Dixon-Solano Water Quality Coalition

January 30, 2025

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On-Farm Groundwater Recharge

Lessons from NRCS's Pilot Program

United States Department of Agriculture

Natural Resources Conservation Service

In a big water year…

- Does your soil infiltrate heavy rains or does it pond and evaporate or run off?
- Can you take flood water after your ground is saturated?
- Where can you put excess water on your farm?

Types of farm recharge practices

- Developing soil that can absorb and infiltrate water
  - Capturing rainfall
- Utilize surface water instead of groundwater
  - “In-lieu” recharge
- Intentional flooding of fields for infiltration
  - On-Farm Recharge or Agricultural Managed Aquifer Recharge (AgMAR)
- Put flood flows in dedicated non-crop areas to recharge
  - Groundwater Recharge Basin or Trench

NRCS has two interim practices for recharge

Recharge basin or trench

- Permanent feature (15 years) – land dedicated to recharge

On-farm recharge

- Management practice in tandem with agriculture

Recharge Pilot program

- Goal: Field test the interim practices
- Limited area
- Limited funding
- Extra requirements on pilot projects
  - Monitoring well
  - Water source and rights

Site selection factors

- Soil Agricultural Groundwater Banking Index (SAGBI)
  - Soil properties, to 60 inch depth

BI | Soil Agricultural Groundwater Banking Index

Factors | Map Settings

This App

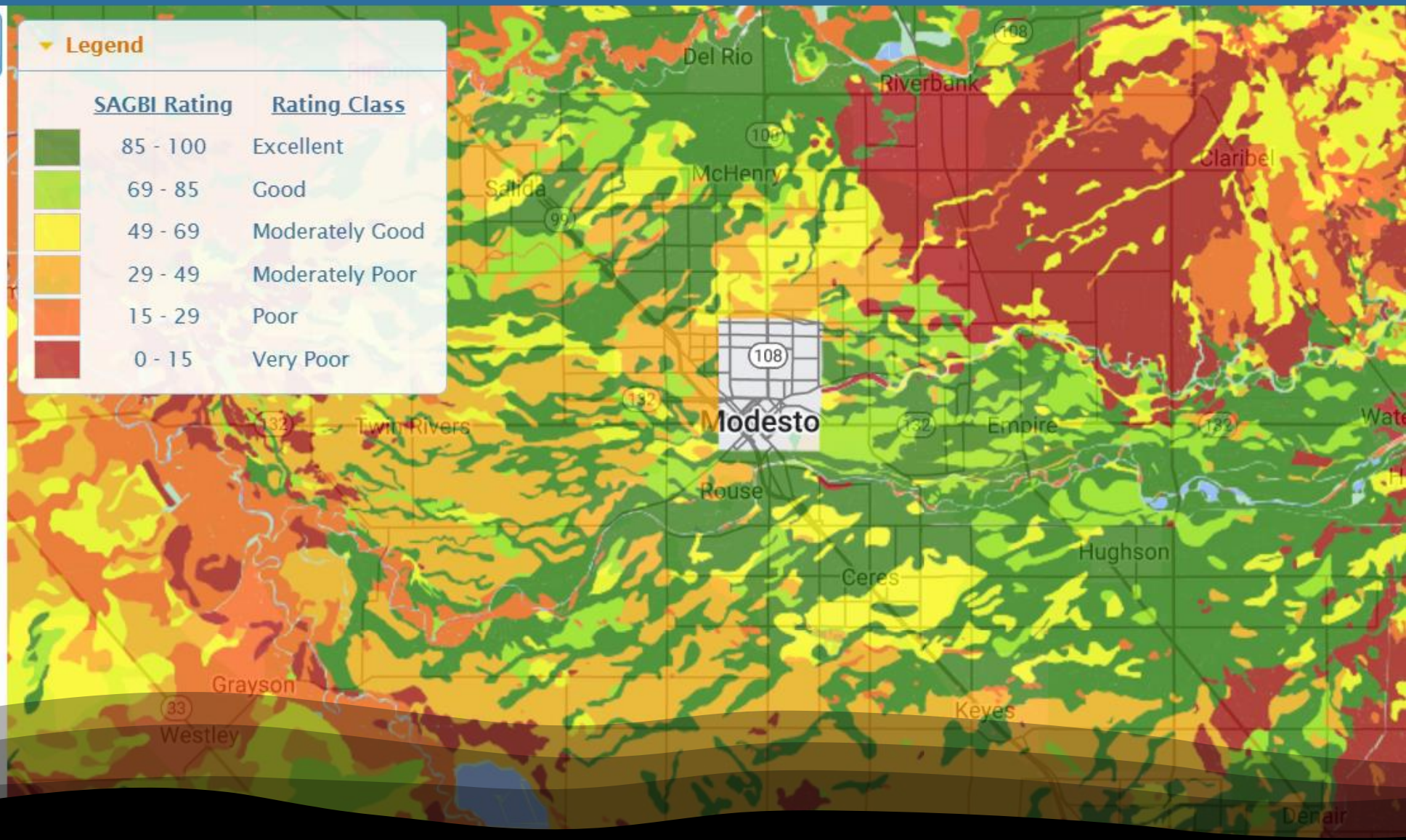
und

Agricultural Groundwater Banking
GBI) is a suitability index for
ater recharge on agricultural land.
I is based on five major factors
ritical to successful agricultural
ater banking: deep percolation,
e residence time, topography,
limitations, and soil surface
. More details can be found in the
icle in *California Agriculture*.

e app

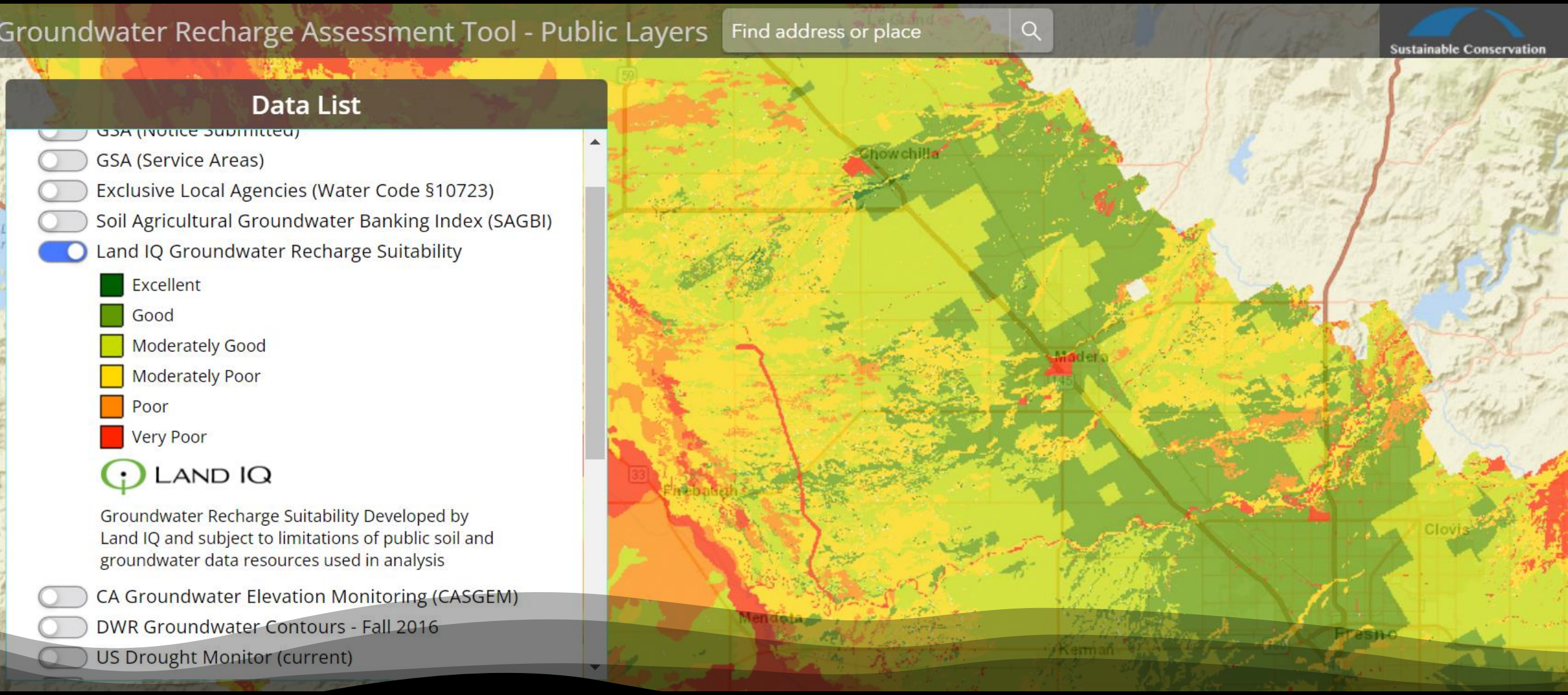
the map to view specific SAGBI
s at that location.
more about each SAGBI factor on
actors' tab.
e 'Map Settings' tab to change the
overlay transparency, or to zoom
pecific area of interest.

was developed by the California
Lab at UC Davis and



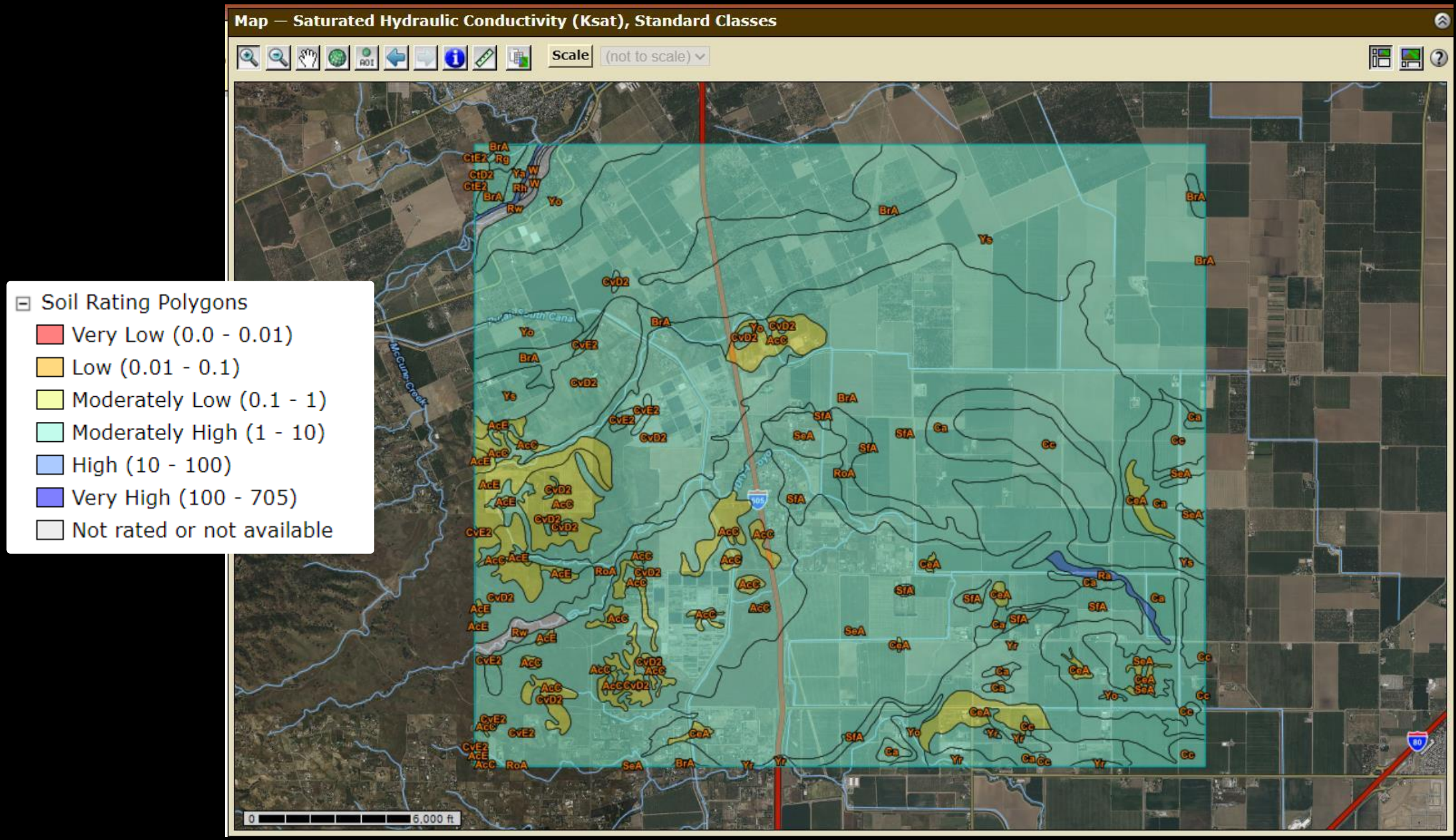
Site selection factors

- Soil Agricultural Groundwater Banking Index (SAGBI)
  - Soil properties, to 60 inch depth
- Groundwater Recharge Assessment Tool (GRAT)
  - Factors for shallow geology, to 120 ft depth


Groundwater Recharge Assessment Tool - Public Layers
Find address or place
Sustainable Conservation
Data List
GSA (Service Areas)
Exclusive Local Agencies (Water Code §10723)
Soil Agricultural Groundwater Banking Index (SAGBI)
Land IQ Groundwater Recharge Suitability
Excellent
Good
Moderately Good
Moderately Poor
Poor
Very Poor
LAND IQ
Groundwater Recharge Suitability Developed by Land IQ and subject to limitations of public soil and groundwater data resources used in analysis
CA Groundwater Elevation Monitoring (CASGEM)
DWR Groundwater Contours - Fall 2016
US Drought Monitor (current)
Chowchilla
Madera
Firebaugh
Mendota
Kerman
Clovis
Fresno

Site selection factors

- Soil Agricultural Groundwater Banking Index (SAGBI)
  - Soil properties, to 60 inch depth
- Groundwater Recharge Assessment Tool (GRAT)
  - Factors for shallow geology, to 120 ft depth
- Saturated hydraulic conductivity (Ksat) for basins


Map — Saturated Hydraulic Conductivity (Ksat), Standard Classes
Scale
(not to scale)
Soil Rating Polygons
Very Low (0.0 - 0.01)
Low (0.01 - 0.1)
Moderately Low (0.1 - 1)
Moderately High (1 - 10)
High (10 - 100)
Very High (100 - 705)
Not rated or not available
0
6,000 ft

Site selection factors

- Water availability- District delivery or water rights for recharge
- Logistics- District cooperation
- Hardware needs
  - Pumps, pipelines, meters
- Water quality considerations

Risk management for water quality

- High-risk sites ruled out
- Source water quality
- Pre-treatment for sediment

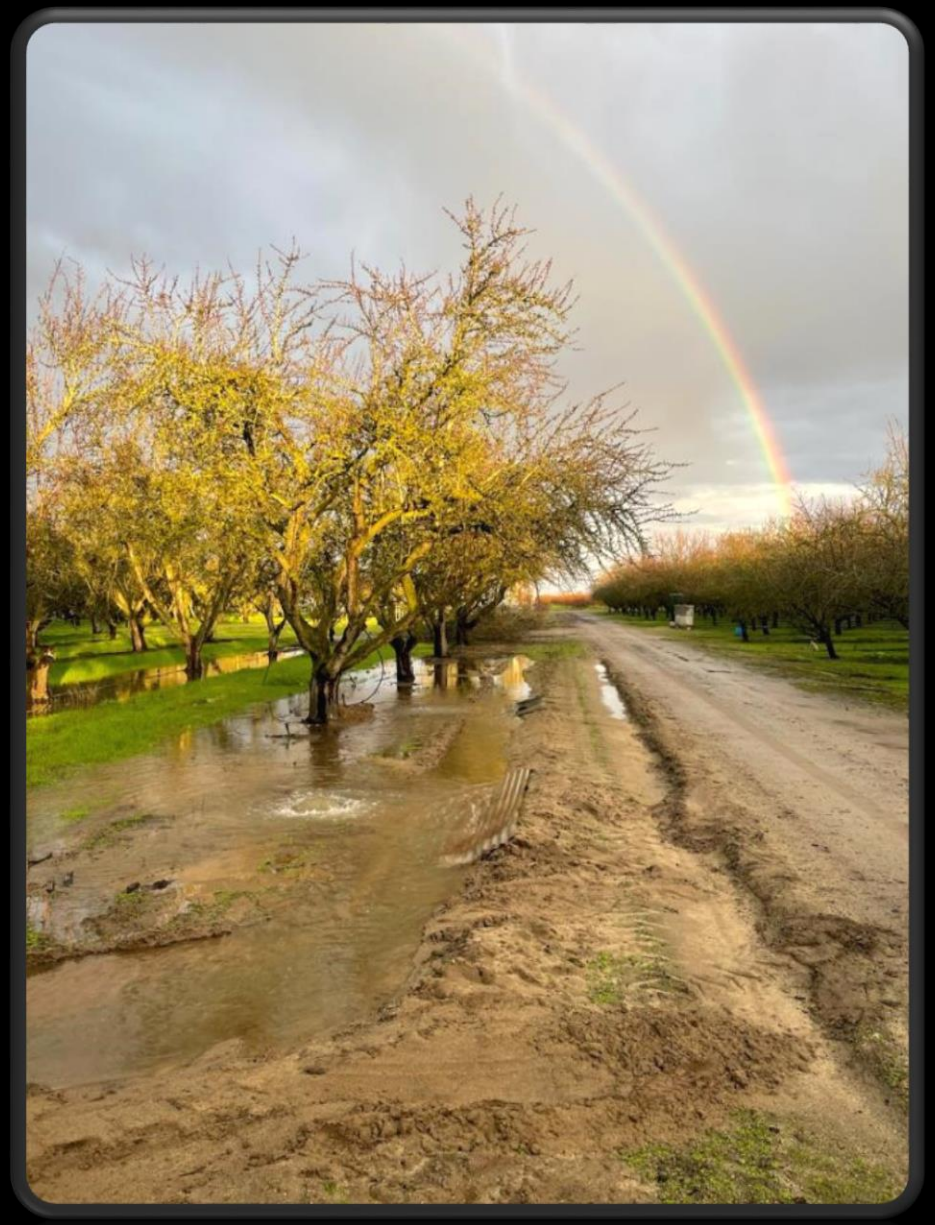
Goal: protect or improve groundwater quality

- Pest management
  - Pesticide leaching risk
  - State regulation- “No-Recharge” materials list
- Nutrient management
  - Nitrate leaching risk
  - Residual nitrate in soil
  - Nitrogen management

Agronomic considerations for crops

Annuals

- Damage to winter crops
- Flooding impacts to soil biology
- Loss of yield



Agronomic considerations for crops

Perennials

- Dormant season field work
- Root or fungal disease
- Root stock flooding tolerance
- Wind-throws- loss of trees
- Loss of yield
- Weed pressure

Farm setup considerations

- Water delivery and conveyance to the field
- Measuring applied water
- Irrigation system
- Field setup- Water spreading on the field
  - Slope and leveling
  - Checks and berms, furrows, flat fields
  - Water distribution plan (gated pipe, alfalfa valves, solid-set risers…)
  - Water management plan
- Seepage issues

What did producers do for on-farm recharge?

- Nutrient management plan review
- Pesticide Use Reports for risk assessment
- Field setup plan for flood
- Consider: flood impacts to crops, cultural practices
- Put water on at least once a year when available:
  1 or 2 years in a 3-year contract

What did producers do for basins?

- Review site history
- Need appropriative water rights or recharge water right
- Only Cropland and Associated land, no pasture or range
- Discuss how water would get to the field: need pipe, turnout or flow meters?
- Basins are paid per ac-ft of storage capacity

Monitoring for pilot projects

- Nearby well to monitor for response
- Well Monitoring:
  - NRCS and Sustainable Conservation staff
  - Nov – Dec pre-recharge, 2022 and 2023
  - March 2023 post-recharge
  - water level measurements
  - water analysis for Nitrate and Total Dissolved Solids

Outcomes for NRCS Pilot for 2022-23

Basin or Trench

- Built 1 on-farm basin
- 18 ac footprint, 60 ac-ft capacity
- >200 ac-ft recharged

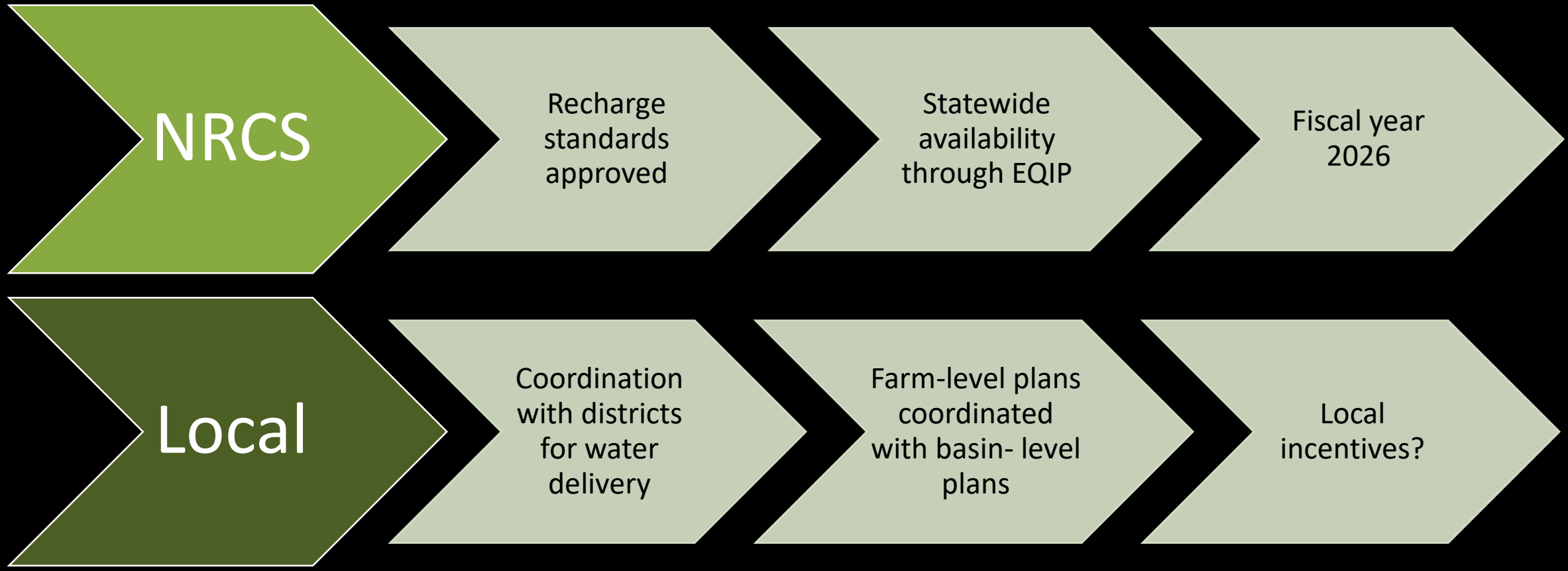
On-farm recharge

- Over 3,000 acres
- Total recharge 4,680 ac-ft
- Averaged 1.7 ac-ft/ac
- Ranged from 0.5 – 3.25 ac-ft/ac

Observations

- Requires skilled management
- Labor costs
- Irrigation vs. Recharge: Minimum application
- Cooperation with agencies- water delivery, water rights
- Incentives
  - NRCS payment rates
  - GSA or ID incentives

Next steps


NRCS
Recharge standards approved
Statewide availability through EQIP
Fiscal year 2026
Local
Coordination with districts for water delivery
Farm-level plans coordinated with basin- level plans
Local incentives?

CA Water Code 1242.1- Flood Emergency Diversions

- State regulation
- Water Resources Control Board, Cal Fish and Wildlife
- Flood flows can be used for groundwater recharge
- No water rights required*
- No CEQA required*

CA Water Code 1242.1- Flood Emergency Diversions

Anyone can divert who:

- Complies with water code conditions
- Owns or has legal access to diversion works
- Owns or has legal access to recharge land

CA Water Code 1242.1- Flood Emergency Diversions

You can divert:

- Floodwater portion of flow
- Surface water in:
  - Rivers
  - Streams
  - Lakes

CA Water Code 1242.1- Flood Emergency Diversions

You can divert when:

- There is flood risk based on local plan
- Active flood emergency declared
- Public notice of flood emergency
- *Delta has special conditions

CA Water Code 1242.1- Flood Emergency Diversions

Where can water go?

☑ Existing facilities

- Basins built for recharge
- Managed wetlands
- Active ag production areas

☒ "No-Recharge" places

- Concentrated animal waste
- Outlier fields for N management
- Risk to levees or water systems
- Areas not in active agricultural production

CA Water Code 1242.1- Flood Emergency Diversions

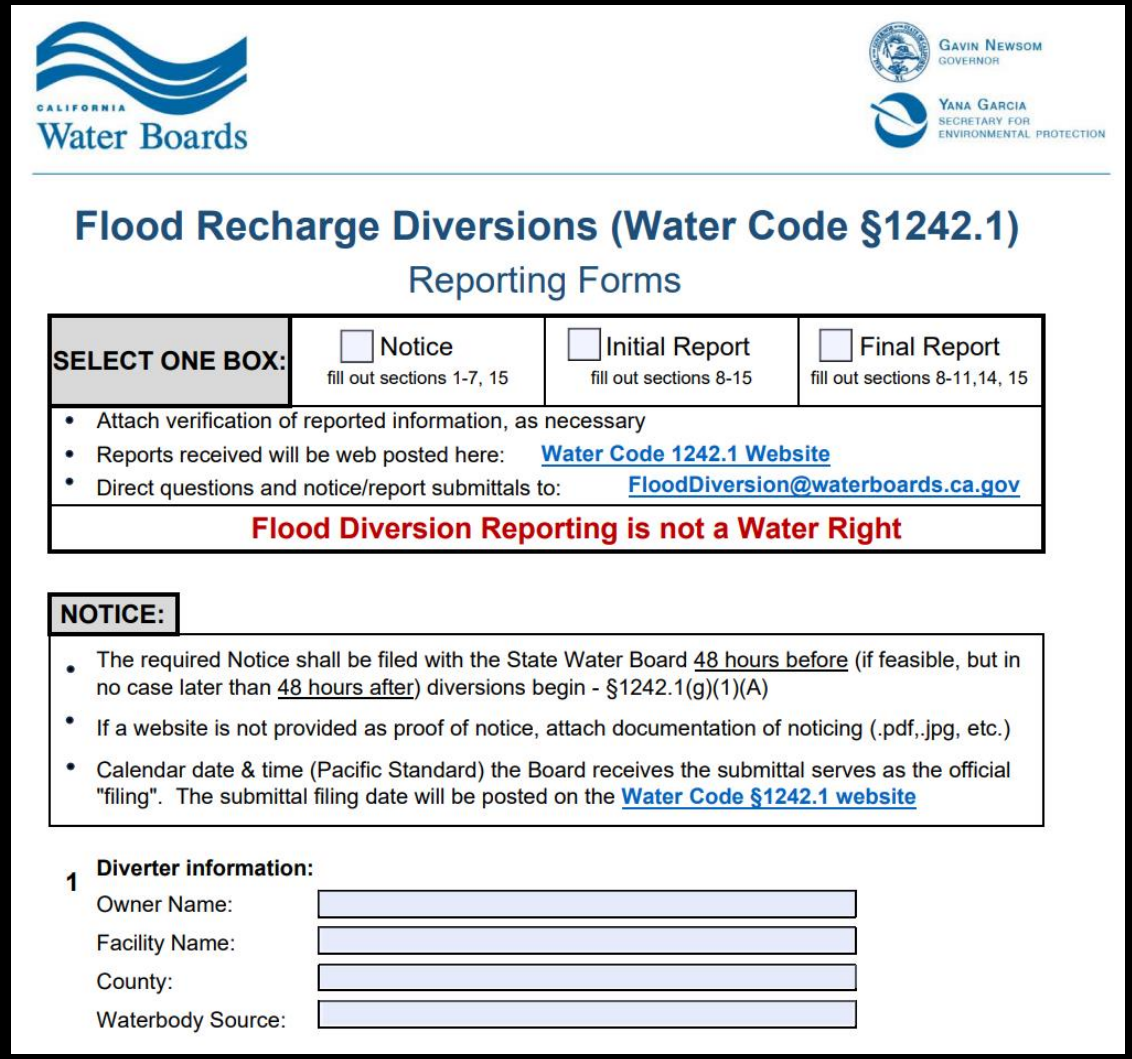
How can water be diverted?

- Temporary or permanent pumps
- No new construction of permanent pumping stations
- Temporary pumps must have simple fish screens

CA Water Code 1242.1- Flood Emergency Diversions

What is in the fine print?

- No water rights are attached to flood diversions
- Reporting to State Water Board is required
- Fish screens approved by Cal Fish and Wildlife



California Water Boards

Gavin Newsom, Governor

Yana Garcia, Secretary for Environmental Protection

Flood Recharge Diversions (Water Code §1242.1)

Reporting Forms

SELECT ONE BOX:	☐ Notice fill out sections 1-7, 15	☐ Initial Report fill out sections 8-15	☐ Final Report fill out sections 8-11,14, 15

- Attach verification of reported information, as necessary
- Reports received will be web posted here: Water Code 1242.1 Website
- Direct questions and notice/report submittals to: FloodDiversion@waterboards.ca.gov

Flood Diversion Reporting is not a Water Right

NOTICE:

- The required Notice shall be filed with the State Water Board 48 hours before (if feasible, but in no case later than 48 hours after) diversions begin - §1242.1(g)(1)(A)
- If a website is not provided as proof of notice, attach documentation of noticing (.pdf,.jpg, etc.)
- Calendar date & time (Pacific Standard) the Board receives the submittal serves as the official "filing". The submittal filing date will be posted on the Water Code §1242.1 website

1 **Diverter information:**

Owner Name:

Facility Name:

County:

Waterbody Source:

CA Water Code 1242.1- Flood Emergency Diversions

- For more details visit Flood Recharge Diversions (Water Code §1242.1.1) | California State Water Resources Control Board
- For technical questions: FloodDiversion@waterboards.ca.gov

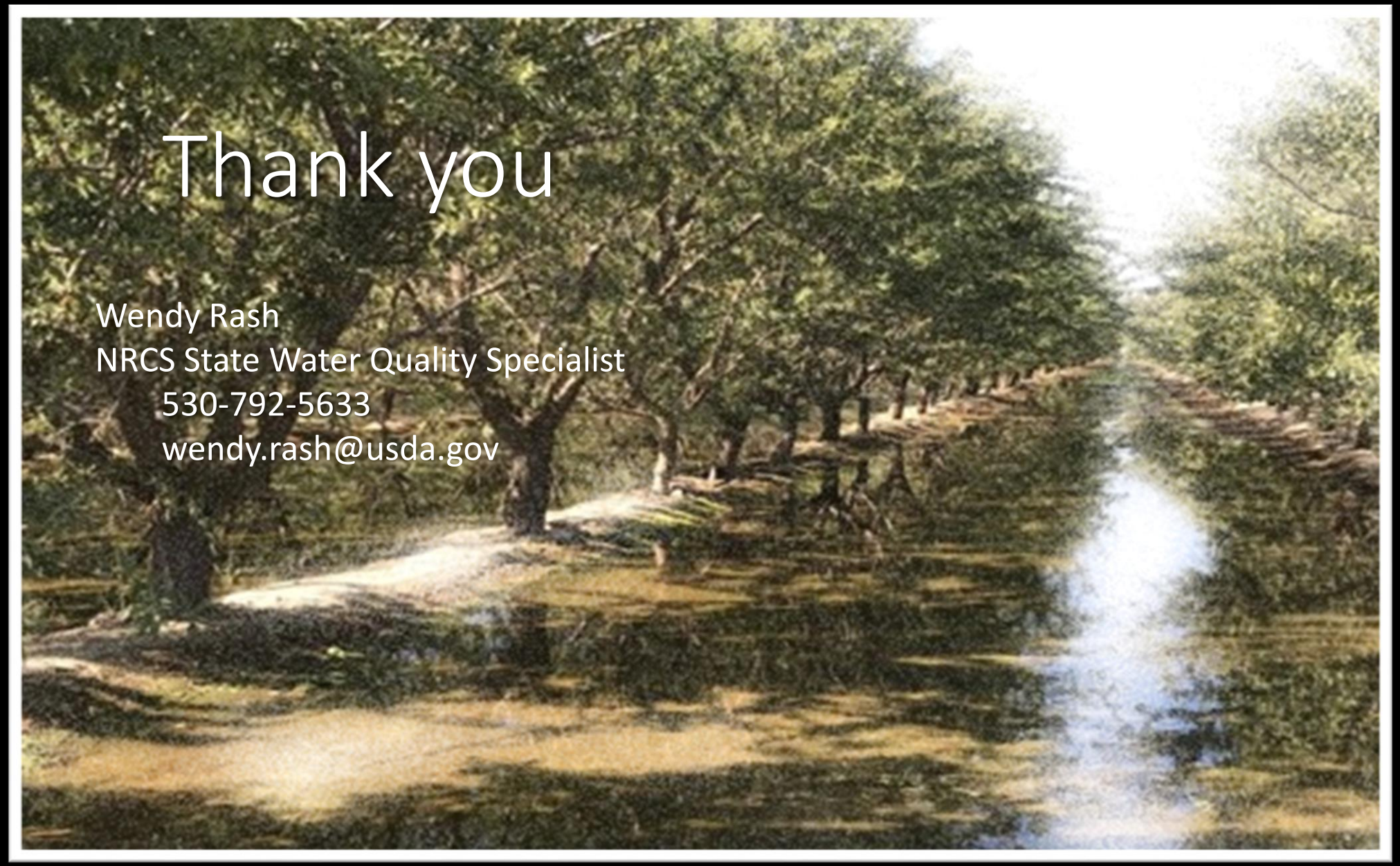
How to get help on groundwater recharge

Funding

- NRCS: EQIP- Coming soon
- Local incentives?
- CA DWR: Flood Diversion and Recharge Enhancement (FDRE) Initiative?

Technical assistance

- NRCS
- Sustainable Conservation
- State Water Resources Control Board (SWRCB)- for flood diversion


Thank you
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