

# Resilience and the Recent Drought

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# California's Economy Is Used to Weathering Periodic Droughts



California Journal, 1991

- Variable climate a constant
- Urban utilities tend *not* to short highest value activities
  - Public health/safety (e.g., hospitals)
  - Employment centers (e.g. industry, commerce)
- Agriculture most vulnerable, but small share of economy (1-2% of GDP)\*

\* Source: Hanak et al. 2012. *Water and the California Economy*. PPIC.



# Droughts Often Spur Innovation in Water Management

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- Late 1980s – early 1990s drought propelled numerous initiatives to diversify water portfolios:
  - Water use efficiency
  - Water marketing
  - Groundwater banking
  - Recycled wastewater



# What Did We Learn From the Latest Drought?

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- Dating the drought:
  - 3 consecutive dry years (2007-09)
  - Drought emergency: June 2008 to March 2011
- Quick look at 4 key areas:
  - (1) Urban water use efficiency
  - (2) Farm economy
  - (3) Water markets
  - (4) Groundwater management and banking



# Urban Water Savings

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- Substantial declines in per capita water use in response to drought programs
  - Weak economy also a factor...
  - ...as were new Delta pumping restrictions
- Questions:
  - Can water savings be maintained? (SBx7-7 goal of 20% X 2020)
  - Can water agencies become more financially resilient to droughts?

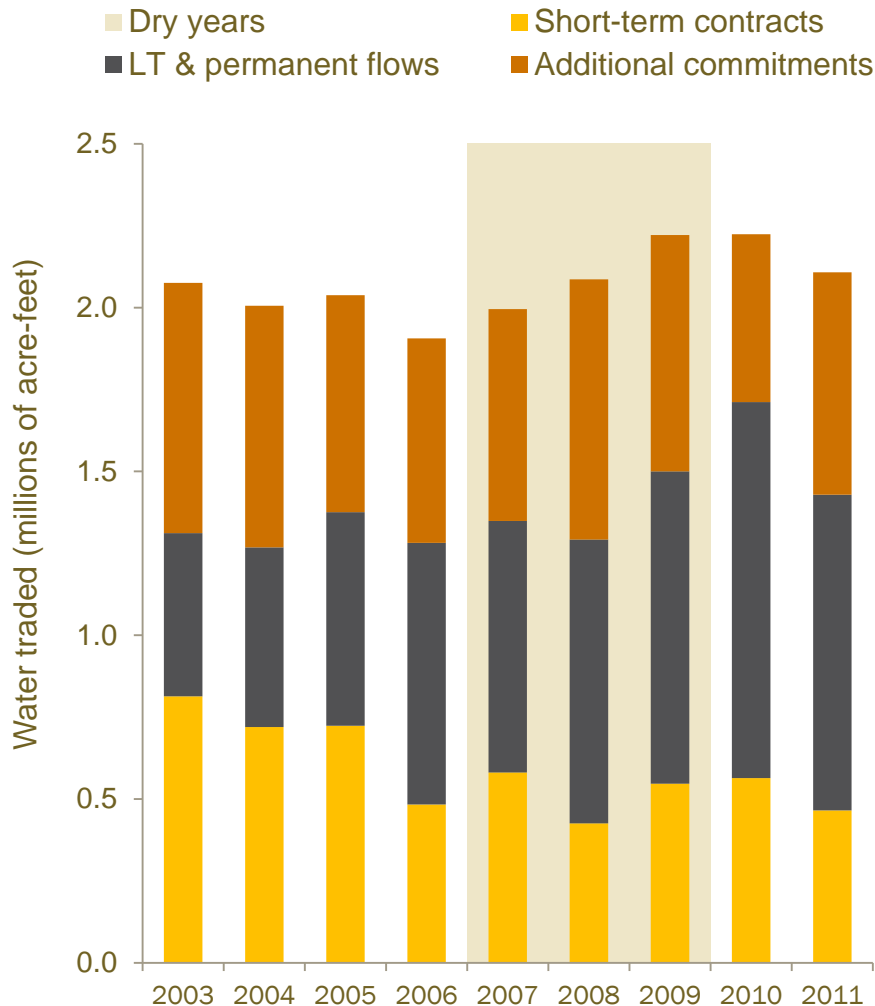


# Farm Economy Revenue and Job Losses

- Hardest hit area: San Joaquin Valley\*
  - 2009 Revenues: ~\$350 million
  - 2009 Jobs: ~10,000
  - 2009 Acres: ~285,000
- Drought effects mitigated by management tools:
  - Water transfers, increased groundwater pumping
- Questions:
  - Viability of increased dry-year pumping in over-drafted areas?
  - “Internalizing” costs of groundwater pumping on others, e.g. subsidence of infrastructure?



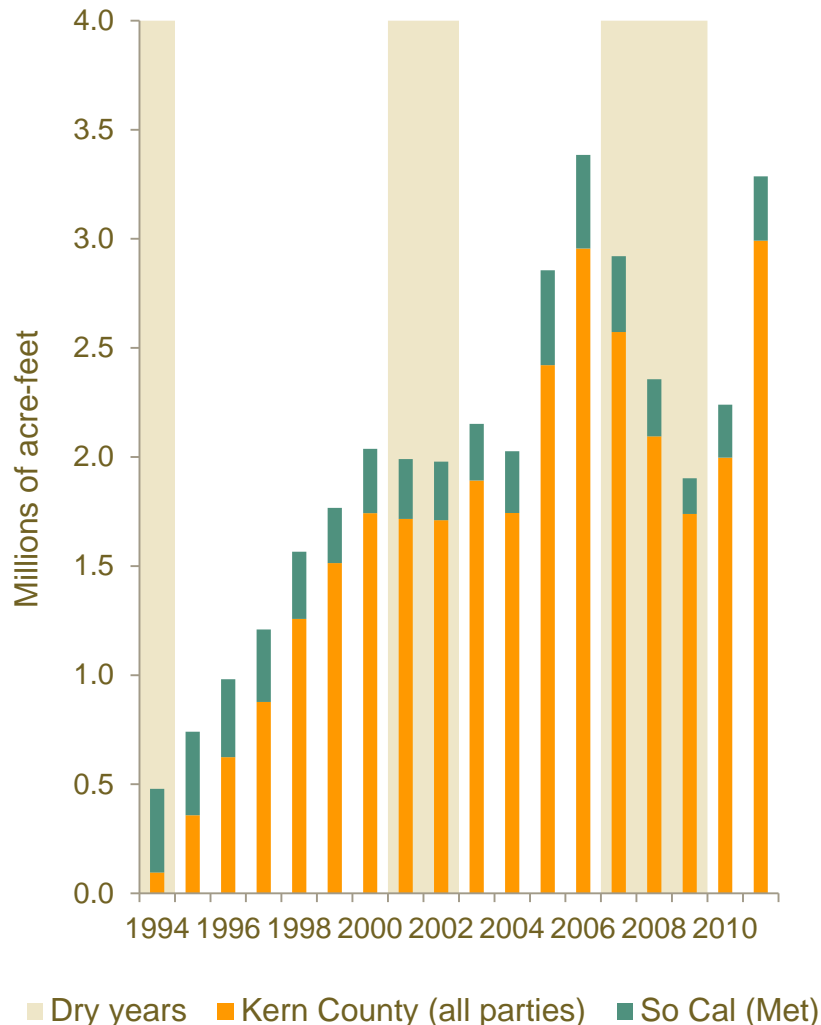
# Slowing Water Market Was Unable to Provide Much Drought Relief



- Infrastructure constraints: Delta
- Institutional constraints: complex, frequently changing approval process
- In all, only 500,000–600,000 acre-feet dry-year supplies from 2007–2010
- Question: Can we relieve these constraints?



# New Groundwater Banks Were Very Useful During Recent Drought



- Total withdrawals 2007–10: 1.9 maf (3x more than water market)
- Rapid recharge thanks to very wet 2011
- But some conflicts over falling groundwater tables
- Questions:
  - How to strengthen groundwater management in banking areas?
  - How to ensure recharge abilities given Delta pumping restrictions?





# Takeaways

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- California's economy can handle multi-year droughts
- But continued innovation is required to reduce the costs of shortages
- Delta conveyance matters for a diversified portfolio: water marketing and groundwater banking
- Marketing and groundwater institutions also need strengthening
- Expansion of other diversification tools is also important: water use efficiency, other local sources
- Water utilities need to improve rate structures to accommodate droughts *and* long-term conservation



# Notes on the use of these slides

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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.

