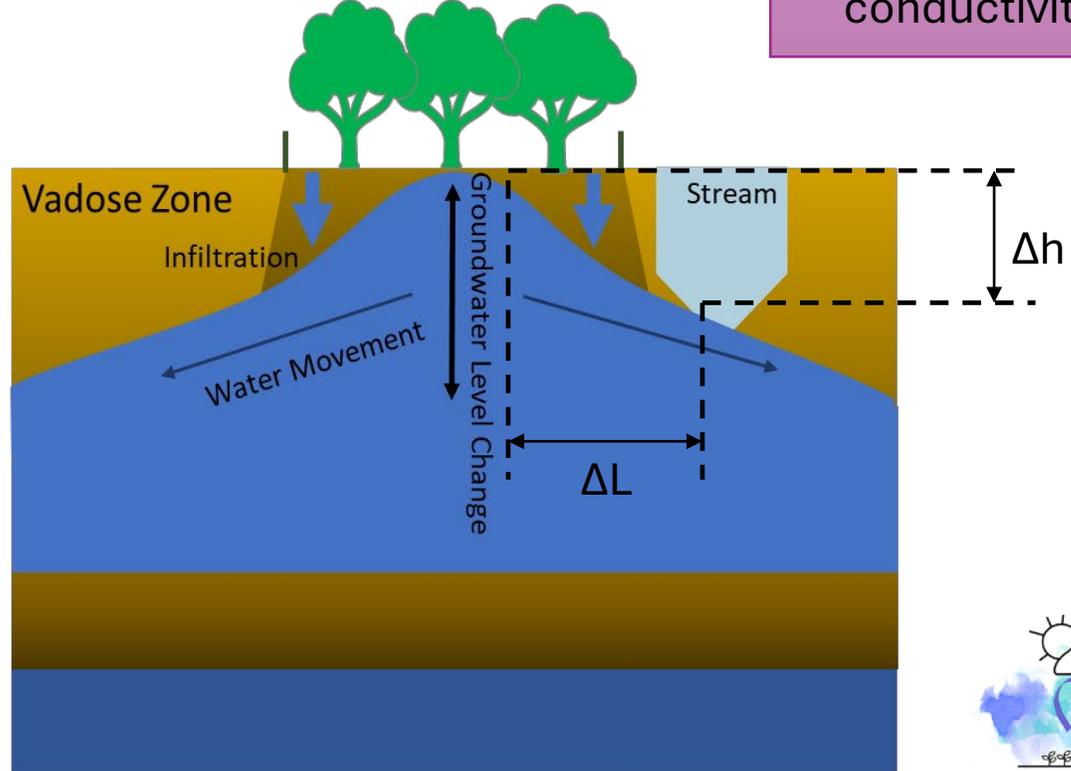
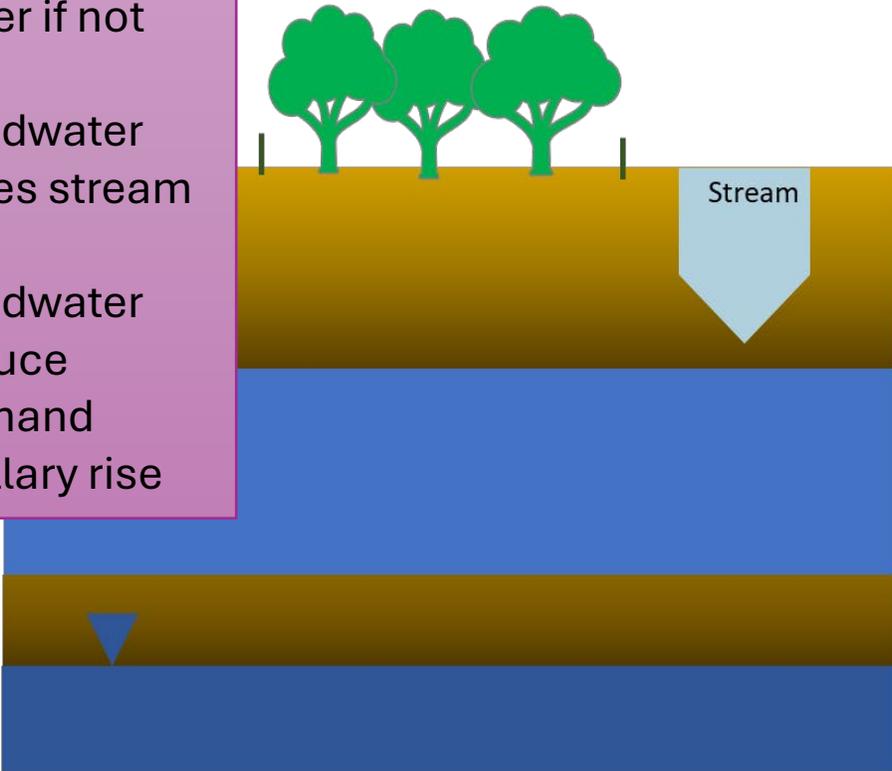


Darcy's Law

$$i = \frac{\Delta h}{\Delta L}$$

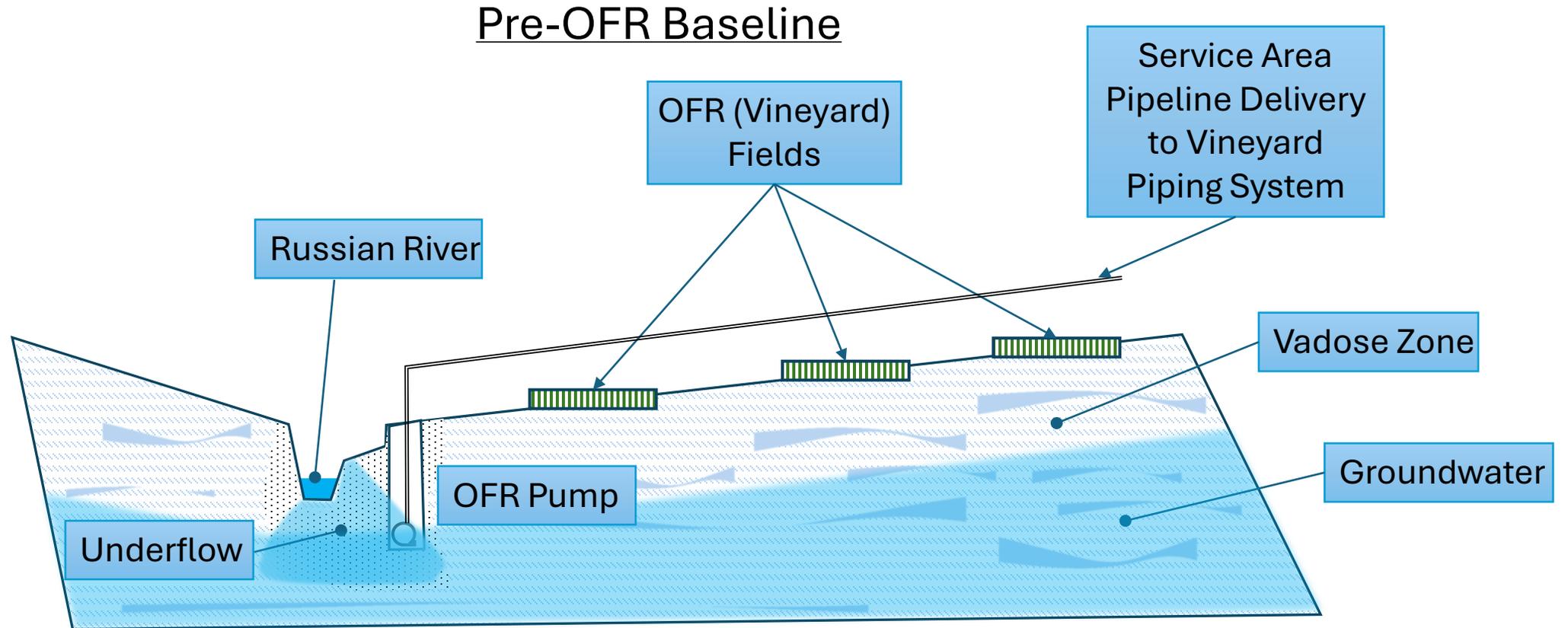
$$Q = KAi$$

K = hydraulic conductivity



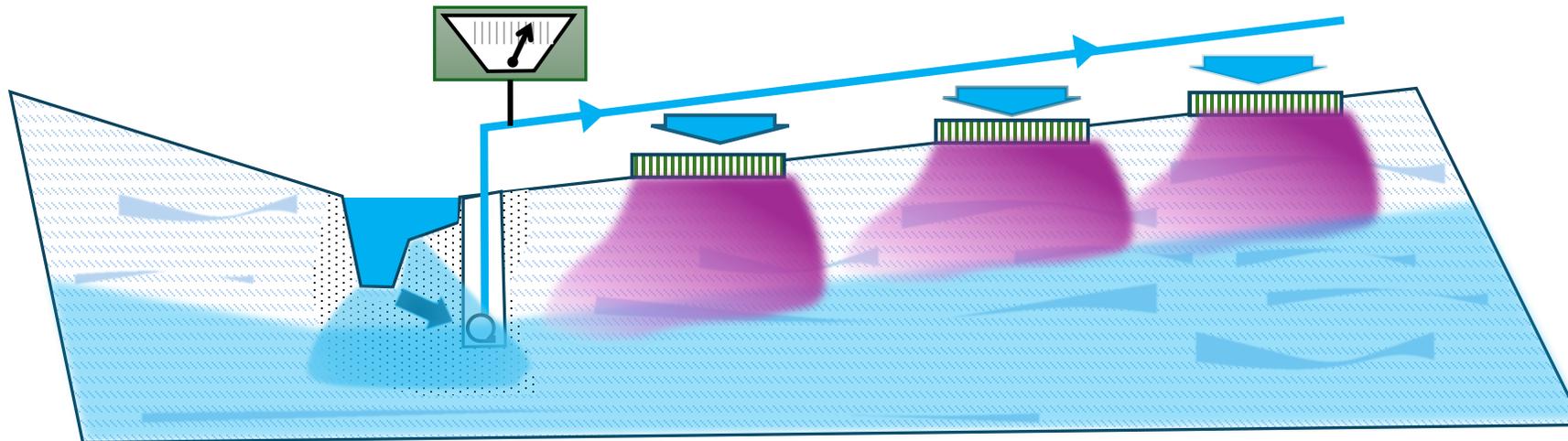
Rain present, but does not cause mounding reflected in diagram

# Alexander Valley FloodMAR Process



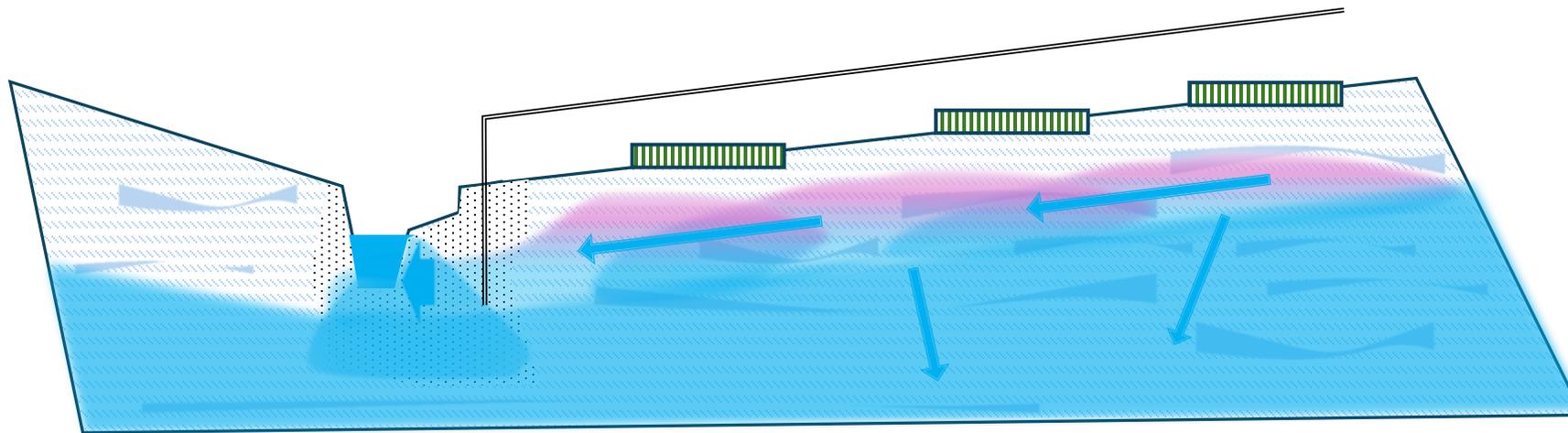
# Alexander Valley FloodMAR Process

November through March

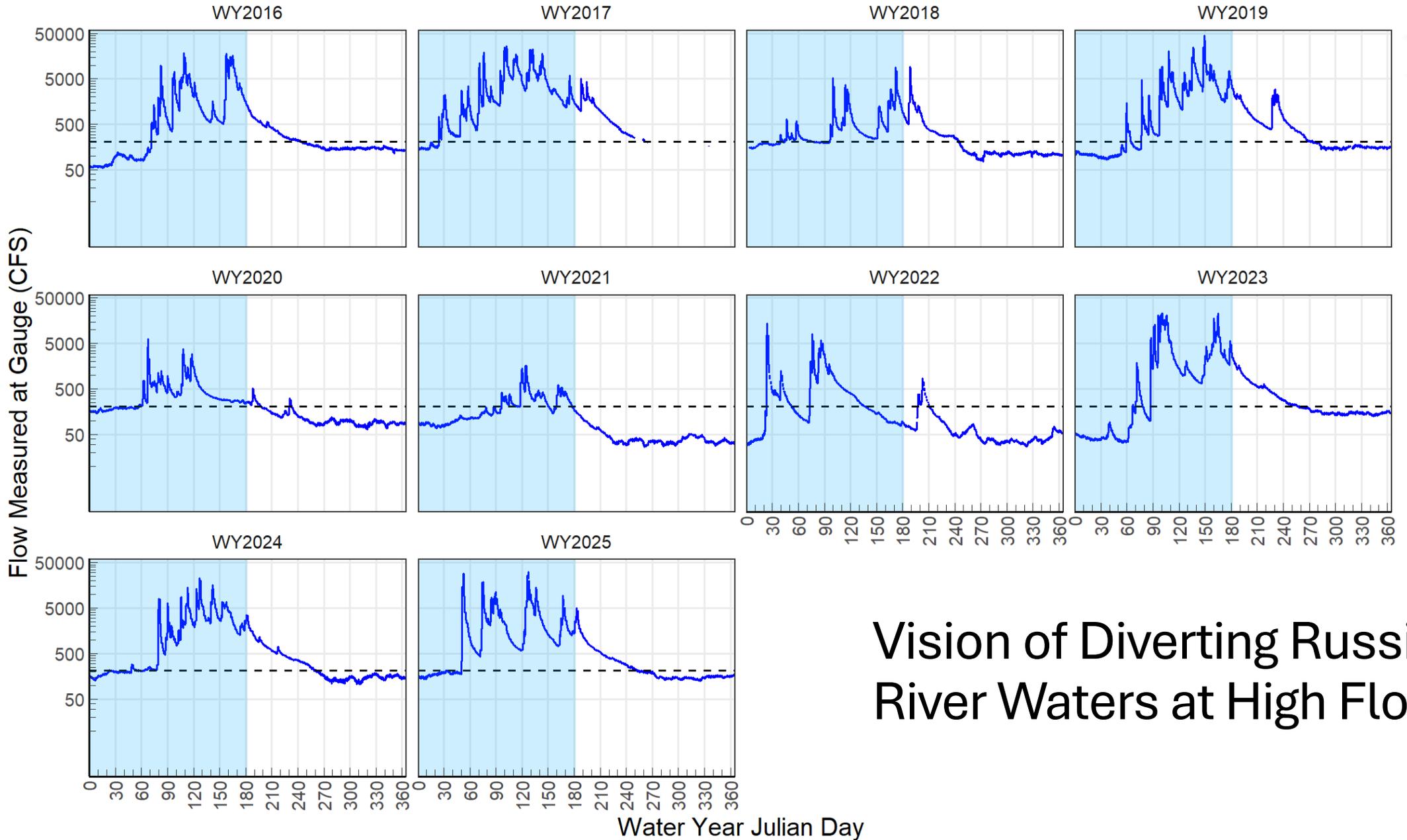


# Alexander Valley FloodMAR Process

April through October

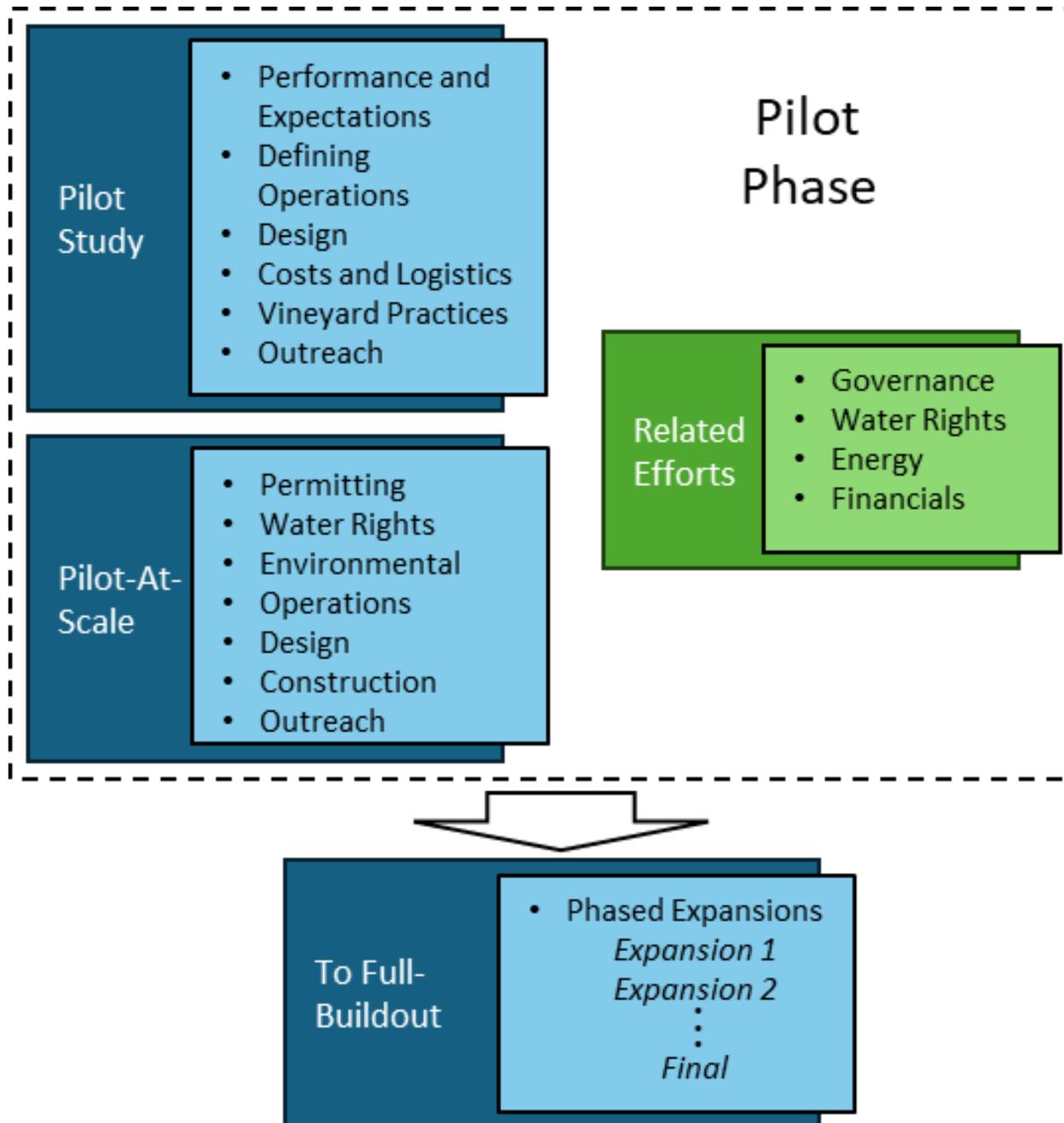


# Russian River Flows Over 210 CFS Measured at Jimtown Gauge (USGS 11463682) for Water Years 2016-2025



## Vision of Diverting Russian River Waters at High Flows

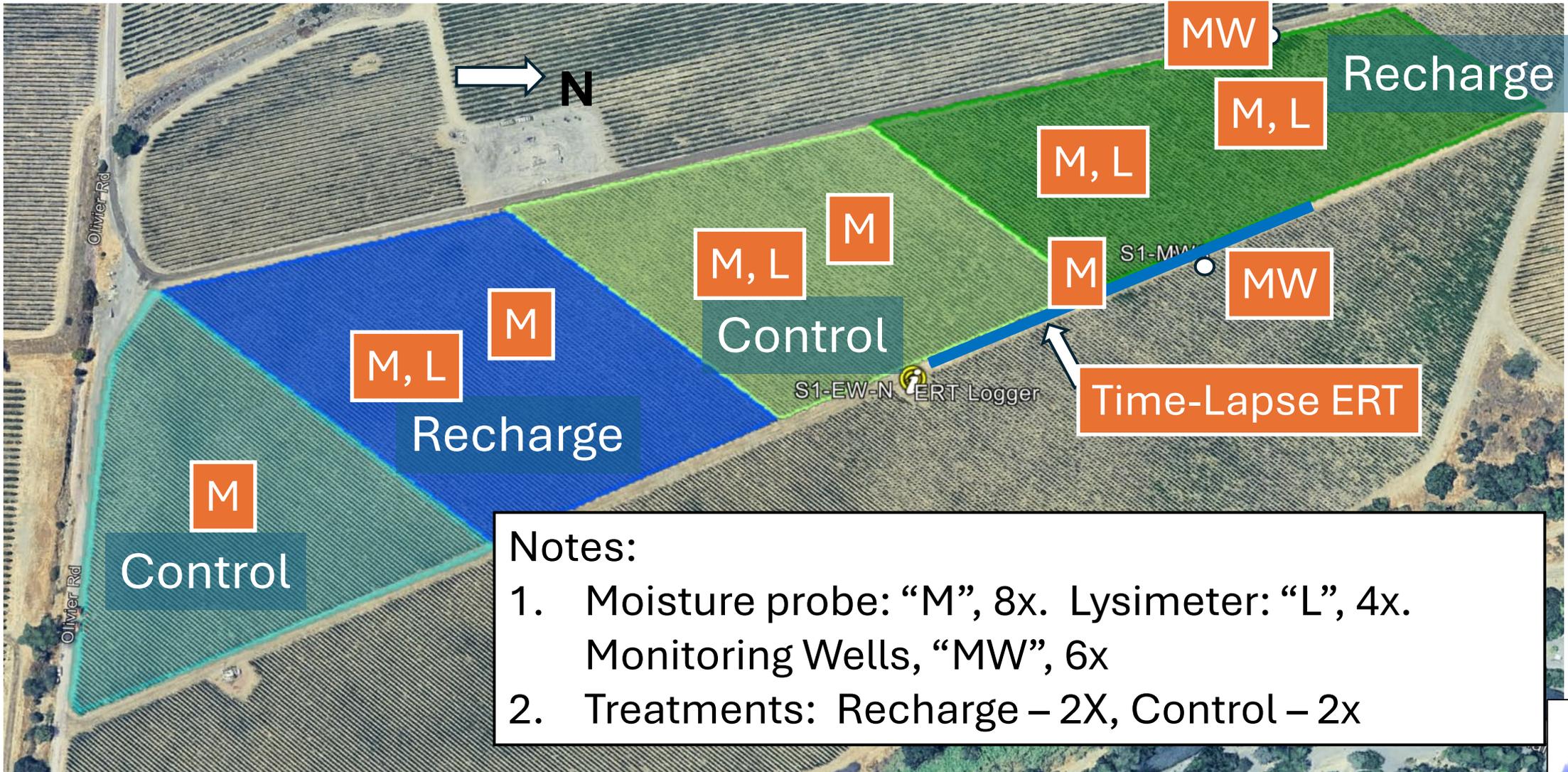
# OFR Initiative Overview



# Average Annual Recharge Targets



	Pilot-At-Scale	Full Buildout	Units
<b>Field Operations</b>			
Assumed Recharge Rate (1)	14.7	14.7	GPM/Ac
	0.1	0.1	AFD
Durations	36.0	36.0	Days
Volume per Acre	2.3	2.3	Ac-Ft/Ac
<b>Alexander Valley Regional Operations</b>			
Estimated OFR fields	974	2,969	Acres
Estimated OFR fields simultaneous Operations	436	1,485	Acres
<b>Total Volume</b>	<b>2,278</b>	<b>6,944</b>	<b>Ac-Ft</b>
<b>Maximum Regional Diversion Rate</b>	<b>15.8</b>	<b>54.5</b>	<b>CFS</b>
1. Rate estimated at this time.			



- Notes:
1. Moisture probe: "M", 8x. Lysimeter: "L", 4x. Monitoring Wells, "MW", 6x
  2. Treatments: Recharge – 2X, Control – 2x

# Frost Protection Sprinklers

Labor limited time

Not in sync with continuous high flow diversions

Higher Maintenance Likely

Frost Protection Sprinklers water rights problem and many have been removed or not maintained

Higher energy cost per volume pumped



# Drip and Micro-Irrigation Sprinklers

Sensitive to filtering

24/7 operations opportunities

More Limited Maintenance Expected

In sync with 24/7 high flow diversions

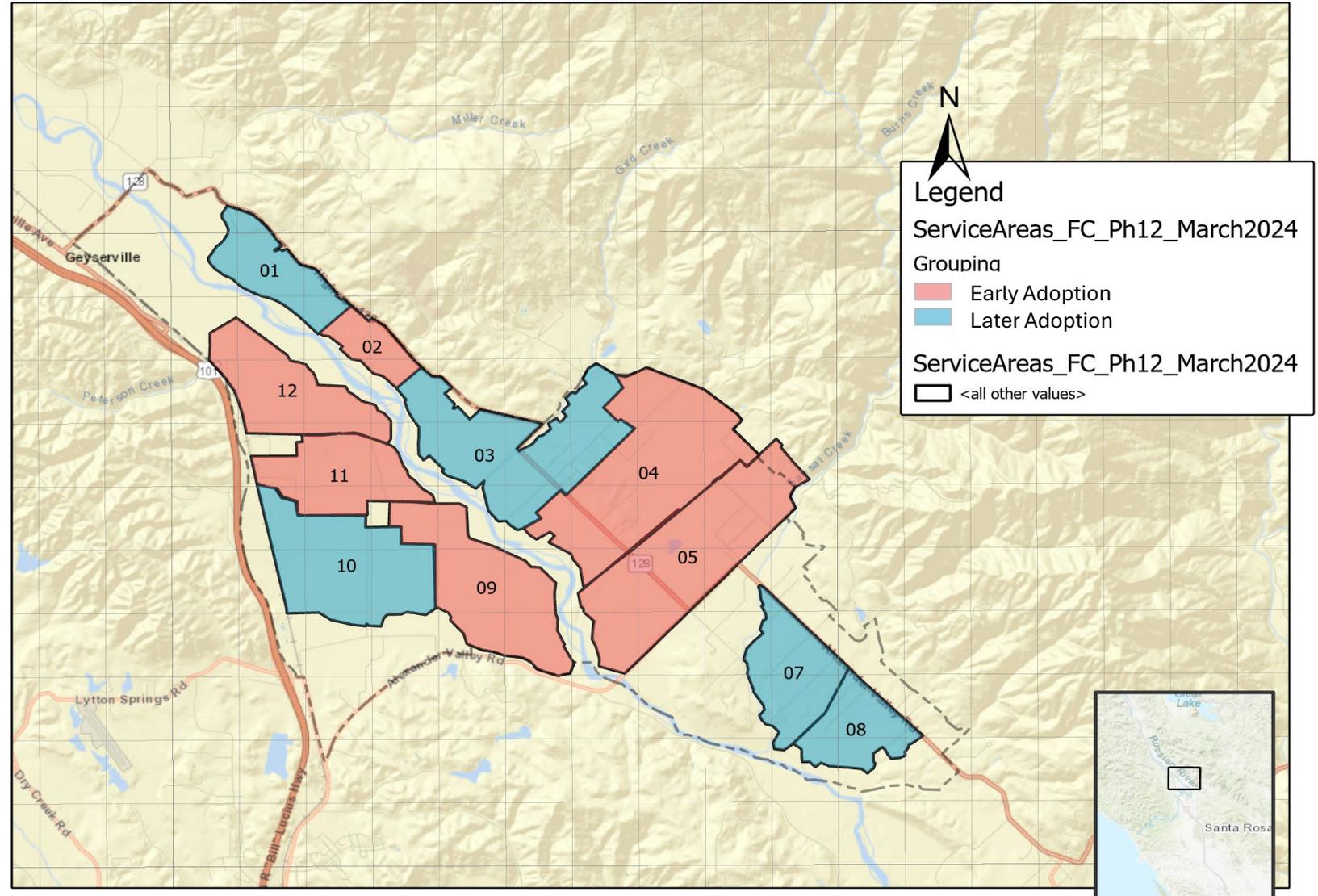
Filtration needs

Lower energy cost per volume pumped



# Defining Service Areas

- Service Areas are laid out in a clockwise direction in Alexander Valley
- Designed to minimize crossing (e.g., streams, railroads, roads) and leverage landowner systems
- Each Service Area will have Russian River OFR supply pump station
- Service Areas are represented by Phase 1 and 2. Phase 3 are not in consideration at this time.



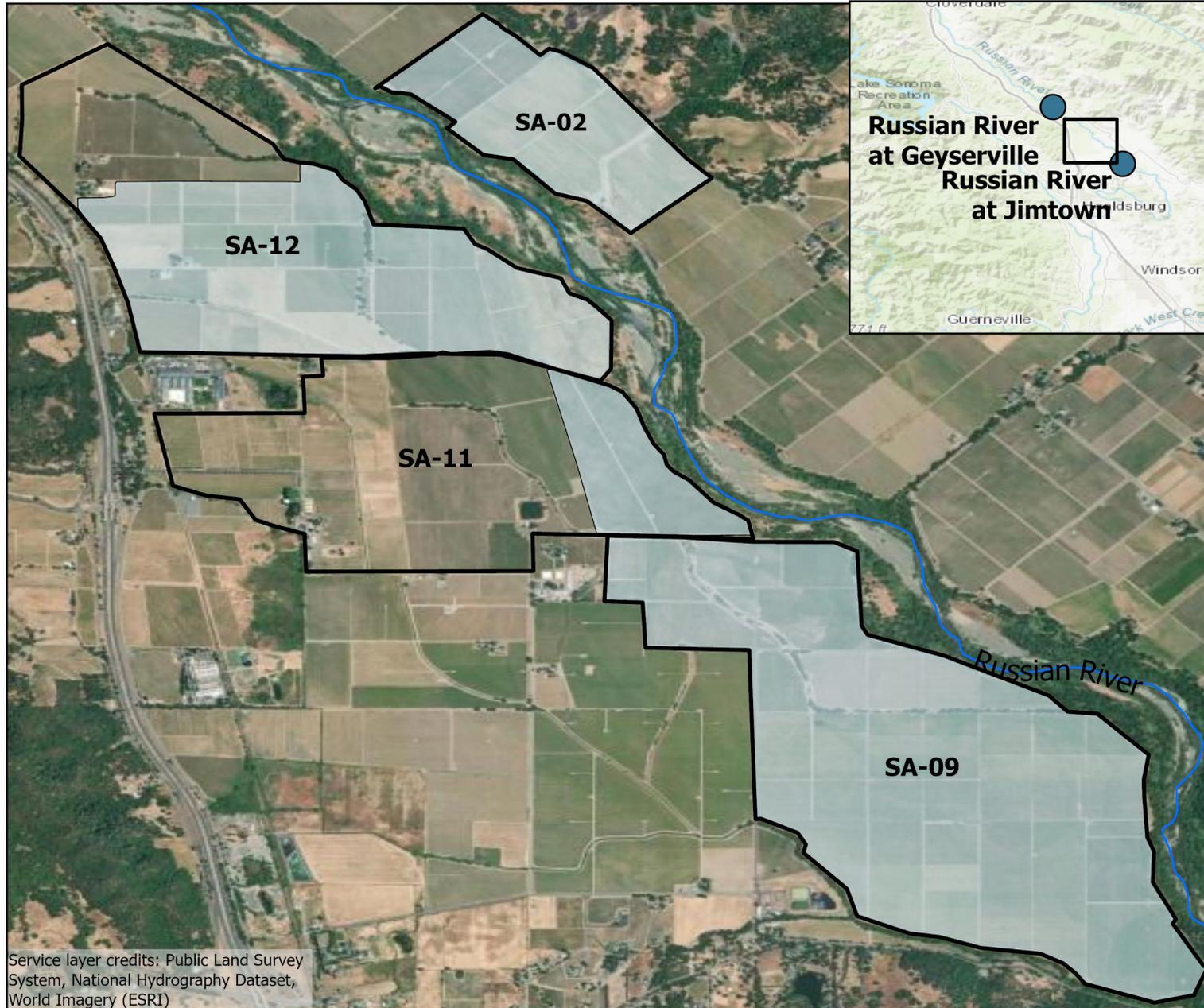
Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS, Sonoma County, Lake County, CA, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, NGA, USGS

0 0.42 0.85 1.7 2.55 3.4  
 Miles

Map Completed by Philip Bachand.  
 Bachand & Associates, March 2024  
 ArcGIS Pro  
 Supported through ESRI Sustainability Program



# Pilot-At-Scale Coverage (~ 970 acres)



Service layer credits: Public Land Survey System, National Hydrography Dataset, World Imagery (ESRI)

Alexander Valley On-Farm-Recharge Initiative

Pilot-At-Scale Potential Recharge Application Areas: SA-02, SA-11, SA-12, SA-09

### Legend

- Service Area Outlines
- Pilot-At-Scale Potential Recharge Application Areas
- USGS Gauge
- Russian River

### Potential Pilot-At-Scale OFR Application Areas

- SA-02: 92 acres
- SA-09: 525 acres
- SA-11: 68 acres
- SA-12: 289 acres

Samantha Fung  
Bachand & Associates  
March, 2026

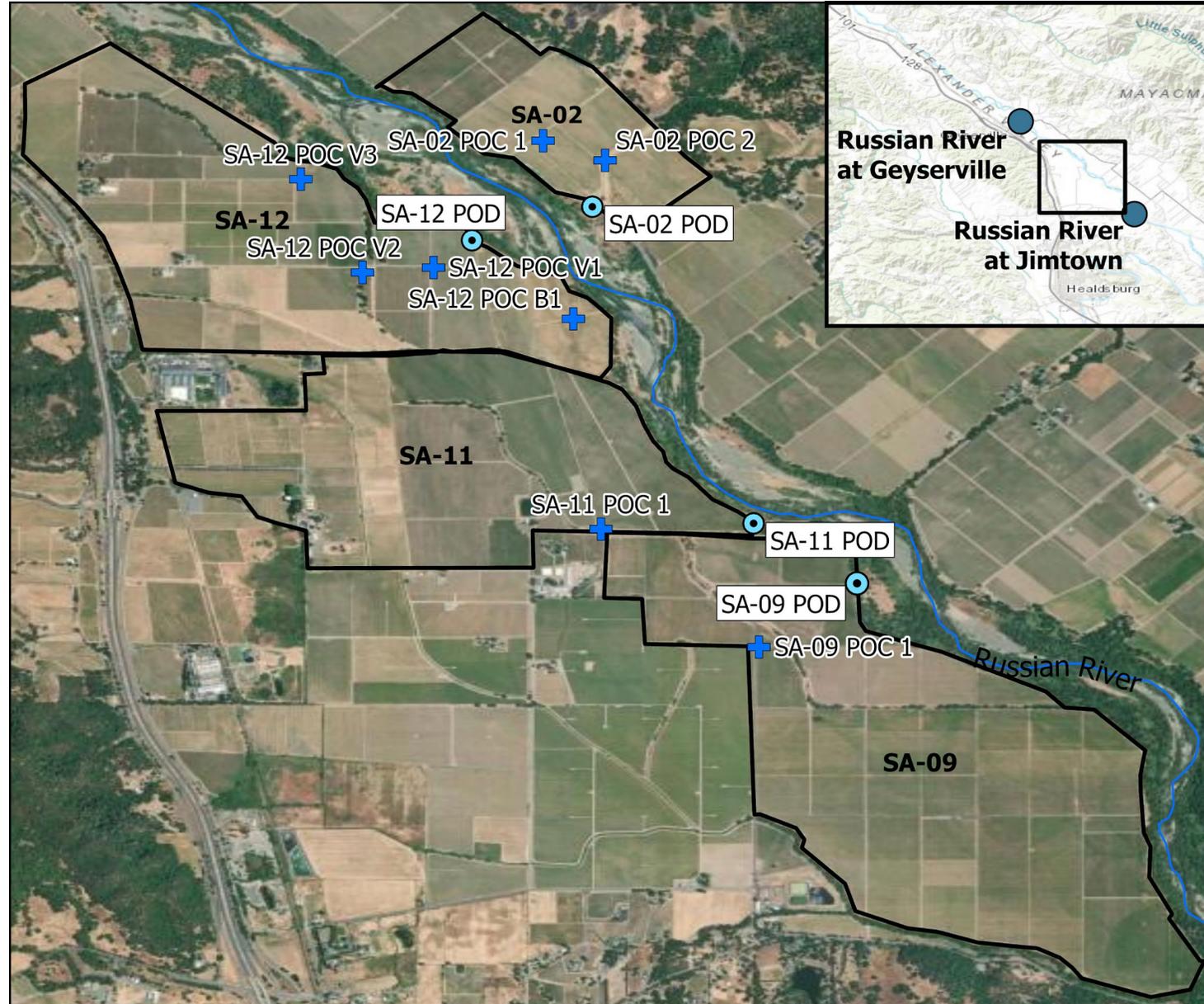


0 0.25 0.5 Miles





# Pilot-At-Scale Infrastructure



Alexander Valley On-Farm-Recharge Initiative

Diversion Monitoring Locations:  
SA-02, SA-11, SA-12, SA-09

**Legend**

- Service Area Outlines
- Point of Diversion (POD)
- Point of Connection (POC) (Landowner Hookups)
- Russian River
- USGS Gauge

Service layer credits: Public Land Survey System, National Hydrography Dataset, World Imagery (ESRI)

Samantha Fung  
Bachand & Associates  
March, 2026

0 2.5 5 Miles

N

# Tasks and Considerations

## Tasks

- Contractual
  - Agreements
- Engineering and Env
  - Permitting –
    - Local, State, Federal
    - Approaches and Strategies
  - Water rights
  - CEQA / Environmental
  - Design and Engineering
- Construction
- Social and Legal
  - Governance
  - Financial
- Outreach

## Considerations

- Vision and Expectations
- Holistic
  - Beneficial Uses (**Stakeholders**)
  - Environmental and Permitting Considerations
  - Vs. Silo
  - Water Rights (**Abundance v Scarcity**)
- Partners / Stakeholders
  - Agencies
  - Landowners
  - Tribes
  - Others....
- Energy and Water Connectivity
- Funding Constraints / Restrictions
- Governance – e.g.,
  - Mission
  - Scope and Responsibilities
  - Equity
  - Financials

# Phase 1 Initiative Deliverables

## “Concrete”

- Pilot at Scale
  - Infrastructure
  - Permits
  - CEQA
  - Temporary Water Rights
  - Agreements
  - Design
  - Diversion Operations Strategy
- Pilot Studies
  - Refinement of operations and design
  - Strategies
  - Proof-of-Concept
  - Expectations
  - Regulatory refinement

## Policy, Planning, ....

- Master Plan
  - Fact Sheet
  - White Paper
- Project Completion Report
  - Challenges
- Water Availability Analysis
  - Abundance/Scarcity paradigm

Questions and Thoughts

# FACT SHEET: ALEXANDER VALLEY ON-FARM RECHARGE INITIATIVE, MASTER PLAN HIGHLIGHTS

WITH POTENTIAL APPLICATIONS THROUGHOUT SONOMA COUNTY AND  
THE WINE COUNTRY

P.A.M. Bachand, Bachand & Associates, Davis, CA 95618



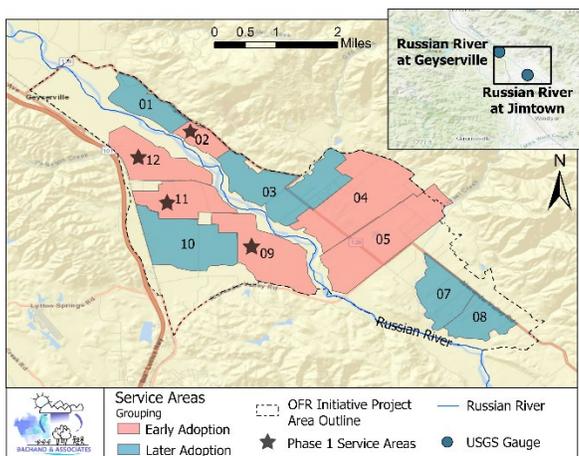
**DRY CREEK RANCHERIA  
BAND OF POMO INDIANS**



## HIGHLIGHTS

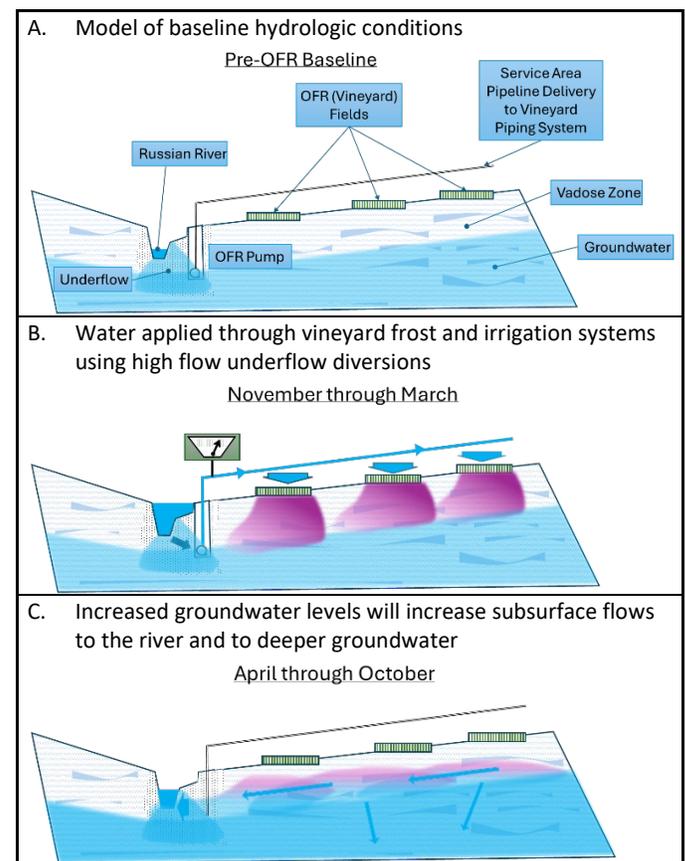
- The Alexander Valley On-Farm Recharge (OFR) Initiative's Pilot Phase envisions recharging across 3,000 acres of active and fallow vineyards with an annual 6,000 - 7,000 acre-foot (AF) capacity, exceeding vineyard irrigation demands by an estimated 50%.
- The Initiative will "sip" diversion water during high flows in fall and winter months using shallow wells along the Russian River and distribute diversions to vineyard partners to apply to their fields as recharge.
- The Initiative will help stabilize regional water resources and support the local community through current and future challenges (e.g., changing climate, threatened and endangered salmonid species, Potter Valley decommissioning, contracting wine sales).
- 2025 WY and 2026 WY pilot studies are being conducted to refine OFR designs and operations. The 2025 WY pilot studies found that OFR did not degrade groundwater quality in the shallow aquifer below.
- Phase 1 construction will be completed Spring 2026 and will serve 1,000 vineyard acres and have an annual recharge capacity of 2,300 AF.

## ALEXANDER VALLEY OFR INITIATIVE VISION



**Figure 1. Planned Service Areas (SAs) under the Initiative. Shallow pumps within each SA adjacent to the Russian River will divert during high flow periods and distribute flows onto vineyards.**

The Alexander Valley On-Farm Recharge Initiative (OFR Initiative) plans to employ 3,000 acres of active or fallow vineyards for OFR using Russian River diversions during high flow periods. The Initiative will draw high flows using a string of shallow wells along the Russian River<sup>1</sup> (Figure 1). Receiving vineyards will utilize existing irrigation systems to apply diverted water onto their fields for recharge. Recharged water will benefit subsurface hydrology (e.g., increase subsurface moisture, replenish groundwater, raise perched groundwater levels) which will, in turn, benefit fisheries, farmers, and other groundwater users (Figure 2).



**Figure 2. OFR Conceptual Model**

The design average annual recharge of 6,000 AF is expected to raise groundwater levels, increasing later season subsurface flows back into the river to benefit salmonids and

<sup>1</sup> Wells will be just outside the county-recognized Riparian Zoning Corridor to help comply with county permitting and setback requirements.

improving background surface and subsurface hydrologic conditions for vineyards (Figure 2). Recharged water will offset all irrigation demands by participating vineyards and provide additional water to benefit wildlife and other users.

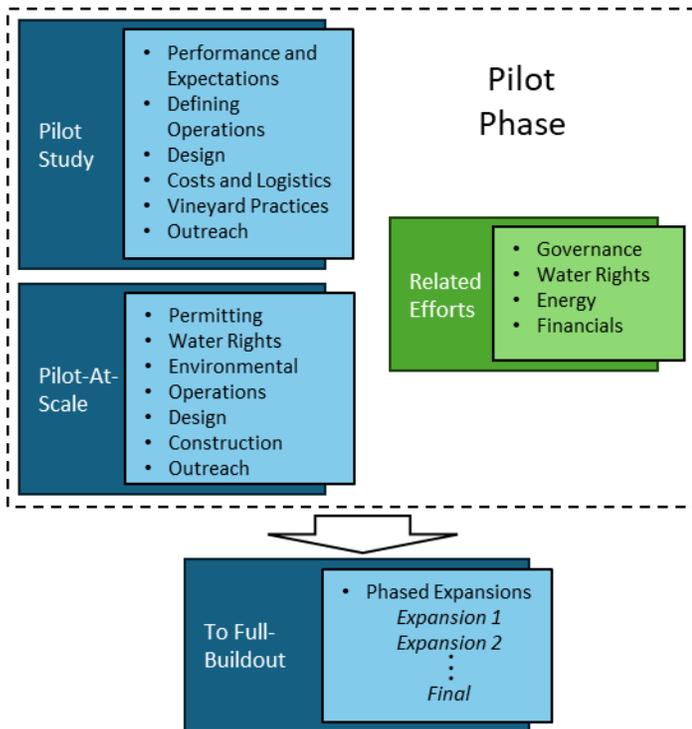


Figure 3. Phased Implementation of the OFR Initiative

The Initiative will be implemented in phases (Figure 3). The Pilot Phase includes 1) 2025 water year (WY) pilot studies with multiple landowners to iron out technical, logistical and financial questions associated with OFR implementation at vineyards and 2) a 2026 WY Pilot-At-Scale program to refine operations and design related to implementation across Alexander Valley at scale (Figure 3).

The Initiative is the first at-scale implementation of OFR in California’s wine country and one of the first for California. The Initiative seeks to reduce the growing uncertainty and risks associated with water supply reliability and, in turn, benefit all those who depend upon regional water resources.

**FACTORS CHALLENGING WATER RELIABILITY**

Alexander Valley and the broader Sonoma County are facing widespread sustainability challenges associated with water.

**CHANGING CLIMATE.** Increasing temperature (Figure 4) and evaporative water losses, along with more frequent and severe droughts and floods, are stressing water resources throughout California, including in Sonoma County. In 2022, water rights along the Russian River were curtailed, in part to protect endangered and threatened salmonid populations. Under California’s Sustainable Groundwater Management Act (SGMA), three Sonoma County basins were designated as medium priority basins and are currently implementing

Groundwater Sustainability Plans (GSPs) with the goal of achieving groundwater sustainability (Figure 5).

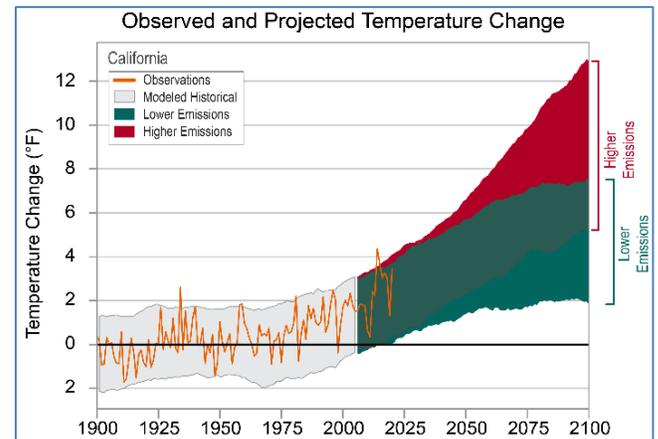


Figure 4. Projected California’s average temperature change with a changing climate for lower and higher emissions

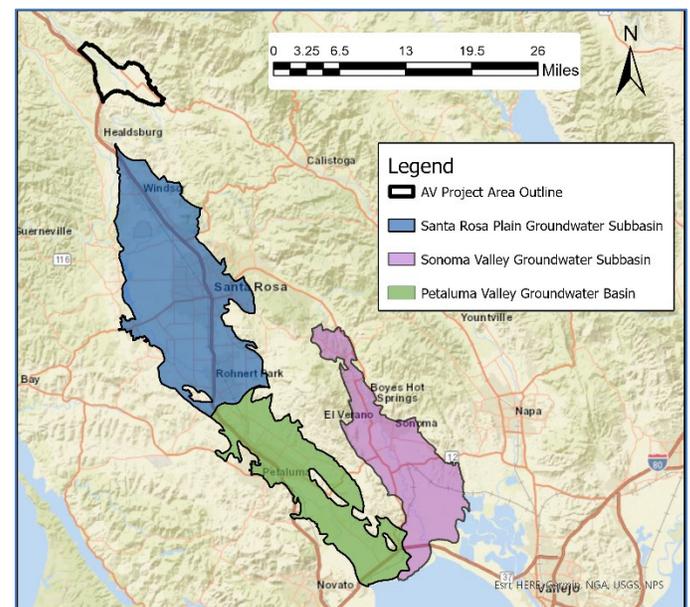


Figure 5. Sonoma County GSAs in relation to Alexander Valley

**POTTER VALLEY.** PG&E’s decommissioning of the Potter Valley Project will decrease delivery of Eel River water to the Russian River. The Potter Valley Project has historically provided approximately 60,000 AF annually to the Russian River; this water has been used throughout the year but is most important during the irrigation period when Russian River flows are low. Upcoming plans to operate the New Eel-Russian Facility (NERF) under a Run-Of-The River model will limit Eel River diversions to high flow periods. Thus, transfers are unlikely when flow is low and demand is high along the Russian River, such as during the summertime irrigation period.

Increased water storage along the Russian River will be necessary to maximize the value of high flow diversions from the NERF. Raising Coyote Dam (Lake Mendocino) to almost double its storage capacity has been considered though

comparable projects suggest construction costs of up to \$600 million, translating to approximately *\$7,000 to \$26,000 per AF of storage based local studies proposing similar actions.*

**PUTTING APPROPRIATIVE WATER RIGHTS AT RISK.**

Appropriative water rights are based on **Use it or Lose it.** If Russian River water becomes chronically unavailable for use by water right holders, those rights could potentially be forfeited due to disuse.

**BROADER ECONOMIC CHALLENGES.** Broader economic challenges are putting pressure on the wine industry within Alexander Valley and throughout Sonoma County. These broader challenges include increased fire frequency and scale, and drops in wine demand. Recent regional wildfires (e.g., 2017 Tubbs fire, 2019 Kincade Fires, 2020 LNU Lightning Complex), have burned over 150,000 acres in Sonoma County and destroyed over 6,000 structures. These events have affected Sonoma County’s resilience; specific to wine industry, the fires damaged vineyards, decreased grape harvest and caused challenges for wine makers related to smoke taint.

Decline in wine demand has exasperated economic challenges for growers in the region. Vineyard owners are planning decadal fallowing of winegrape acres as they struggle with declining demand. The scale of fallowing is uncertain though an expectation of a 10% floor is realistic.

**TARGETED SPECIFICATIONS AND STRATEGY AT FULL-BUILDOUT**

Partnering vineyards receiving diverted flows will use micro irrigation system to apply the water across vineyard lands at a rate of approximately 1 in/day for recharge. Soils data and the 2025 WY pilot studies have demonstrated that the region’s soils should accommodate water application at the design rates (i.e., 1 in/day).

At Full Buildout, the system will divert up to 55 cubic feet per second (CFS) from the Russian River during high flow periods. We assume OFR will be implemented across 60% of the 5,000 acres of suitable vineyard lands for about 30 days on each field.

The Initiative expects to define high flow conditions as instream discharges exceeding 210 CFS at the Jimtown USGS gauge (as well as meeting other downstream thresholds to protect senior water rights users). These conditions commonly begin with the rainy season and extend into April. Data from the last decade suggest these flow conditions commonly exceed 100 days a year except during the driest years, such as 2021 and 2022 (Table 1). OFR will divert less than 1% of typical winter volumes. *Under this design, OFR diversions represent “sipping” and not “gulping” from the high flows.* The targeted annual recharge of 6,000 AF will exceed the region’s estimated irrigation demand of 4,000 AF by 50%.

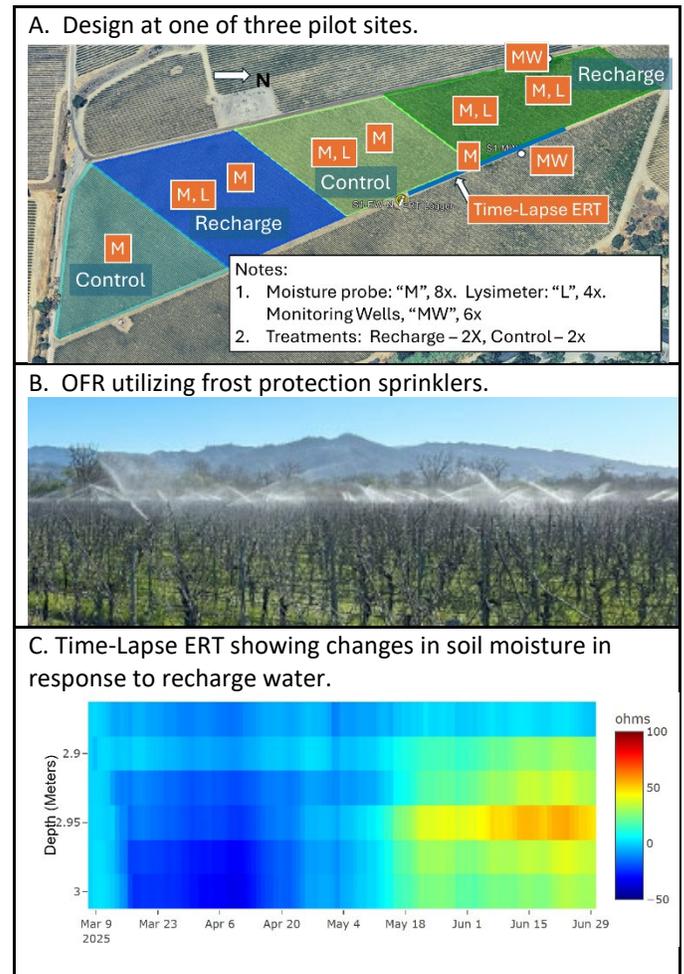
**Table 1. Potential days of OFR diversions based on historic data and a flow threshold of 210 CFS at the Jimtown gauge during the first half of the water year (Oct-Mar). Blue columns show water volumes.**

Water Year	Winter Flow Volume Past Jimtown	Potential OFR Diversions		Operational OFR Diversions			Available OFR Diversion Days
	Acre-Feet	Acre-Feet	(1%)	Acre-Feet	(1%)	(2%)	
2016	686,424	12,212	1.8%	6,000	0.9%	49.1%	112
2017	1,302,107	17,271	1.3%	6,000	0.5%	34.7%	159
2018	199,441	11,287	5.7%	6,000	3.0%	53.2%	123
2019	924,100	12,088	1.3%	6,000	0.6%	49.6%	112
2020	171,290	13,148	7.7%	6,000	3.5%	45.6%	126
2021	82,278	6,482	7.9%	6,000	7.3%	92.6%	69
2022	210,125	9,072	4.3%	6,000	2.9%	66.1%	93
2023	849,221	11,134	1.3%	6,000	0.7%	53.9%	105
2024	794,822	12,316	1.5%	6,000	0.8%	48.7%	136
2025	926,465	14,429	1.6%	6,000	0.6%	41.6%	133
<b>Median</b>	<b>740,623</b>	<b>12,150</b>	<b>1.7%</b>	<b>6,000</b>	<b>0.8%</b>	<b>49.4%</b>	<b>118</b>

1. Percent of Russian River Flows  
2. Percent of Potential OFR Diversions

**PILOT STUDIES: REFINING OFR**

The Initiative implemented OFR Pilot Studies across three partner sites with varying soil characteristics during the 2025 WY; Pilot Studies will be repeated and expanded during the 2026 WY Pilot-At-Scale.



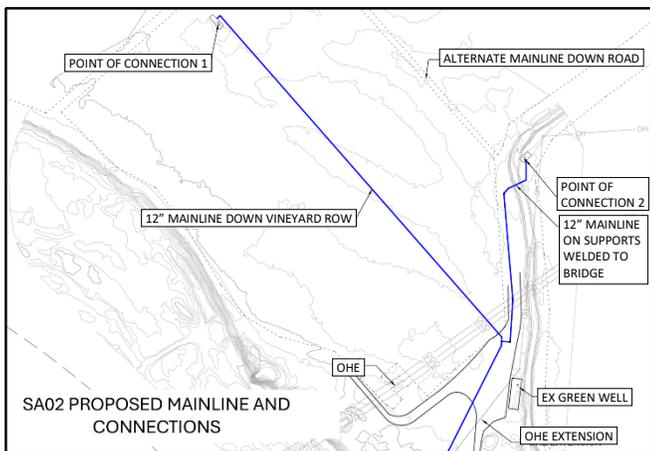
**Figure 6. OFR pilot at one of 3 sites. Applied 28” of water from late February into early April. Time lapse ERT data showed moisture effects from OFR applications through depth.**

During the 2025 WY Pilot Studies, pilot sites were monitored and studied for hydrologic, water quality and agronomic responses to OFR (Figure 6A), as well as associated costs and benefits. Each pilot site applied 28" of water through their frost protection systems (Figure 6B). In-field instrumentation was installed to track hydrologic and soil conditions such as soil moisture, groundwater levels and porewater and groundwater quality (Figure 6A). To improve spatial understanding of groundwater responses to OFR, time-lapse Electrical Resistance Tomography (ERT) was used to continuously monitor groundwater levels along transects (Figure 6A, Figure 6C). Monitoring wells were installed to enable studying upstream, within field, and downstream effects to help characterize groundwater responses. The wells were instrumented with pressure transducers (15-min data), which enabled modeling groundwater responses in space and time.

Findings from the 2025 WY Pilot Studies will be shared in January 2026. Public workshops will occur during fall 2026 to share findings from the completed Pilot Phase (Figure 3).

## PILOT-AT-SCALE: CONCEPT DEMONSTRATION

The OFR Initiative has identified *11 Service Areas (SAs) to implement OFR at Full Buildout*. The Pilot-At-Scale phase will install the necessary diversion facilities (e.g., shallow well, filtration, piping) in four of those SAs and connect to vineyard irrigation infrastructure (Figure 1, marked with stars). Figure 7 shows the infrastructure layout and design for SA02.



**Figure 7. Draft infrastructure design for Service Area 02.** The figure shows well locations, pipeline alignment and points of connections (POCs) to private partners irrigation system.

*The first four SA installations will serve as a test case to define, and later streamline, required permitting, regulations and processing. Simplification of these regulatory processes will be required for the widespread, cost-effective adoption of this approach as a significant and realistic solution to California's water challenges.*

The Pilot-At-Scale will service 1,000 acres and recharge over 2,000 AF annually, requiring maximum diversions of 17 CFS

from the Russian River (Table 2). Pumping costs are anticipated at approximately \$110 per AF.

## SOCIAL AND LEGAL CHALLENGES

Several social and legal challenges are being concurrently addressed, in part, during the Pilot Phase (Figure 3): e.g., governance, energy, water rights, financials. For this type of public/private partnership solution to be viable, these social and legal issues require solutions. Water resources are a critical challenge for Alexander Valley and Sonoma County more broadly; efforts to develop cost-effective solutions should be prioritized by stakeholders and governing agencies.

**Table 2. Targeted operational outcomes for Pilot-At-Scale and for Full Buildout.**

	Pilot-At-Scale	Full Buildout	Units
<b>Field Operations</b>			
Assumed Recharge Rate (1)	14.7	14.7	GPM/Ac
	0.1	0.1	AFD
Durations	36.0	36.0	Days
Volume per Acre	2.3	2.3	Ac-Ft/Ac
<b>Alexander Valley Regional Operations</b>			
Estimated OFR fields	974	2,969	Acres
Estimated OFR fields simultaneous Operations	436	1,485	Acres
<b>Total Volume</b>	<b>2,278</b>	<b>6,944</b>	<b>Ac-Ft</b>
<b>Maximum Regional Diversion Rate</b>	<b>15.8</b>	<b>54.5</b>	<b>CFS</b>
1. Rate estimated at this time.			

The potential solution of increasing storage space in regional dams is estimated at \$7,000 - \$26,000 per AF of storage. Perhaps more importantly, the timeline for that kind of solution offers no respite for the current communities facing declining revenue streams and a more uncertain future.

*OFR offers a holistic and more cost-effective solution that, at a minimum, can offer a bridge solution and, at the maximum, a potential replacement to surface reservoir expansion. Understanding the full potential of OFR is a critical goal of OFR Initiative.*

## PARTNERS



## TO LEARN MORE

Alexander Valley On-Farm Recharge Initiative, Master Plan Vision. Available from Dry Creek Rancheria and Bachand and Associates.

Dry Creek Rancheria Band of Pomo Indians: Lacie McWhorter, Dry Creek Rancheria Public Works Department  
[Lacie.McWhorter@riverrockcasino.com](mailto:Lacie.McWhorter@riverrockcasino.com)

Bachand and Associates: Philip Bachand, Ph.D.  
[philip@bachandassociates.com](mailto:philip@bachandassociates.com)  
[www.bachandassociates.com](http://www.bachandassociates.com)