Exploring the Potential for Water-Limited Agriculture

Farmland in Transition: The San Joaquin Valley
July 26, 2022

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The San Joaquin Valley's irrigated cropland is getting squeezed

- Models for wheat showed that minimal irrigation reduces crop failure risk substantially
- Forage products may prove a high-value use of water
- And there may be other public/private benefits to keeping crops in the ground

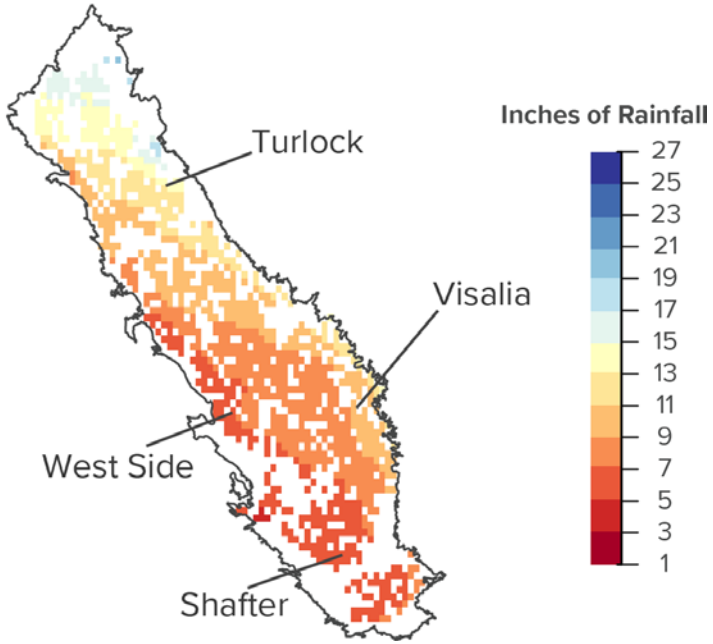
What do we mean by “dryland” and “water-limited”?

- Dryland
  - Precipitation, soil water only
  - Semi-arid areas of the world
- Water-Limited
  - Dryland plus a few inches of irrigation

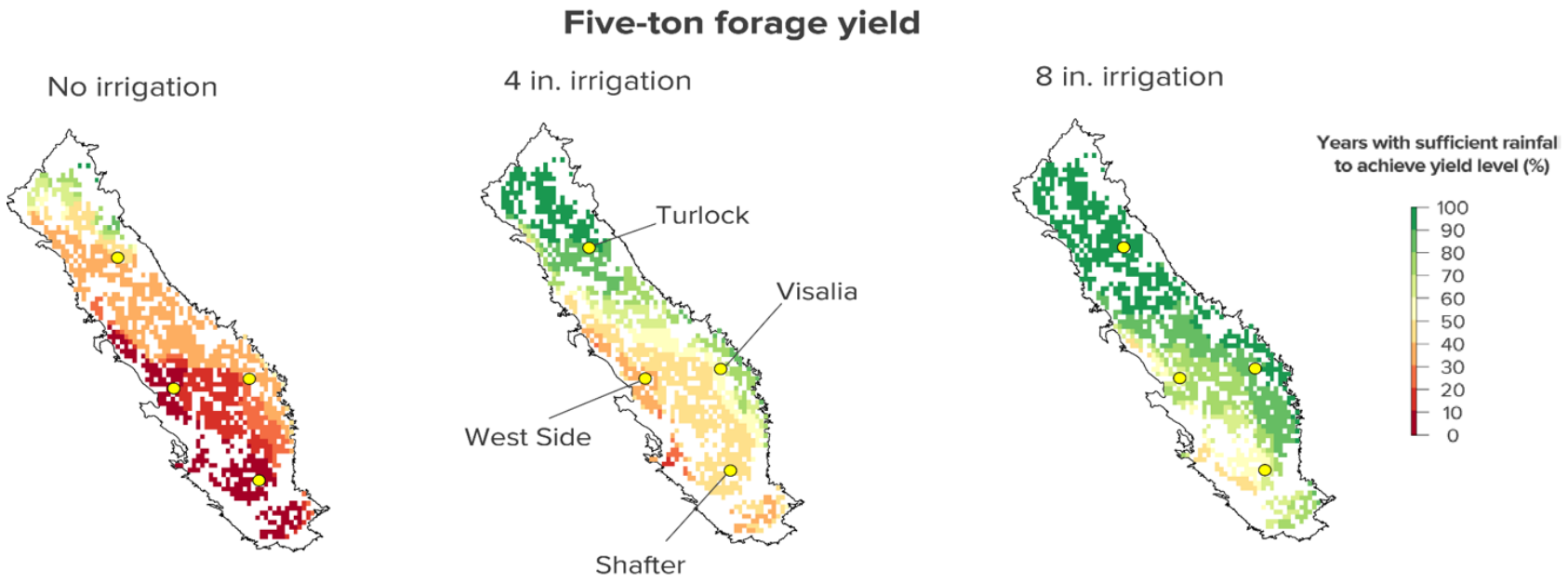
Can winter crops still be grown with no irrigation?

- We explored this question with crop models and conversations with growers and other experts
- Winter wheat case study
  - Common in dryland settings
  - Robust research base
- Rainfall quantity and variability a big constraint

Average annual rainfall, 2011-20



With 4–8 inches of irrigation, establishment and yields improve



Agronomic potential is only one part of the equation

- There are also economic, operational factors to consider
  - Profit potential
  - Market for forage crops
  - Cost of maintaining irrigation systems; ability to make targeted applications
- And there are other crop-related dynamics not captured by our modeling
  - Salt, weed pressure may further limit yields over time

Water-limited crops offer other benefits

- Public benefits such as dust mitigation, surrogate habitat for wildlife
- Private benefits to the grower
  - Maintaining soil quality
  - Keeping land operational
  - Building flexibility into operations
- Net water use – on balance, might not be much more than fallow

Policy considerations

- Consider external support to promote public benefits
- Account for net water use from fallow in local water budgets

Research needs

- Conduct on-farm trials to verify results, build grower familiarity
- Evaluate market opportunities
- Develop improved varieties and techniques
- Explore other winter and drought-adapted crops
- Explore role of grazing systems and rangelands

Note 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.

Land Transitions and Dust in the San Joaquin Valley

Farmland in Transition: The San Joaquin Valley
July 26, 2022

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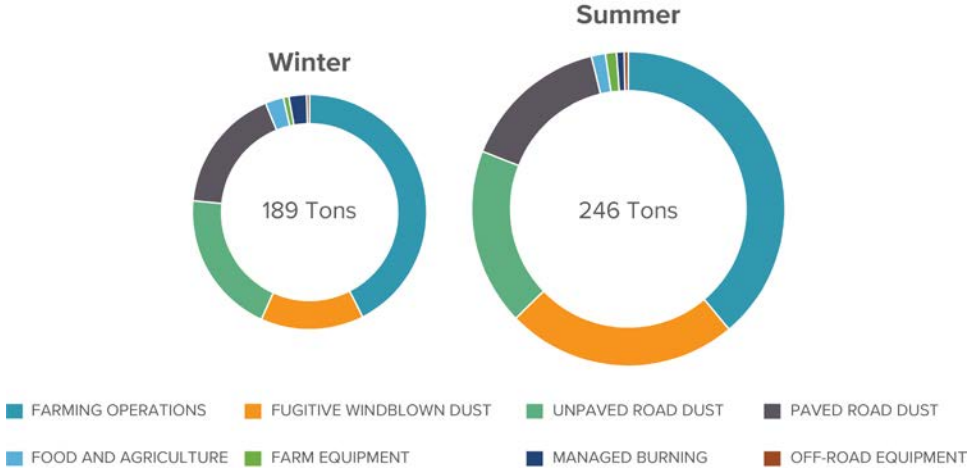
SGMA, dust, and the future of valley air quality

- Future of the SJV depends critically on better managing groundwater
- If poorly managed, fallowed lands can generate dust—and increase health risks
- Principal negative effects for low-income, rural communities
- Priorities for coordinated action
  - Clarify responsibilities
  - Identify potential hotspots
  - Provide funding support

The landscape is important for valley particulate pollution

- Landscape dust sources are significant (60% of PM_{10})
- Valley has seen progress on PM_{10} concentrations
- Additional risks from dust
  - Valley Fever
  - Legacy pesticides

Most PM_{10} from the landscape is generated in the summer



Source: CARB

Other agricultural land transitions in the West can deliver some lessons

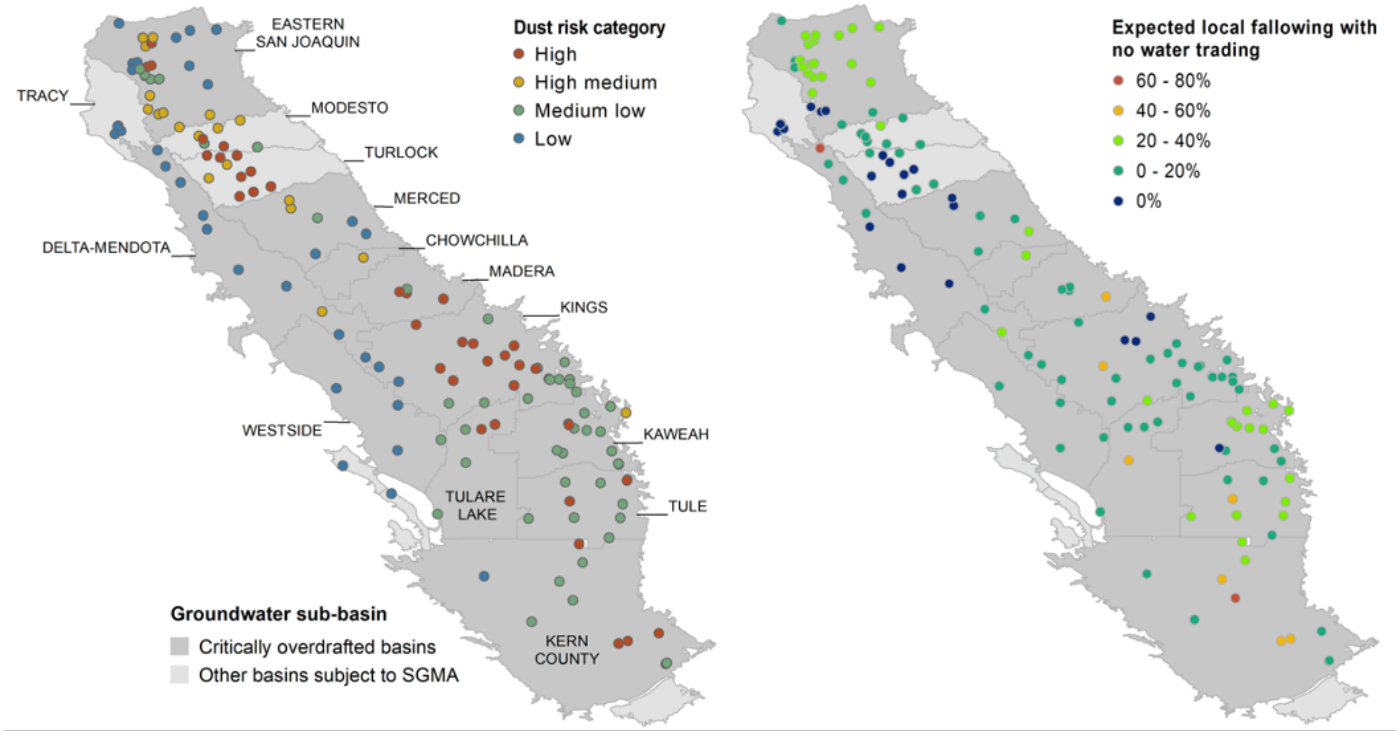
- Imperial Valley, Antelope Valley, and Eastern Washington
- Key ingredients for success:
  - Funding
  - Monitoring
  - Innovation
  - And some luck

What to expect from land transitions in the San Joaquin Valley

- Some lands create more PM than others
  - Effects of idling may vary by prior land use, time of year
  - Dust can spike during orchard harvest (esp. almonds)
- Rural areas are more exposed
  - Increasingly arid climate likely to compound risks
  - Certain areas face heightened risk

Source: Fresno Bee

Identifying “hotspots” for dust risk in rural communities



Source: UC Davis, NASA, and PPIC

Reducing risk requires action on idled and cropped lands

- Maintaining vegetative cover: easiest, most cost-effective approach
- Landscape cover (gravel, mulch) more costly, but longer-term benefits
- Ongoing improvements on working lands also important
  - SJV air district's Conservation Management Practice (CMP) has helped

Source: R. Kerekes

Getting out ahead of the problem

- Improve **understanding** of dust risk in rural areas
  - Tools to identify hotspots for dust impacts
  - Potential roles for CARB, EPA, and SJV air district
- Clarify GSA and landowner **responsibilities**
  - Air district update of CMPs can keep valley agriculture ahead of the curve
- Leverage existing **funding** programs, and develop new ones
  - USDA NRCS and California Dept. of Conservation
  - Potential models: district programs for harvesters, burning

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