

Water and the Future of the San Joaquin Valley

April 3, 2019

Supported with funding from the S. D. Bechtel, Jr. Foundation, the TomKat Foundation, the US Department of Agriculture, the US Environmental Protection Agency, and the Water Foundation



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An interdisciplinary research team



Ellen Hanak
PPIC
Economics



Alvar Escriva-Bou
PPIC
Engineering



Brian Gray
PPIC
Law



Sarge Green
CSU Fresno
Engineering



Thomas Harter
UC Davis
Hydrology/Climate



Jelena Jezdimirovic
PPIC
Economics



Jay Lund
UC Davis
Engineering



Nat Seavy
Point Blue
Conservation
Ecology/Biology



Josué Medellín-Azuara
UC Merced
Economics



Peter Moyle
UC Davis
Biology

...with important direction from many valley experts

Chuck Ahlem
Eric Averett
Ashley Boren
Paul Boyer
Kimberly Brown
Karen Buhr
Peter Carey
Michael Carbajal
Emmy Cattani
David Cehrs
Vito Chiesa
Joe Choperena
Greg Coleman

Daniel Cozad
Pamela Creedon
Vernon Crowder
Terry Erlewine
Tommy Esqueda
Melissa Frank
Michael Frantz
Noel Gollehon
Abby Hart
Ann Hayden
Maria Herrera
Matt Hurley
Michael Hurley

J. Paul Hendrix
Trevor Joseph
Jonathan Kaplan
Adam Livingston
Karl Longley
Joe MacIrvine
Cannon Michael
Sarah Moffatt
Daniel Mountjoy
Soapy Mulholland
Mike Olmos
Dave Orth
Lorelei Oviatt

Brian Pacheco
Stephen Patricio
Jeff Payne
Bill Phillimore
Katie Pranek
Jon Reiter
Jesse Roseman
Jonathan Vaughn
Josh Viers
Walter Ward
Kathy Wood-McLaughlin
Stuart Woolf



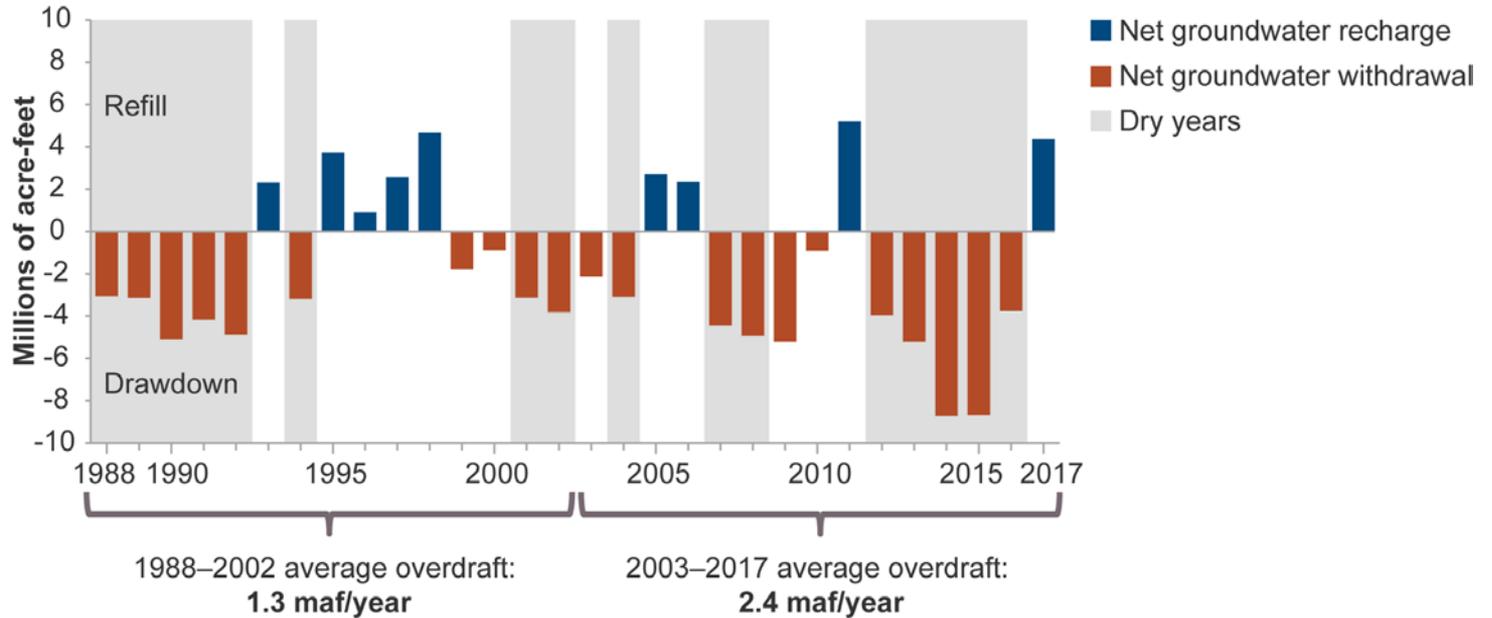
The San Joaquin Valley is at a pivotal moment

- California's largest farming region faces unprecedented challenges and inevitable change
- Much at stake for region's economy, public health, environment
- Most promising approaches
 - Increase flexibility
 - Provide incentives
 - Leverage multiple benefits
- Increased cooperation, coordination will be key
- State, federal governments can provide vital assistance

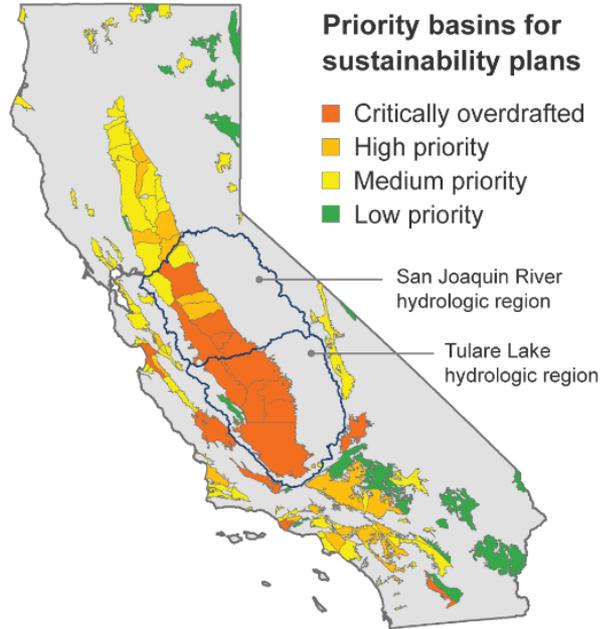


The valley relies on groundwater overdraft to deal with its long-term water imbalance

- 30-year valley-wide deficit (1988-2017): 1.8 maf/year



The valley is ground zero for implementing the Sustainable Groundwater Management Act



- Most of the valley's groundwater basins are critically overdrafted
- Consequences are dry wells, sinking lands, reduced supplies for droughts
- Most basins must adopt plans by 2020, achieve sustainability by 2040
- Attaining balance means more recharge, less water use, or both
- Impacts will vary across the region



Valley agriculture faces linked challenges on water, air, and habitat quality

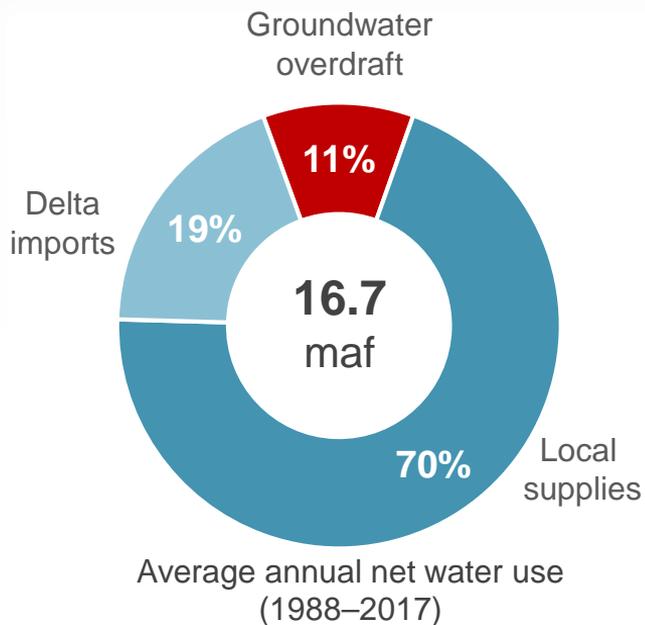
- Nitrate in groundwater
 - Risks to drinking water
- Salinity in west-side soils and groundwater
 - Limits crop productivity
- Poor air quality
 - Could increase with more land following under SGMA
 - Dairy industry will need to tackle methane emissions
- Highly altered natural environment
 - Conflicts over land, water management



Outline

- Balancing water supplies and demands
- Addressing groundwater quality challenges
- Fostering beneficial water and land use transitions

Many approaches to reduce overdraft



Supply management options

- Capture and store more local runoff
- Increase local runoff
- Increase Delta imports
- Reduce exports to other regions
- Reuse and repurpose local supplies

Demand management options

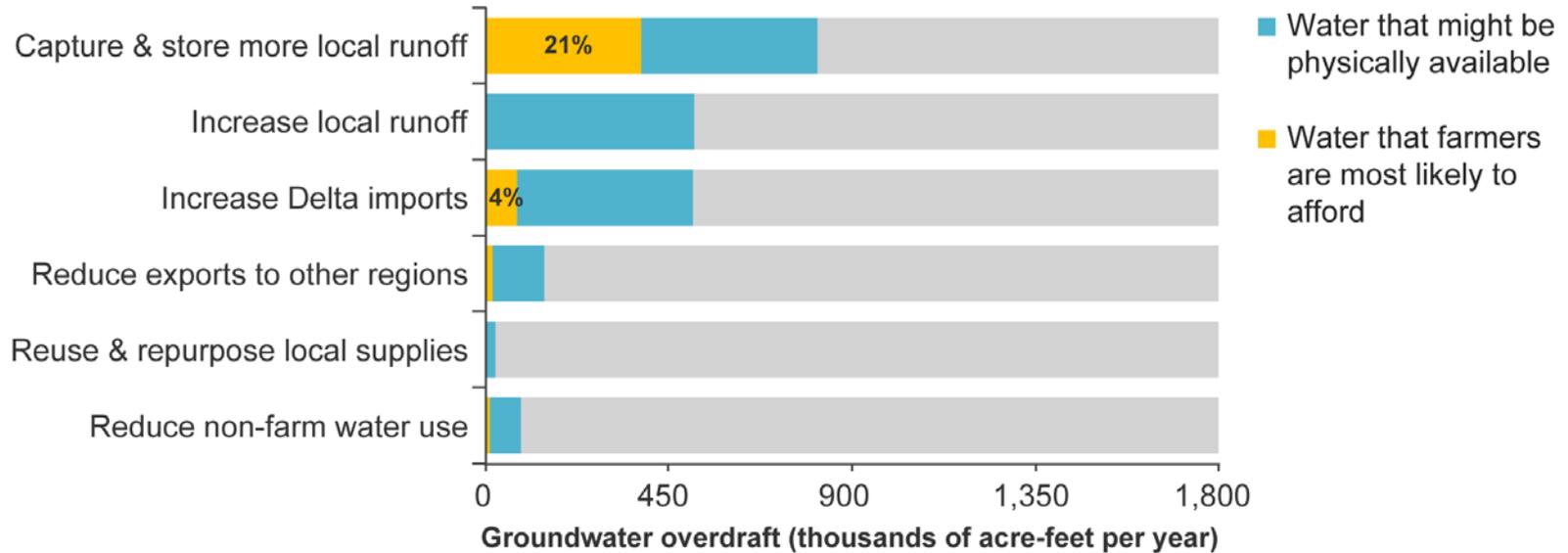
- Reduce net farm water use
- Reduce net urban water use
- Reduce net water use for open space, wetlands
- Reduce losses from water infrastructure
- Increase flexibility

We examined approaches shown in red



Supply options vary greatly in potential yield and in affordability for valley farming

New supplies can affordably fill about 25% of overdraft

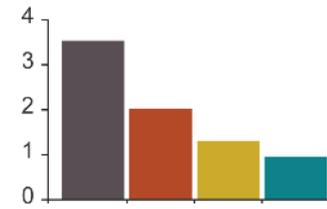


Flexibility is key to managing farm water demand

- Inflexible water use is very costly
- Local water trading slashes costs
- Valley-wide surface water trading cuts costs further
- Trading + new supplies also reduces land fallowing

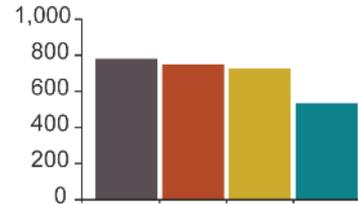
Crop revenue losses

(billions of \$)



Land fallowing

(thousands of acres)

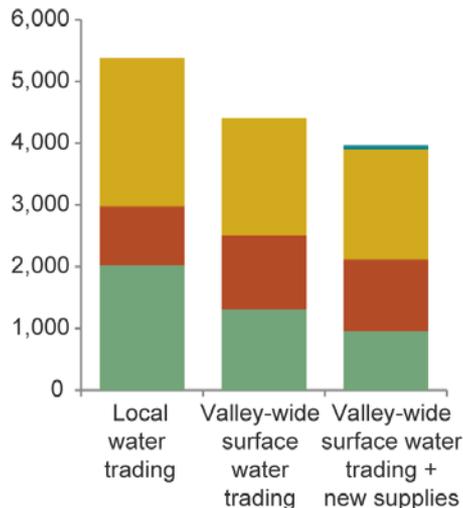


- Inflexible local water use
- Local water trading
- Valley-wide surface water trading
- Valley-wide surface water trading + new supplies

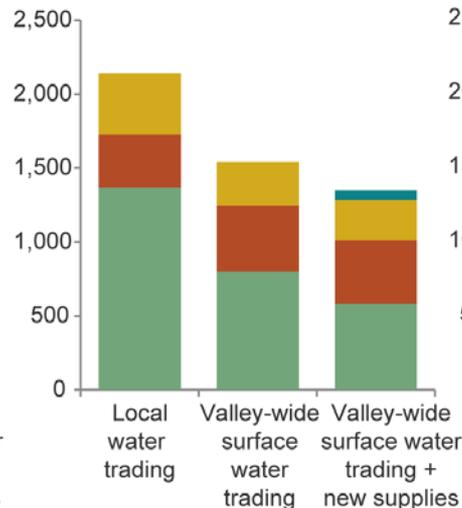


A portfolio approach can minimize regional economic losses

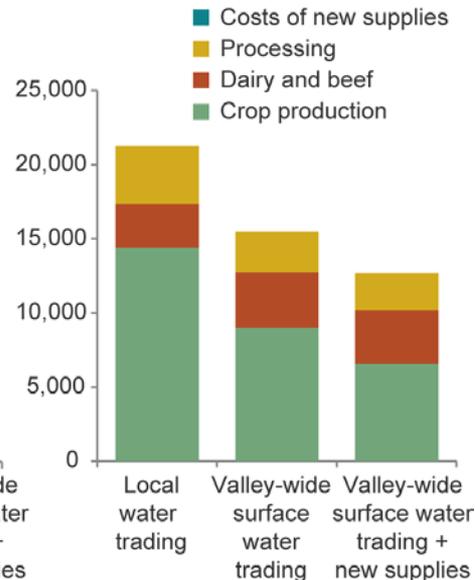
A) Revenue losses
(\$ millions)



B) GDP losses
(\$ millions)



C) Job losses



Gradually ending overdraft (“glide path”) can also help



Priorities for action

1. *Assess infrastructure needs, modernize operations
2. Incentivize recharge on farmland
3. Develop local water trading rules
4. *Clarify how much water is available for recharge
5. *Facilitate approvals for trading and banking projects
6. Coordinate to maximize benefits

** Priority areas for state and federal involvement*



Outline

- Balancing water supplies and demands
- Addressing groundwater quality challenges
- Fostering beneficial water and land use transitions

Groundwater quality must be addressed while implementing SGMA

- Three new areas of focus
 - Providing safe drinking water
 - Managing nitrogen loading
 - Managing salt balance
- Potential synergies, but also trade-offs, in tackling these issues alongside SGMA



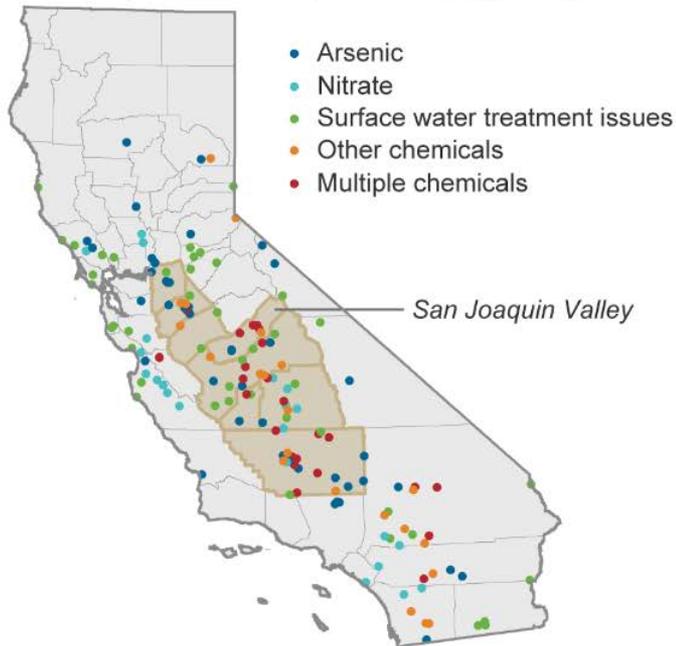
CV-SALTS meeting

Source: cvsalinity.org

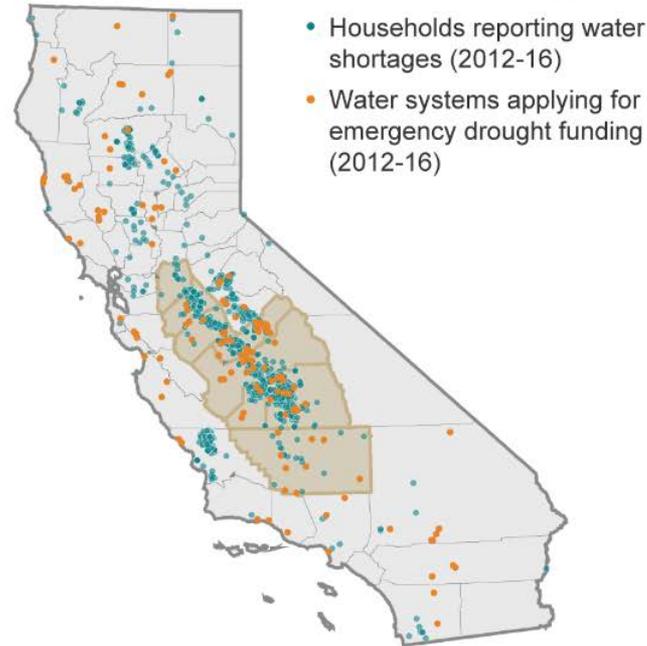


The valley is a hot spot for California's safe drinking water crisis

A) Non-compliant water systems by type of pollutant

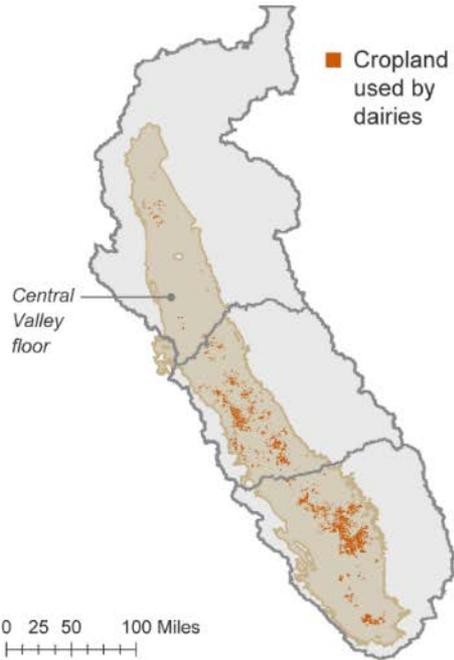


B) Water systems and households facing shortages

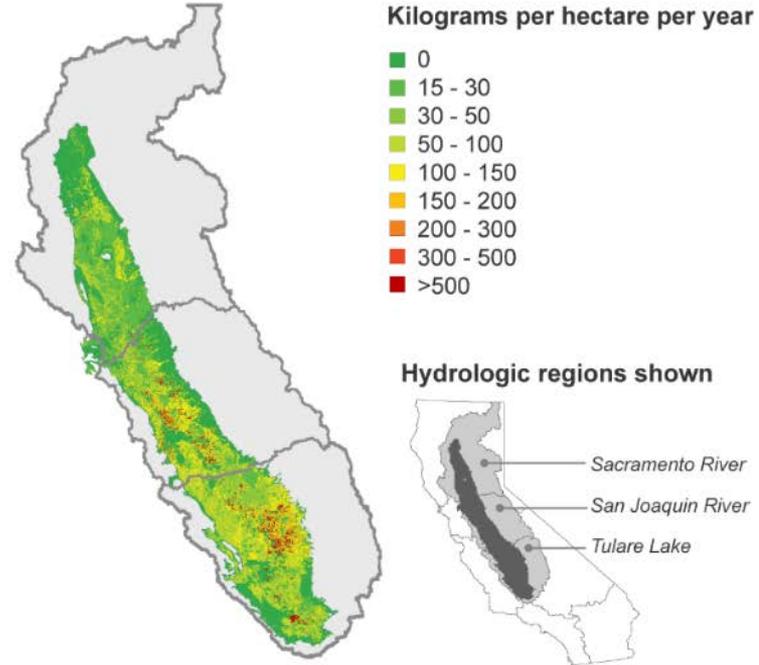


Dairies face special challenges in managing manure

A) Cropland used by dairies

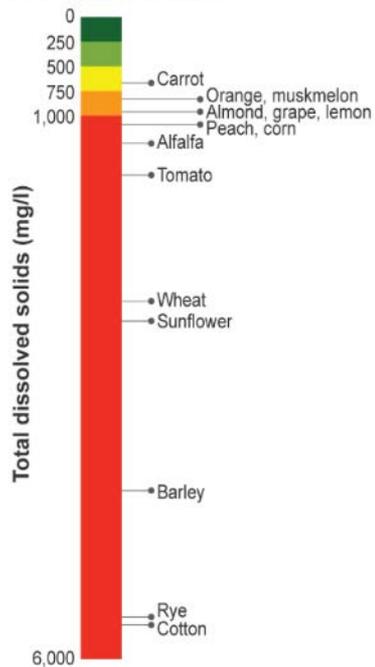


B) Nitrogen loading to groundwater



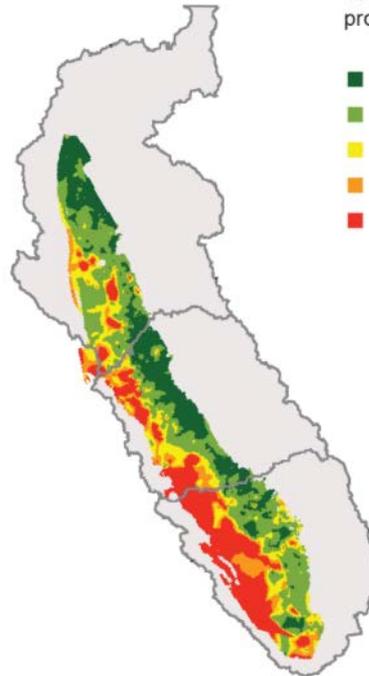
Better approaches are needed to manage salts

A) Salinity thresholds at which crop yields start to decline



B) Shallow groundwater salinity

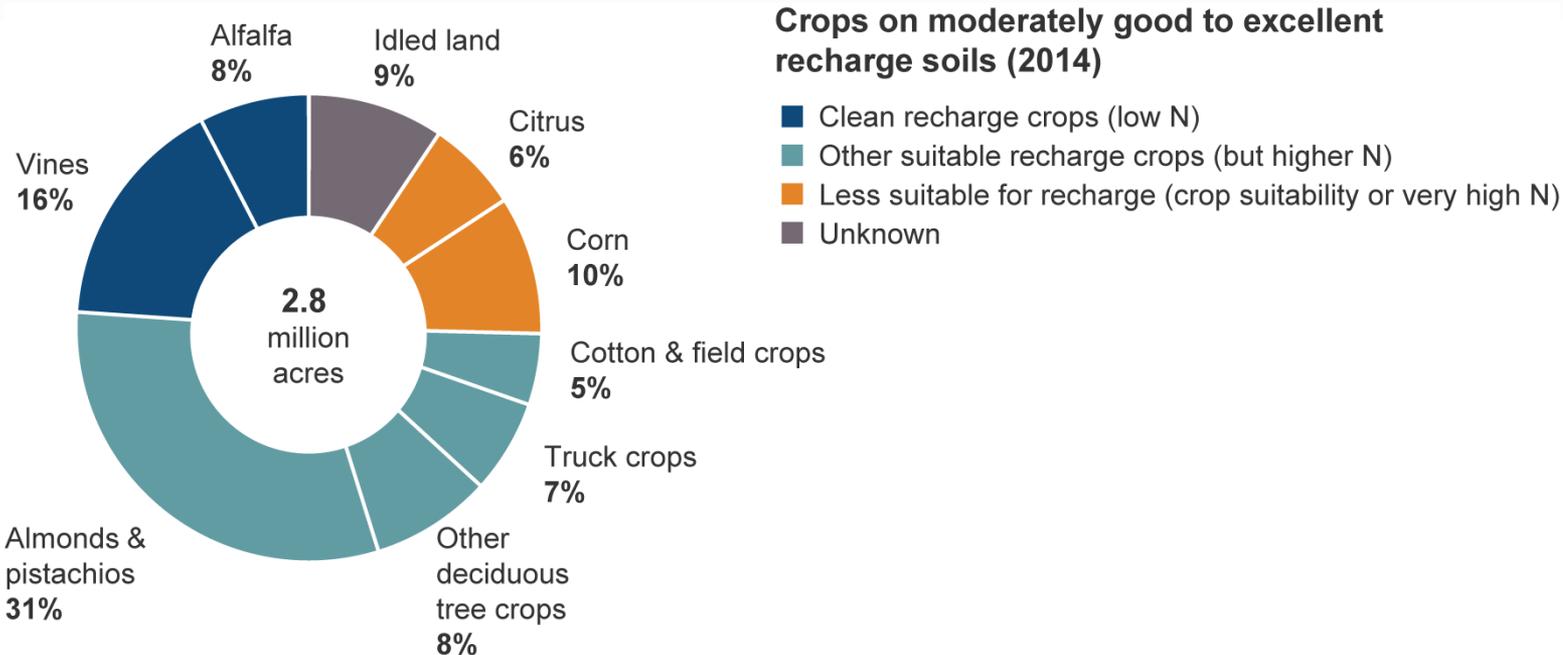
Total dissolved solids in the production zone (mg/L)



Hydrologic regions shown



Tools to balance groundwater supplies and demands can affect groundwater quality



Priorities for action

1. * Provide safe and reliable drinking water
 - Consolidate, aggregate systems
 - Provide technical support
 - Mitigate dry wells
 - Ensure funding
2. Coordinate water quality and quantity management
3. Implement new technologies to manage pollutants, especially for dairies
4. * Provide regulatory flexibility to manage nitrogen, salt loading

** Priority areas for state and federal involvement*

Outline

- Balancing water supplies and demands
- Addressing groundwater quality challenges
- Fostering beneficial water and land use transitions

Changes to water and land present new challenges, opportunities

- Ecosystems under stress
- Water becoming scarcer
- More land available, but with less revenue
- Threats of land retirement: dust, pests, weeds
- Potential for multi-benefit approaches: healthy soils, habitat, solar, recharge, flood protection, recreation

Rivers



Wetlands



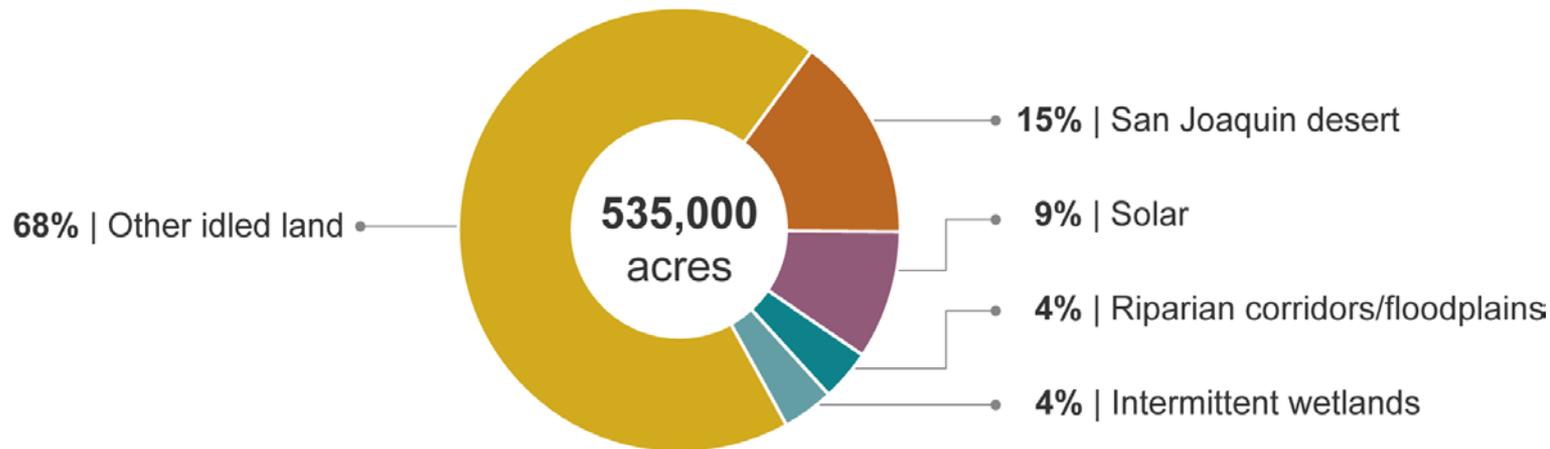
Drylands



Current planning efforts only account for 1/3 of land likely to be fallowed

- The goal should be to steward all idled lands

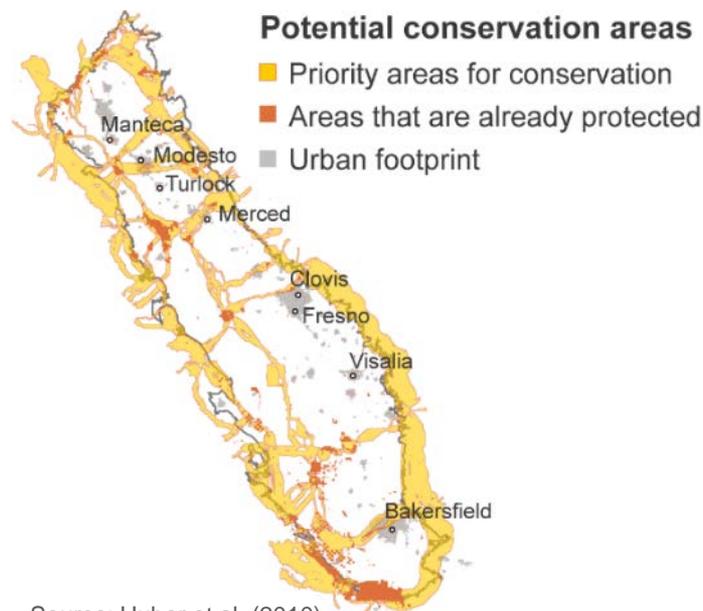
Potential uses of formerly irrigated lands



Priorities for action: Planning

- Involve many local parties, including county and city planners
- Regional scope would enable more synergies

One example of a regional approach



Source: Huber et al. (2010)



Priorities for action: Flexible regulatory approaches

- * Large landscape, multi-species permitting
- * Simplified, streamlined permitting
- * Protect landowners from regulatory risk
 - Safe harbor
 - Relax prime farmland retirement restrictions



Kern Water Bank

Source: Maven's Notebook

** Priority areas for state and federal involvement*



Priorities for action: Funding and incentives

- * Redirecting, pooling funding sources will be key
 - Water, land, energy use fees
 - State, federal grants and credits
- Many farmers will also need other incentives (e.g., keep rights to water from fallowed lands for use on other lands)



Atwell Island Land Retirement Program Source: Jezdimirovic

** Priority areas for state and federal involvement*



Priorities for action: Funding and incentives

- From 2012–17 USDA provided an annual average of \$155 million statewide, and \$50 million within the valley for resource stewardship
- *Aligning funds with planning goals can encourage beneficial groundwater management and land conversion decisions



USDA Regional Conservation Partnership Program funded expansion of McMullin On-Farm Flood Capture project

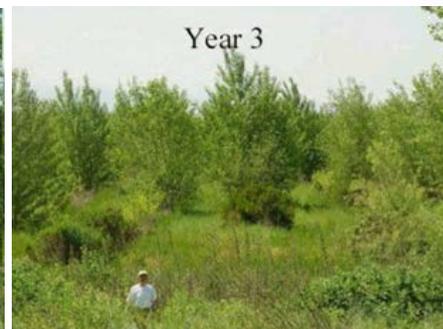
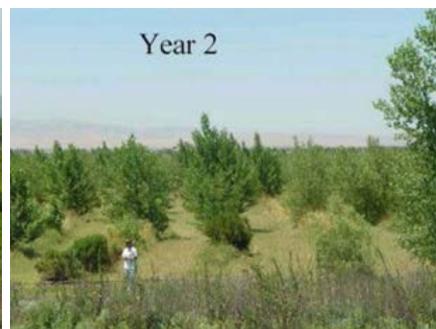
Source: Kings Basin Water Authority

* *Priority areas for state and federal involvement*



Farmers can contribute to cost-effective approaches for stewarding lands on a large scale

River Partners' San Joaquin River restoration project



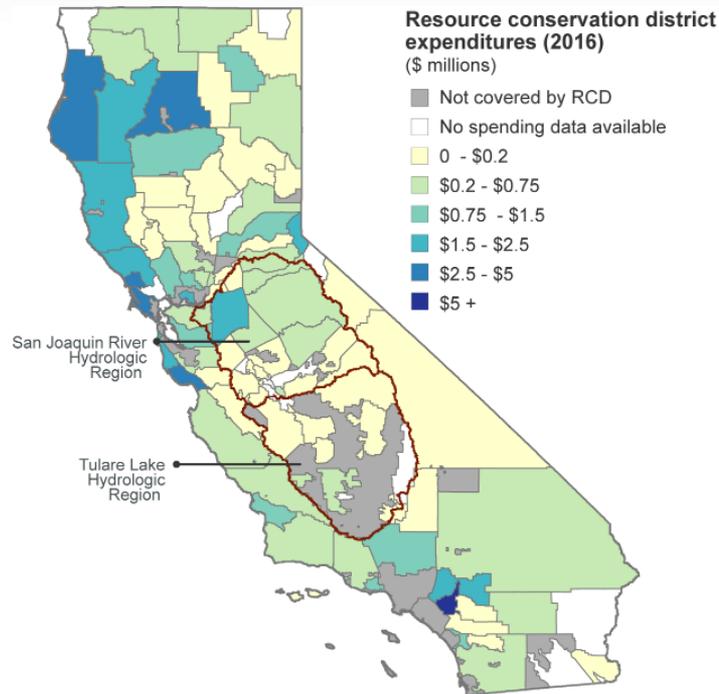
Source: River Partners



Priorities for action: Technical support, R&D

- * Much experimentation will be needed
- RCDs are ideal partners, but too limited in coverage, underfunded
- Other key “honest brokers”: NGOs, UC Extension, USDA technical assistance

* *Priority areas for state and federal involvement*



Effective and equitable solutions will require cooperative approaches

- Problems can't be solved farm-by-farm
- Many opportunities to tackle multiple problems at once and get multiple benefits
- Broad-based partnerships will be key
- State, federal agencies can play vital roles



Thank you



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Notes on the use of these slides

These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

Ellen Hanak (hanak@ppic.org; (415) 291-4433)

Thank you for your interest in this work.

