Dixon-Solano Water Quality Coalition

January 23, 2024

Wendy Rash, Water Quality Specialist, NRCS

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 it?

Types of farm recharge practices

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

Two recharge interim practice options

Recharge trench or basin

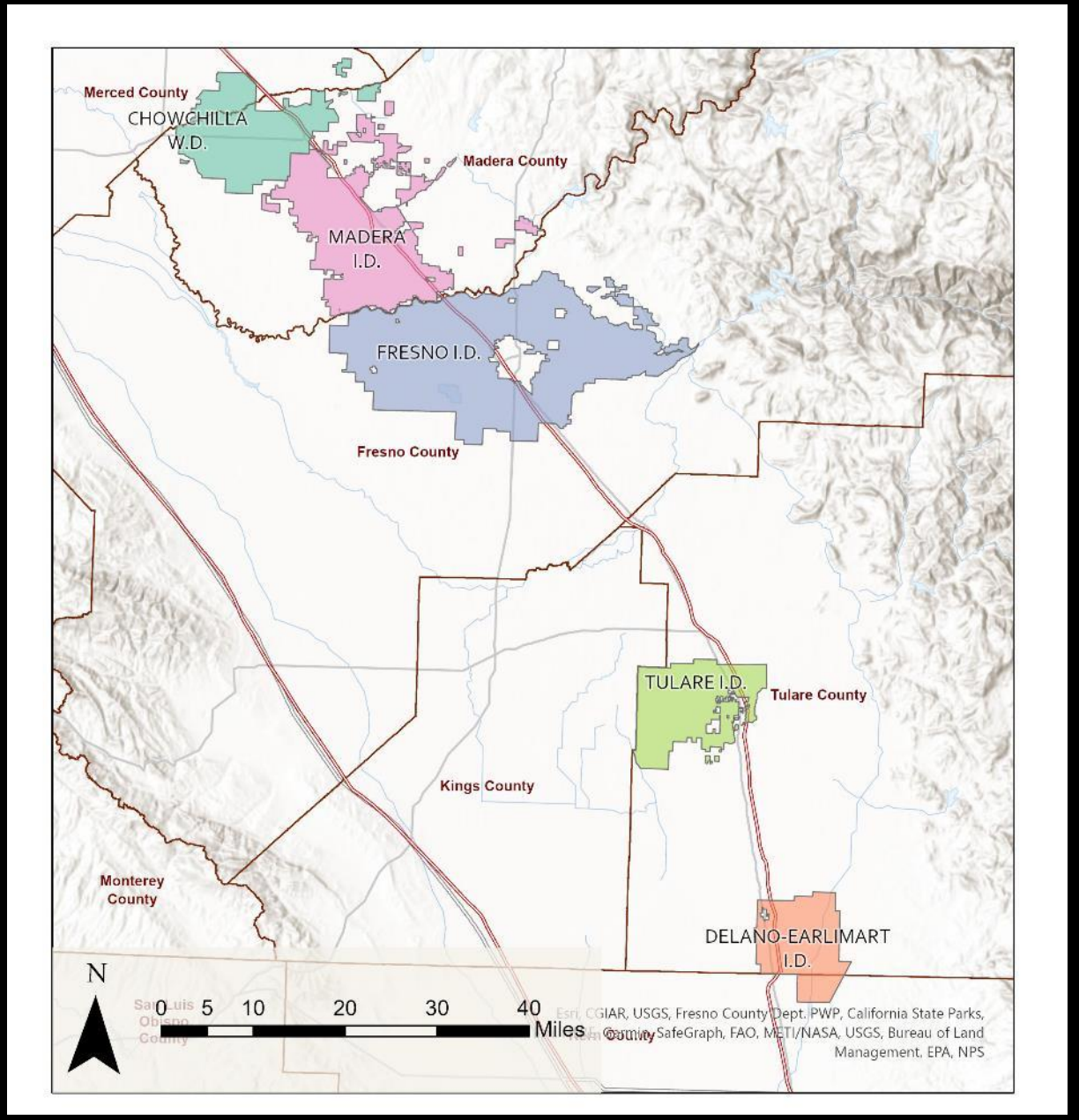
- Permanent feature (15 years) – land dedicated to recharge

On-farm recharge

- Management practice in tandem with agriculture

USDA-NRCS Recharge Pilot

Part of the Environmental Quality Incentives Program



Recharge Pilot program

- Goal: Field test the interim practices
- $1.4 million in Fiscal Year 2022, $1.5 M in Fiscal 2023
- Limited area
- 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
- Groundwater Recharge Assessment Tool (GRAT)
  - Factors for shallow geology, to 120 ft depth
- Saturated hydraulic conductivity (Ksat) for basins

BI | Soil Agricultural Groundwater Banking Index

Factors | Map Settings

This App

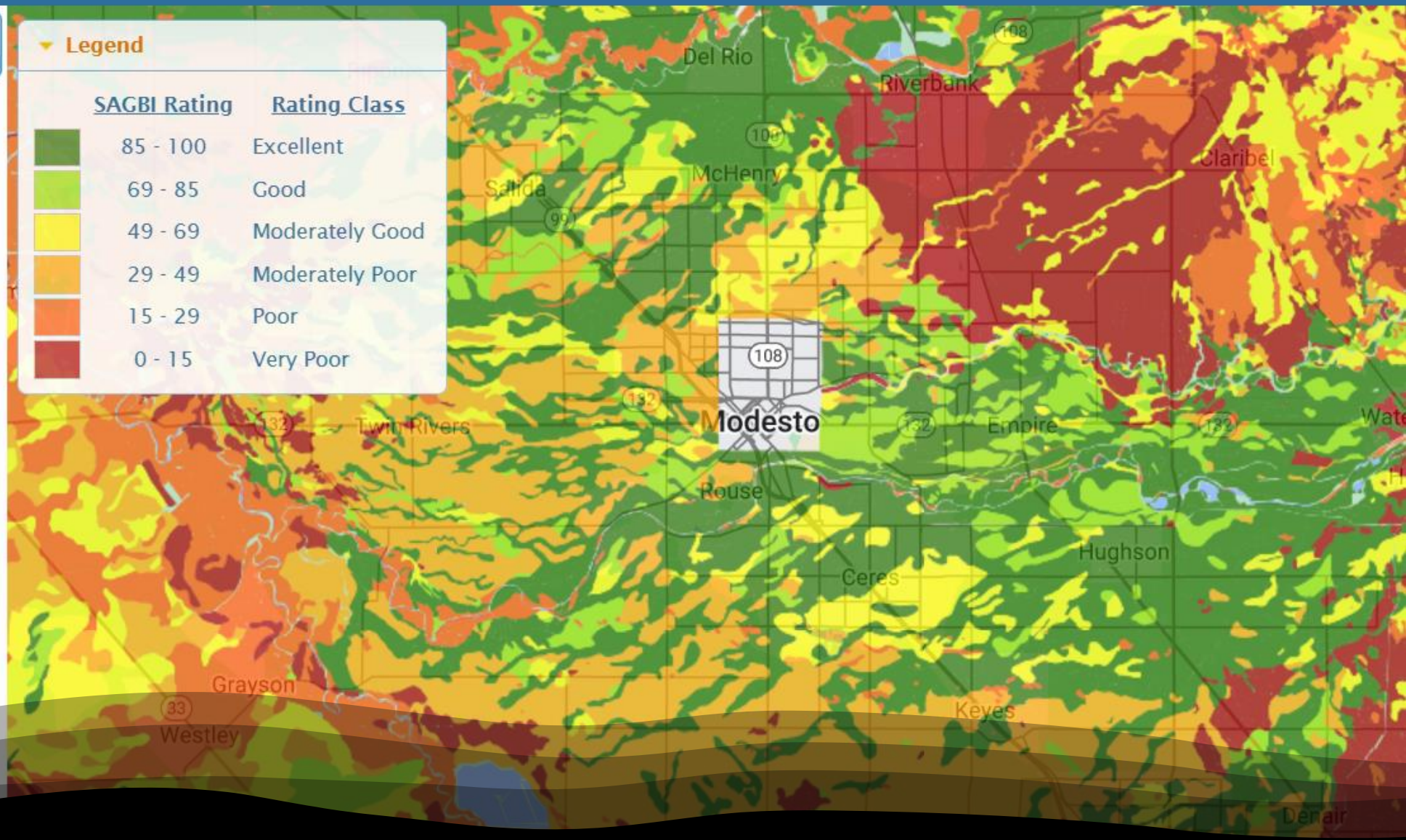
und

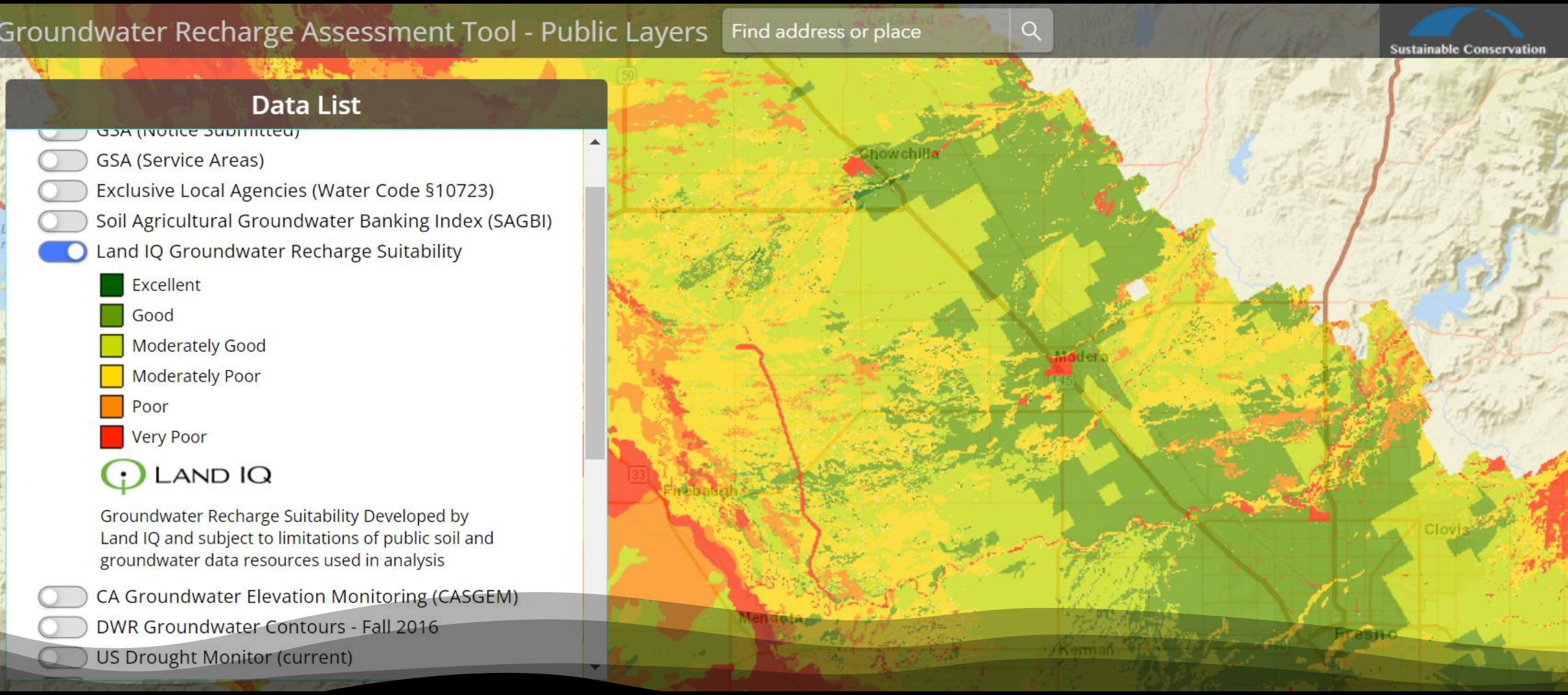
Agricultural Groundwater Banking
GBI) is a suitability index for
ater recharge on agricultural land.
I is based on five major factors
ritical to successful agricultural
ater banking: deep percolation,
e residence time, topography,
limitations, and soil surface
. More details can be found in the
icle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



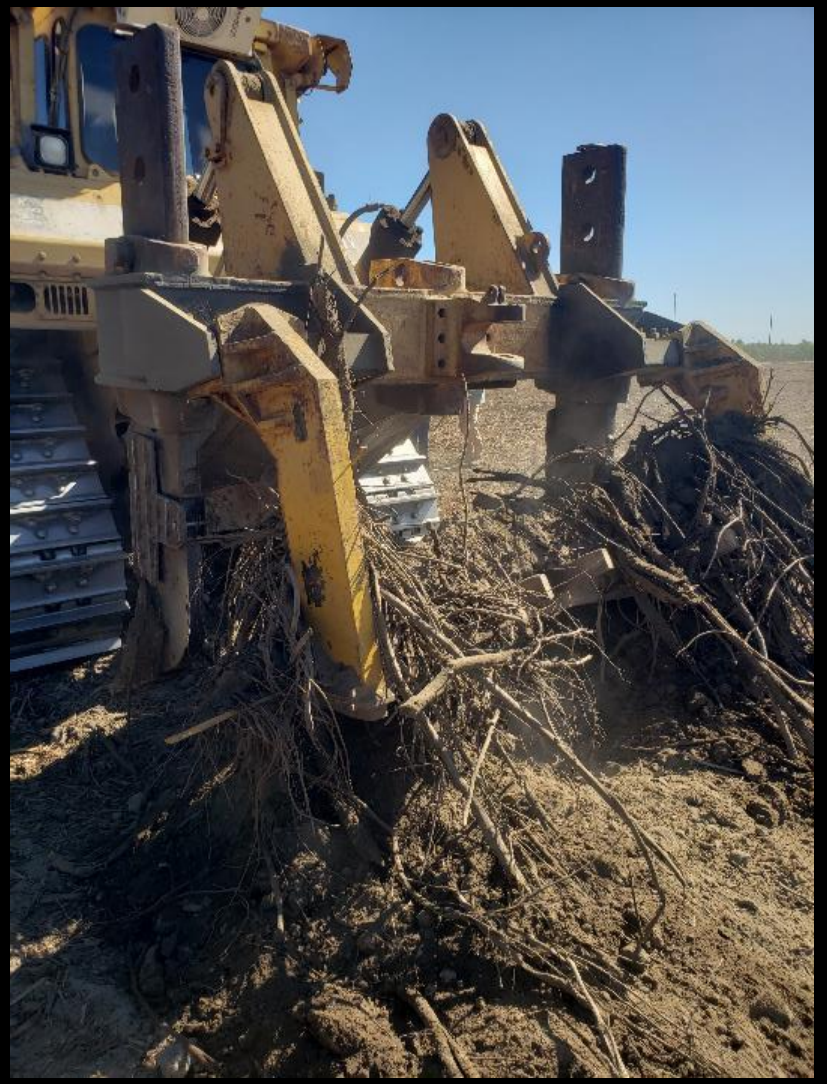

Groundwater Recharge Assessment Tool - Public Layers
Find address or place
Sustainable Conservation
Data List
GSA (Service Areas)
Exclusive Local Agencies (Water Code §10723)
Soil Agricultural Groundwater Banking Index (SAGBI)
Land IQ Groundwater Recharge Suitability
Excellent
Good
Moderately Good
Moderately 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

- Water availability- District delivery or water rights for recharge
- Water quality considerations
  - Source water
  - Nutrient management
  - Pest management

On-Farm Recharge: Walnut replant example

- Before: Walnut orchard, could not flood irrigate effectively
- Plan: Keep open 2+ years before replanting, design for recharge
- Orchard removal; land leveling, pump, pipe, gated pipe; cover crop
- Apply on-farm recharge water during fallow (annual crop) and after re-planting



Photos courtesy of Mark Hutson

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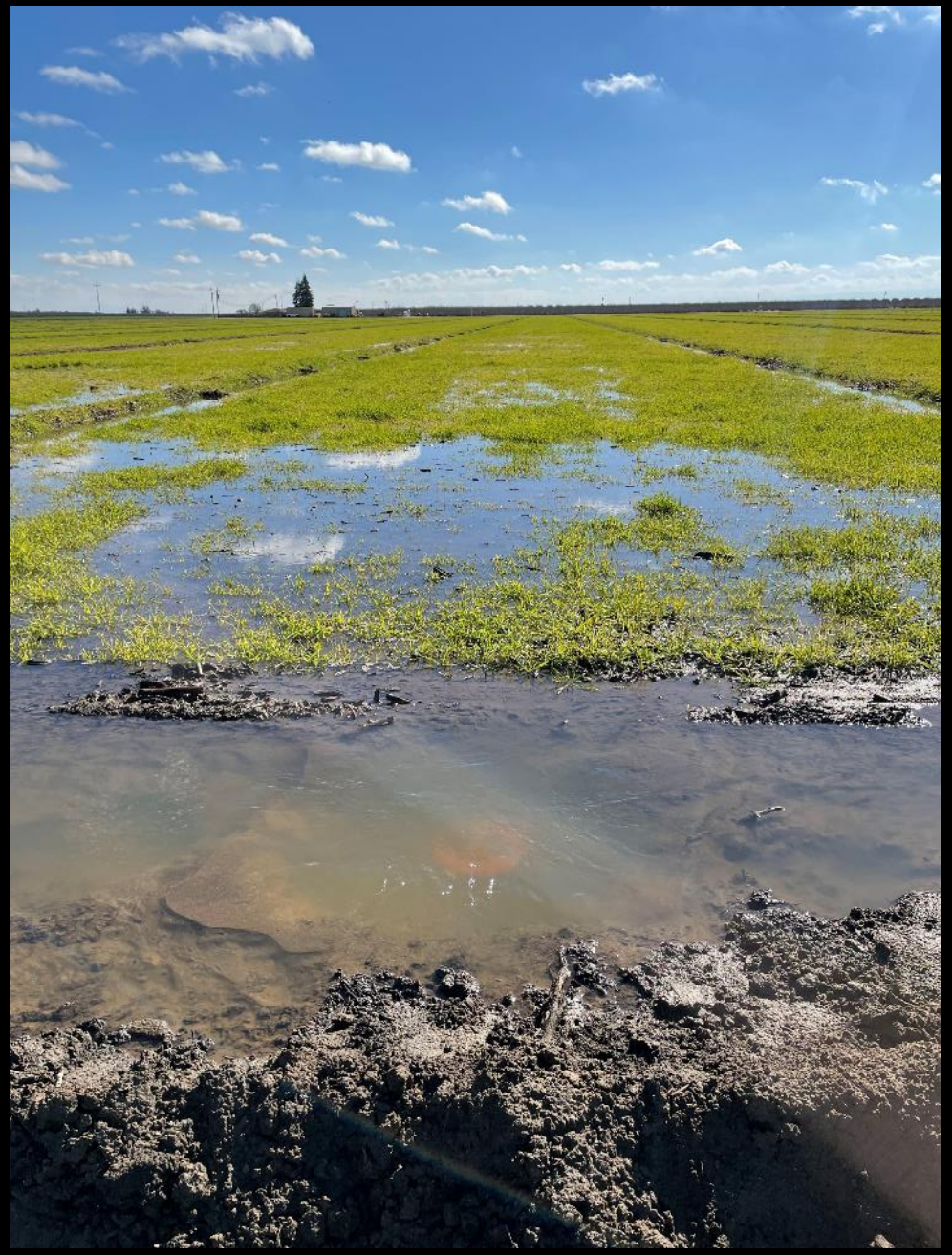


- Barley and cover crop planted
- Applied recharge water Jan-Feb 2023
- 88.6 ac-ft recharged on about 40 acres

Photo by Wendy Rash, USDA

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

Risk management for water quality

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

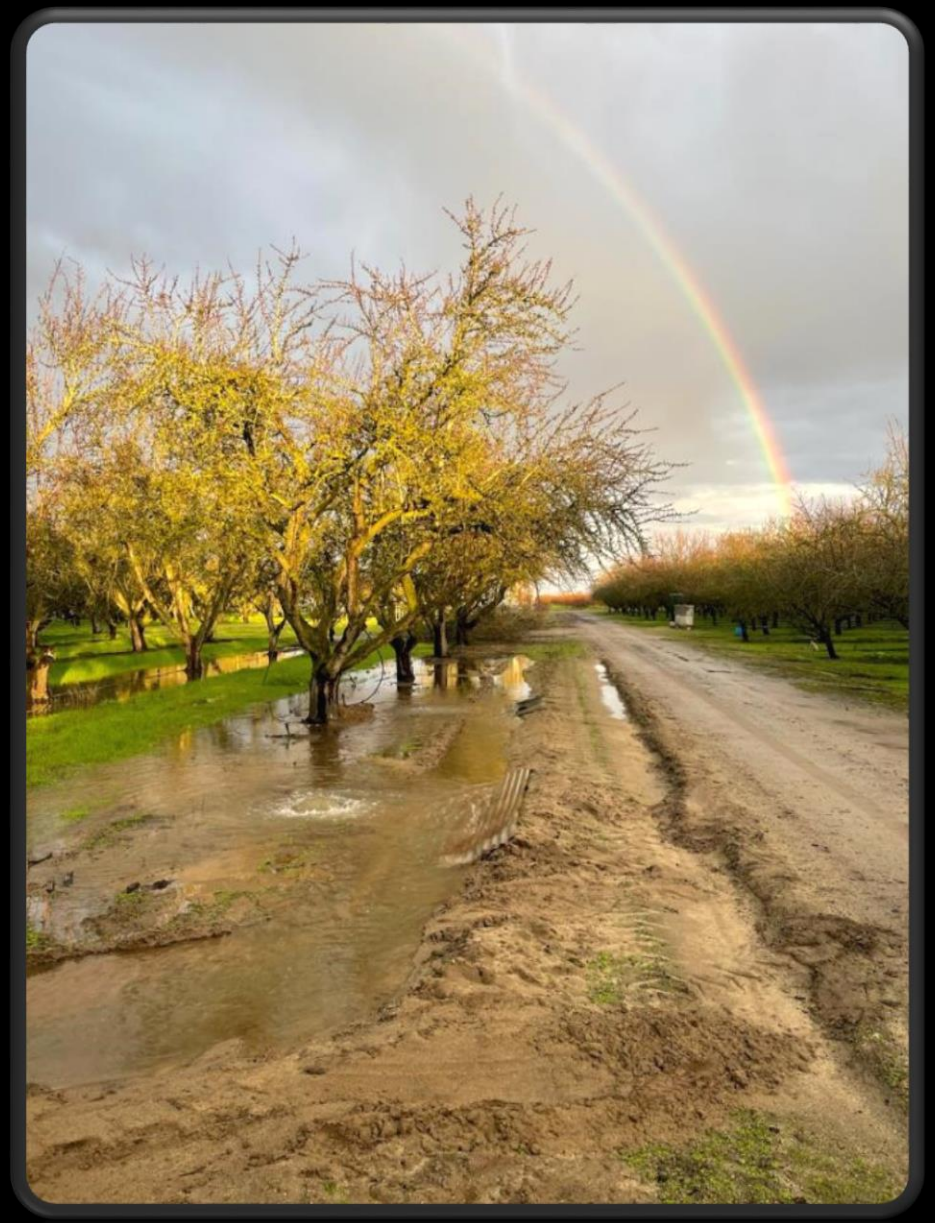
Goal: protect or improve groundwater quality

- Pest management
  - Pesticide leaching risk
  - State regulation- “No-Recharge” 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
- Loss of yield
- Wind-throws- loss of trees
- Weed pressure
- Root stock flooding tolerance

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

Projects planned for 2022-23 in NRCS Pilot

Basin or Trench

- Design storage capacity ranged from 1 to 30 ac-ft

On-farm recharge

- Over 2,800 acres
- Vineyard
- Almonds
- Annuals or fallow

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

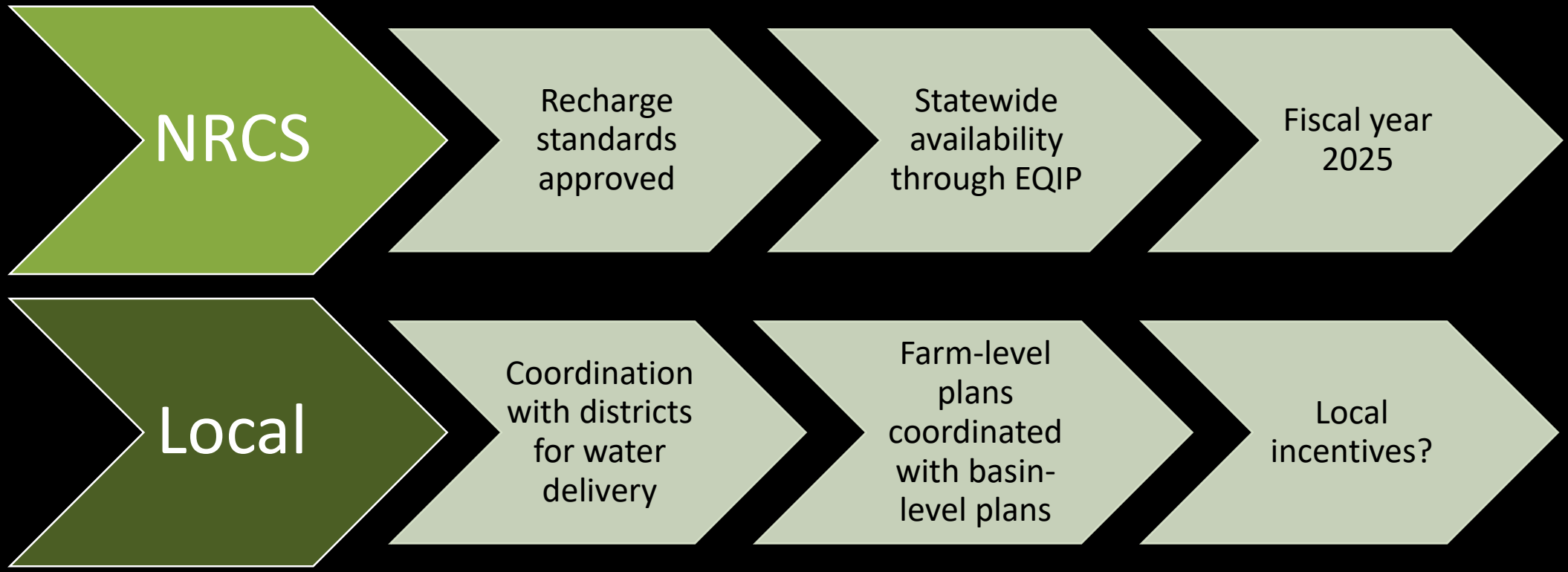
On-farm recharge

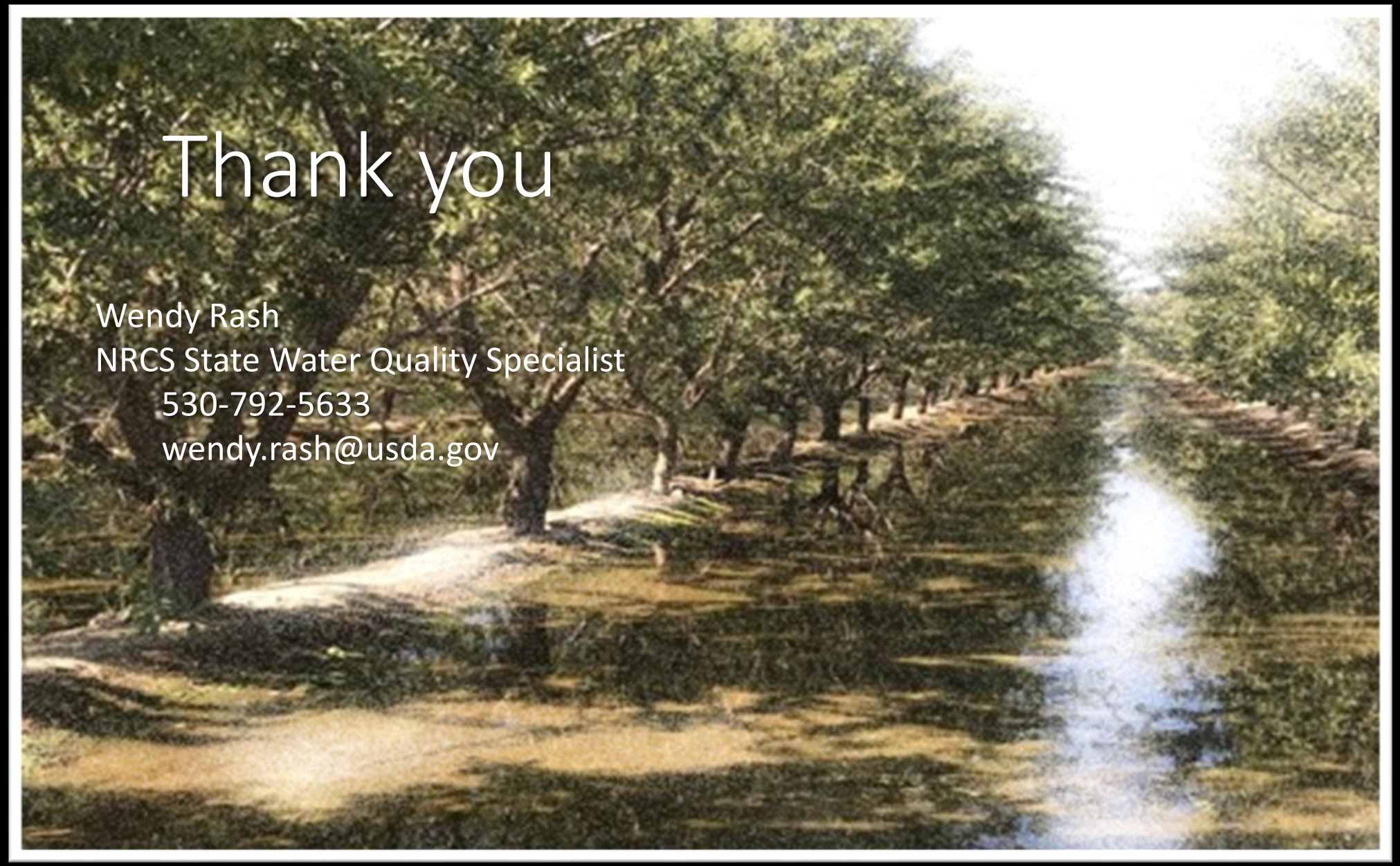
- Total recharge 4,680 ac-ft
- Averaged 1.7 ac-ft/ac
- Ranged from 0.5 – 3.25 ac-ft/ac

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 2025
Local
Coordination with districts for water delivery
Farm-level plans coordinated with basin-level plans
Local incentives?


Thank you
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Extra slides below

In case there are questions

Do not print or display

Plans can include supporting practices like:

Basin or Trench

- Structures for Water Control
  - Inlets, outlets
  - Flow meters
- Pre-treatment of water
  - Sediment basin
  - Coagulants (PAM)
  - Denitrifying Bioreactor

On-Farm Recharge

- Water conveyance
  - Pipeline
  - Field ditch
  - Pump
- Water control
  - Diversion/Dike
- Land shaping

These are conservation practices that can be paid for as part of an EQIP contract!

Financial assistance

Costs reimbursed AFTER contract is signed and design criteria are met (Draft- subject to change)

Recharge trench or basin (815): one-time payment after construction	
Trench: $4.13 per cubic yard excavated	
Basin: $4,461.53 per AF storage capacity <10 ac ft	5 ac ft basin = $22,308
Basin: $4,189.81 per AF storage capacity >=10 ac ft	20 ac ft basin = $83,797
On farm recharge (817): annual payment each year field is inundated with water	
$115.54 per acre inundated* <60 acres	20 acres = $2,311
$105.33 per acre inundated* >=60 acres	80 acres = $8,427

*If weather conditions prevent inundation, this practice can't be performed or reimbursed

Pilot program continues for Fall-Winter 2024-25 recharge

- Talk to your local NRCS Field Office to apply
- Confirm with irrigation district that your turnout will be served

Photo: USDA

Timeline


NRCS ranks the plans
January 2024 (Date TBD)
Application DUE
(Form 1200)
November 3,
2023
Recharge
Winter
2024-25
Fall 2023
Application
period
OPEN
November – December 2023
Applicant works with NRCS to
develop plan
Jan-Feb 2024
Highest scoring
projects will be
awarded funding

Narrow Recharge Trench (Irrigation reservoir)