

Water and the Future of the San Joaquin Valley

February 22, 2019

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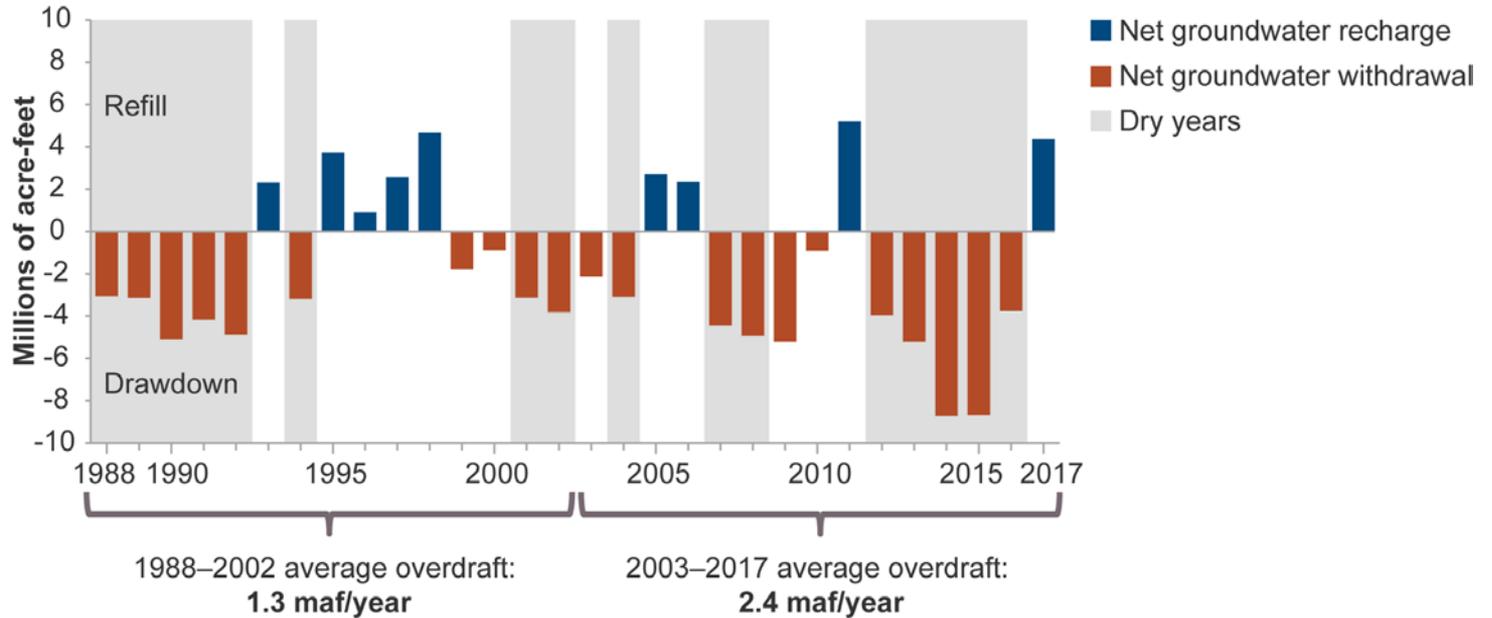
The San Joaquin Valley is at a pivotal moment

- 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

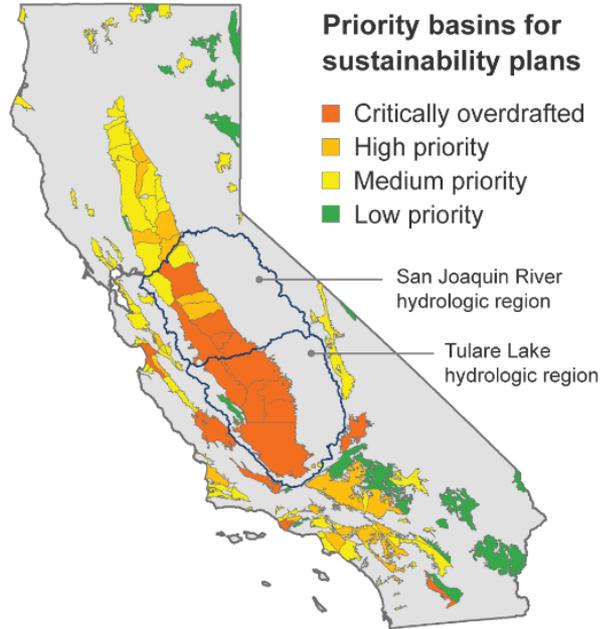


The valley relies on groundwater overdraft to deal with its long-term water imbalance

- 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

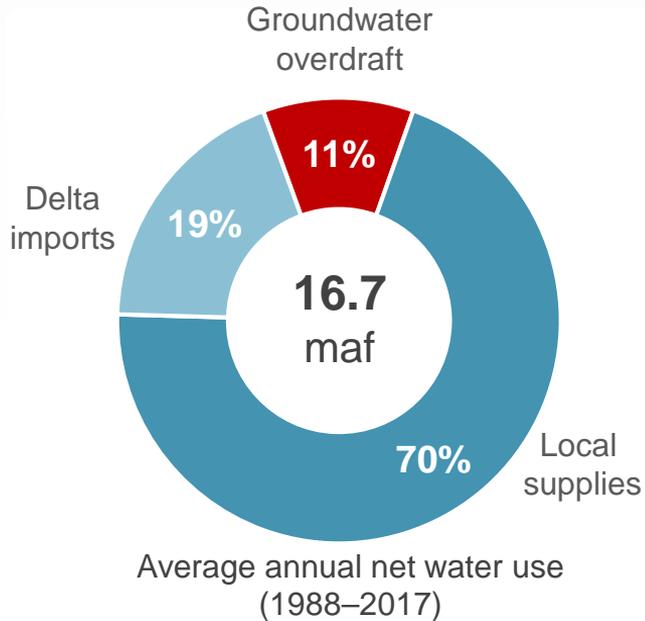
- Nitrate in groundwater
 - Risks to drinking water
- Salinity in west-side soils and groundwater
 - Limits crop productivity
- Poor air quality
 - Could increase with more land following under SGMA
 - Dairy industry will need to tackle methane emissions
- Highly altered natural environment
 - Conflicts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

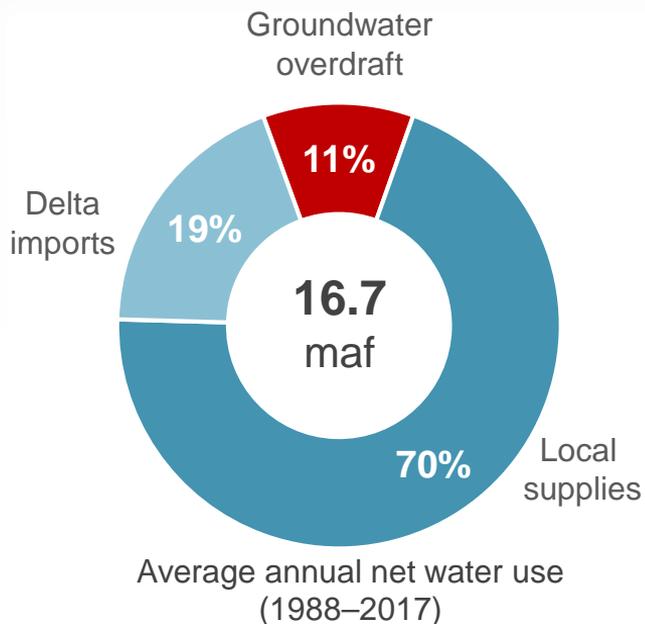
- Capture and store more local runoff
- Increase local runoff
- Increase Delta imports
- Reduce exports to other regions
- Reuse and repurpose local supplies

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



Many approaches to reduce overdraft



Supply management options

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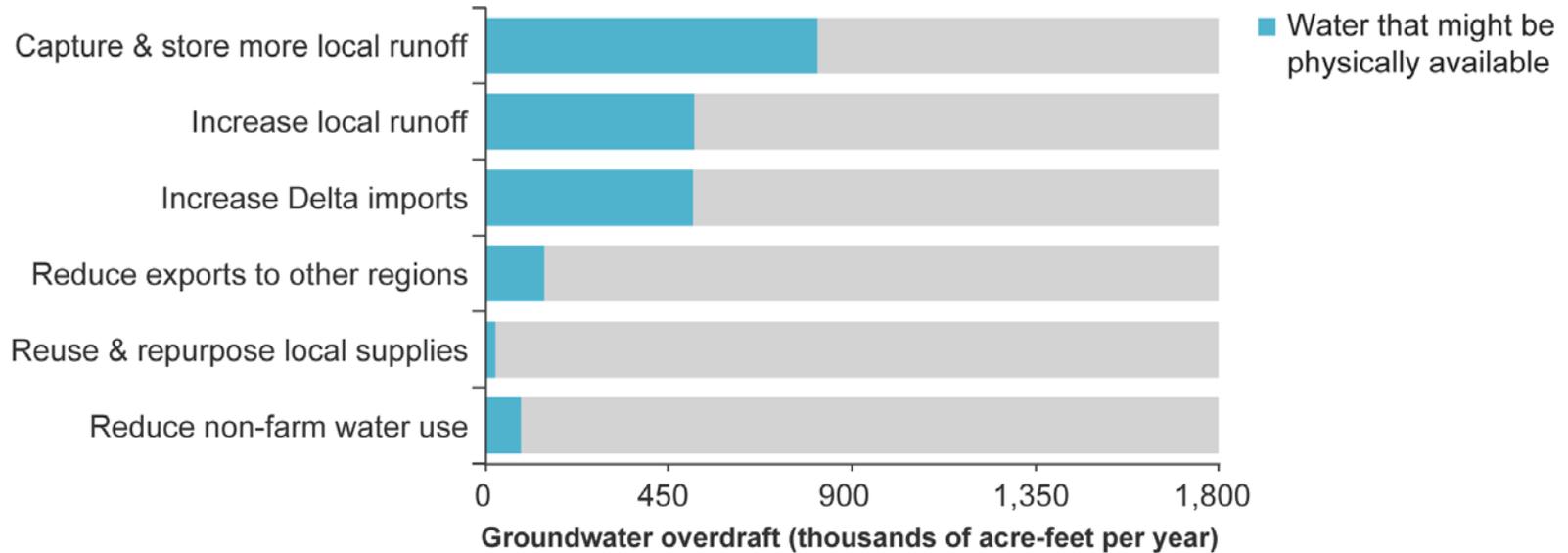
Demand management options

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- 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

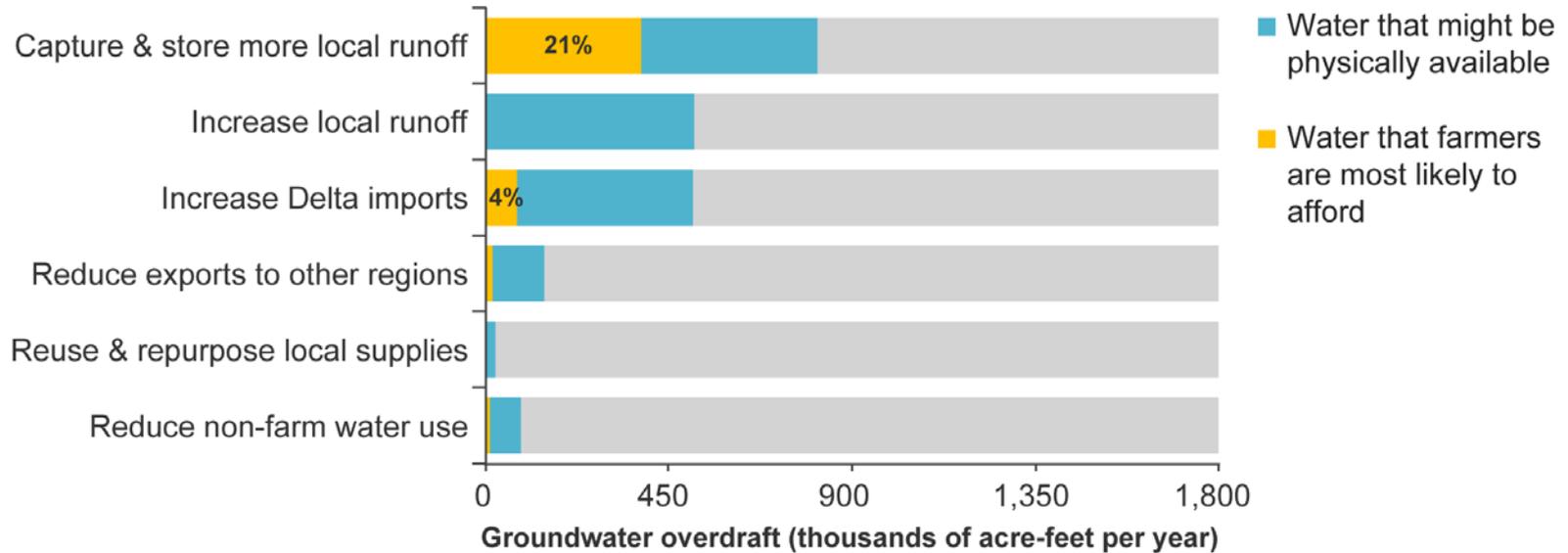


Supply options vary greatly in potential yield....



...and in affordability for valley farming

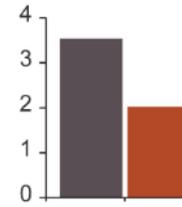
New supplies can affordably fill about 25% of overdraft



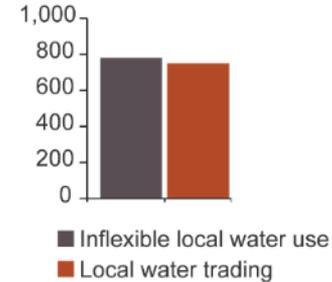
Flexibility is key to managing farm water demand

- Inflexible water use is very costly
- Local water trading slashes costs

Crop revenue losses
(billions of \$)



Land following
(thousands of acres)

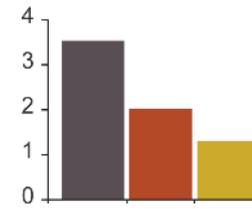


Flexibility is key to managing farm water demand

- Inflexible water use is very costly
- Local water trading slashes costs
- Valley-wide surface water trading cuts costs further

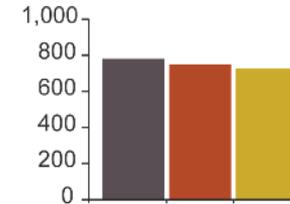
Crop revenue losses

(billions of \$)



Land fallowing

(thousands of acres)



■ Inflexible local water use
■ Local water trading
■ Valley-wide surface water trading

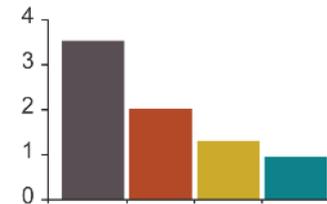


Flexibility is key to managing farm water demand

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

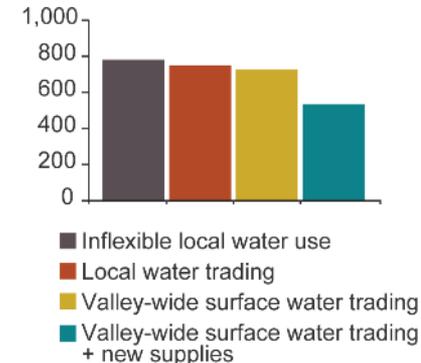
Crop revenue losses

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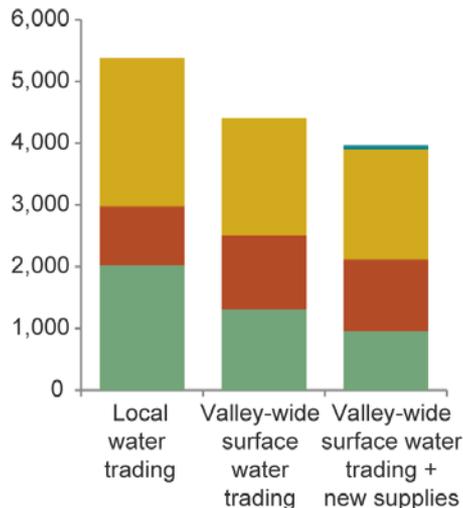
Land fallowing

(thousands of acres)

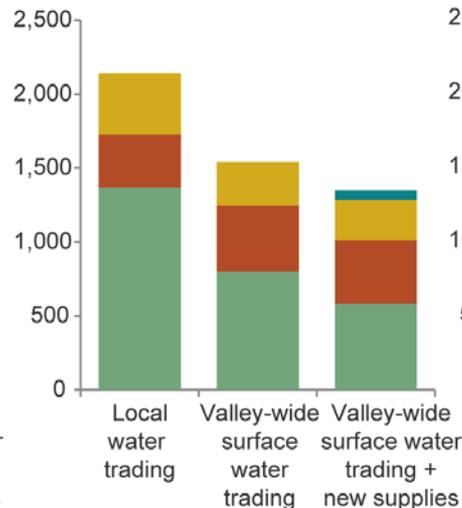


A portfolio approach can minimize regional economic losses

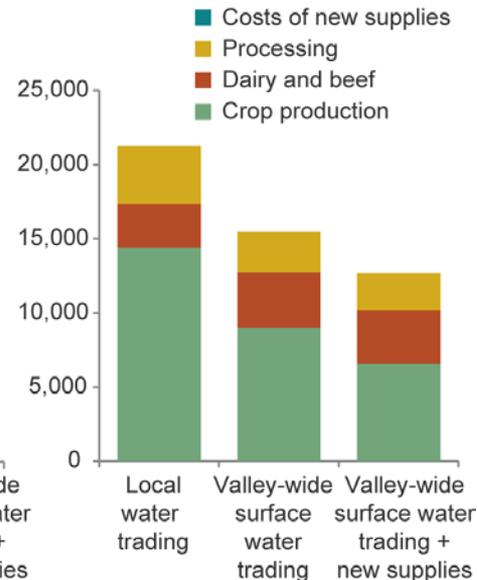
A) Revenue losses
(\$ millions)



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

Outline

- Balancing water supplies and demands
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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



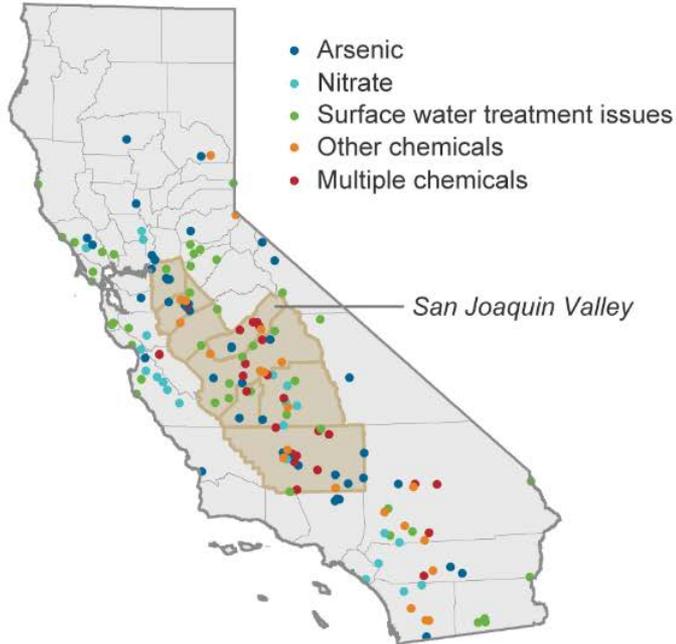
CV-SALTS meeting

Source: cvsalinity.org

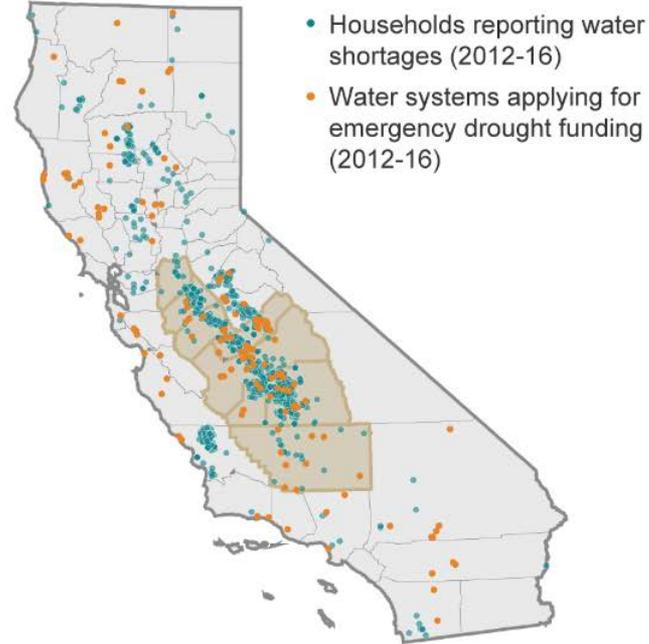


The valley is a hot spot for California's safe drinking water crisis

A) Non-compliant water systems by type of pollutant

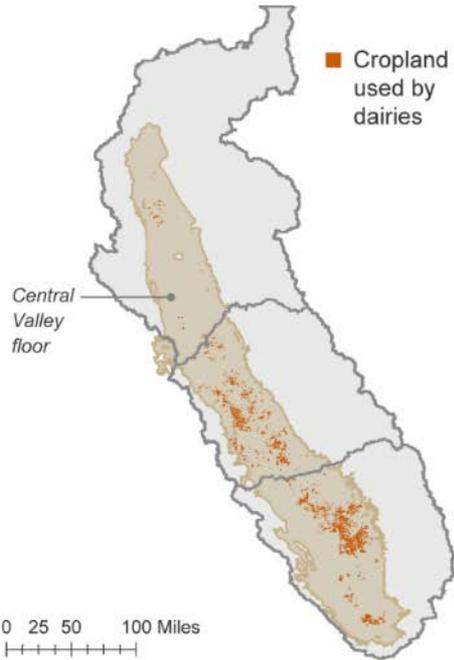


B) Water systems and households facing shortages

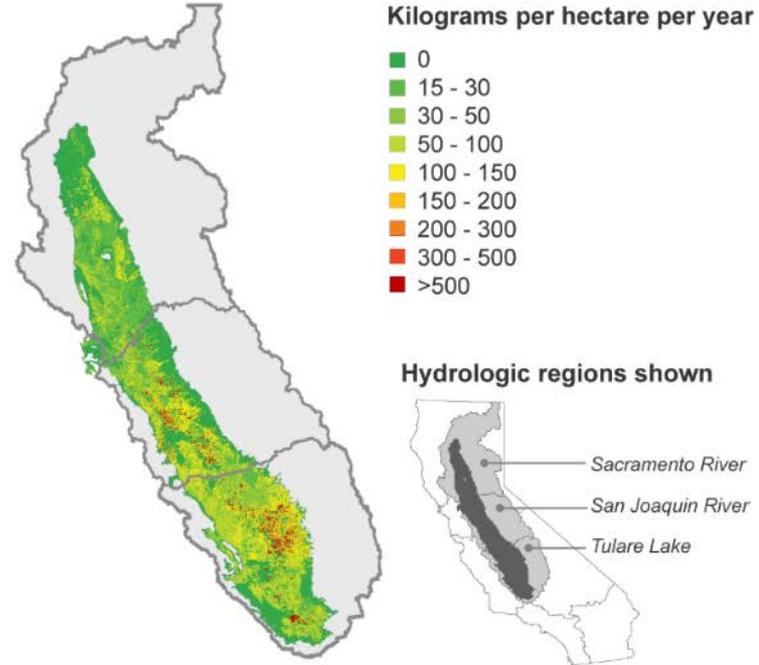


Dairies face special challenges in managing manure

A) Cropland used by dairies

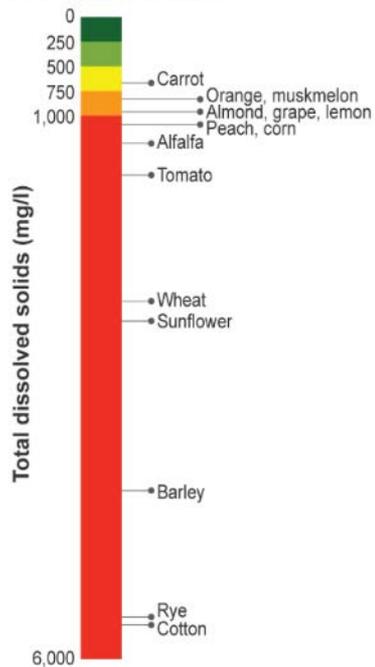


B) Nitrogen loading to groundwater



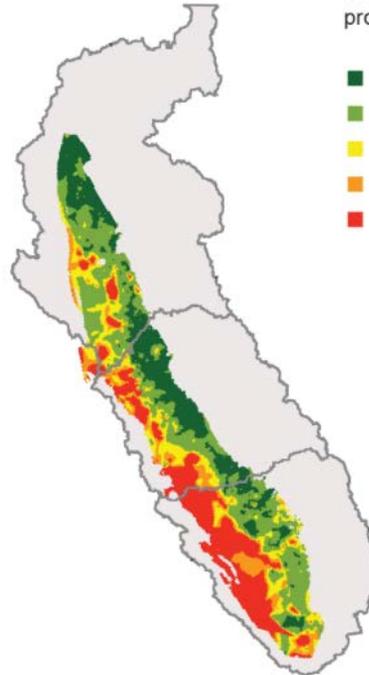
Better approaches are needed to manage salts

A) Salinity thresholds at which crop yields start to decline



B) Shallow groundwater salinity

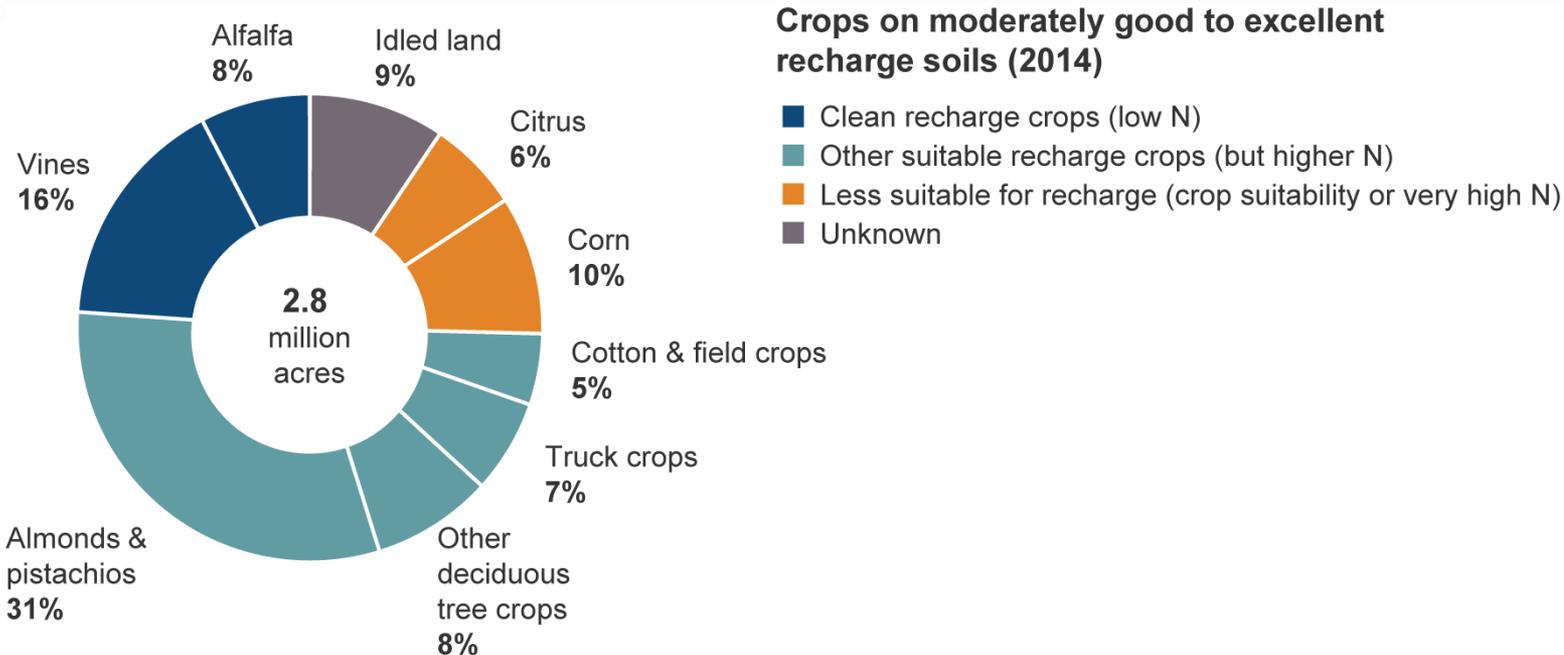
Total dissolved solids in the production zone (mg/L)



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



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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, pest, weeds
- Potential for multi-benefit approaches: healthy soils, habitat, solar, recharge, flood protection, recreation

Rivers



Wetlands



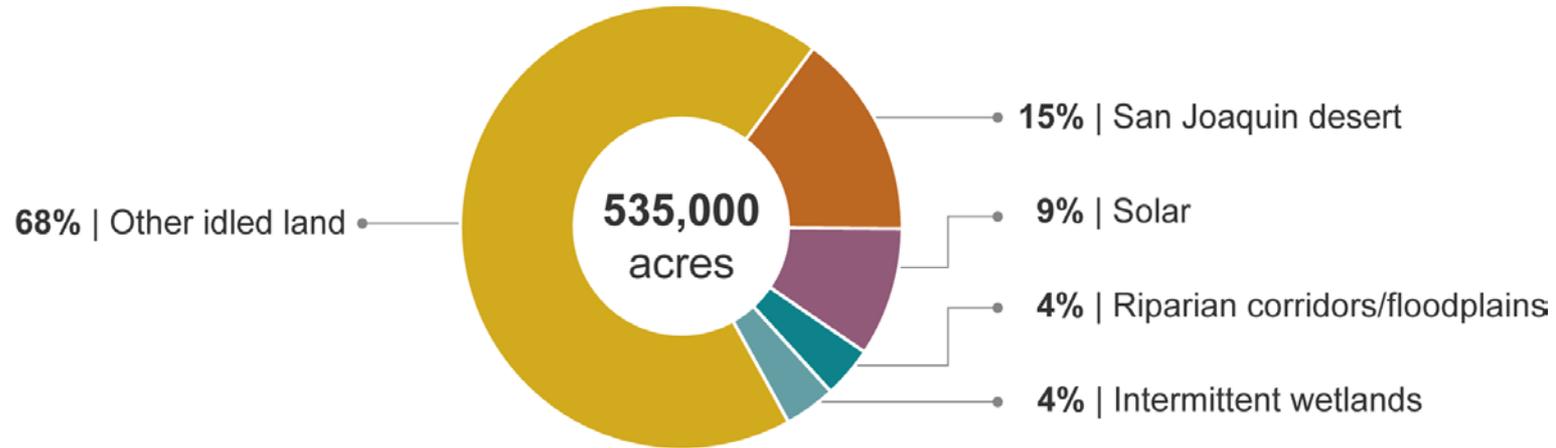
Drylands



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

- The goal should be to steward all idled lands

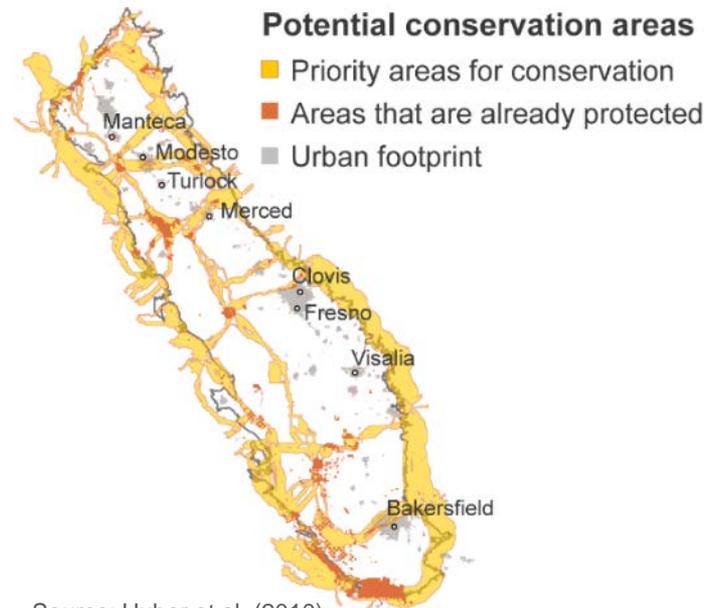
Potential uses of formerly irrigated lands



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



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



Cost-effective approaches are essential for stewarding lands on a large scale

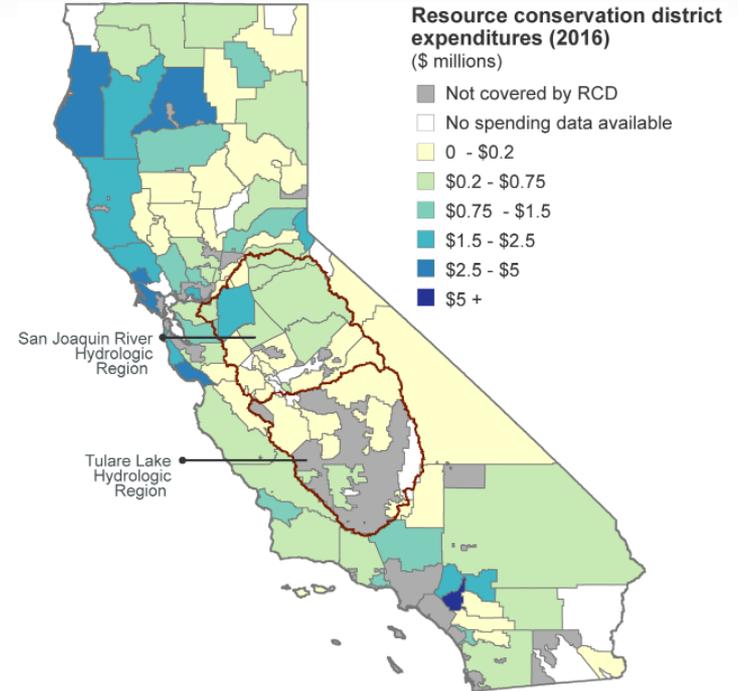
River Partners' San Joaquin River restoration project



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



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:

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Thank you for your interest in this work.



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