Water Conservation Issues

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"Conservation of natural resources has meant different things to different people."

Resource Economist John V. Krutilla, 1967

*"**I know it when I see it**."*

Supreme Court Justice Potter Stewart, 1964

Farmers?

Environmentalists?

Recreationalists?

Municipal & Industrial Users?

Water Conservation?

- "An act or policy that will result in additional water for other uses or users"
- Hydrologic reality vs. public perception of water issues
- Much of what is called "water conservation" **doesn't make more water available**.

Conventional Wisdom…

- *Idea or explanation that is generally accepted as true by the public…*
  1. Water conservation is good.
  2. Low irrigation efficiency is bad.
  3. Low irrigation efficiency = wasted water
  4. Ag irrigation practices need to be "improved"
  5. ↑ ag irrigation efficiency = ↑ water conservation
  6. More water for other, new users
  7. Everybody's happy!

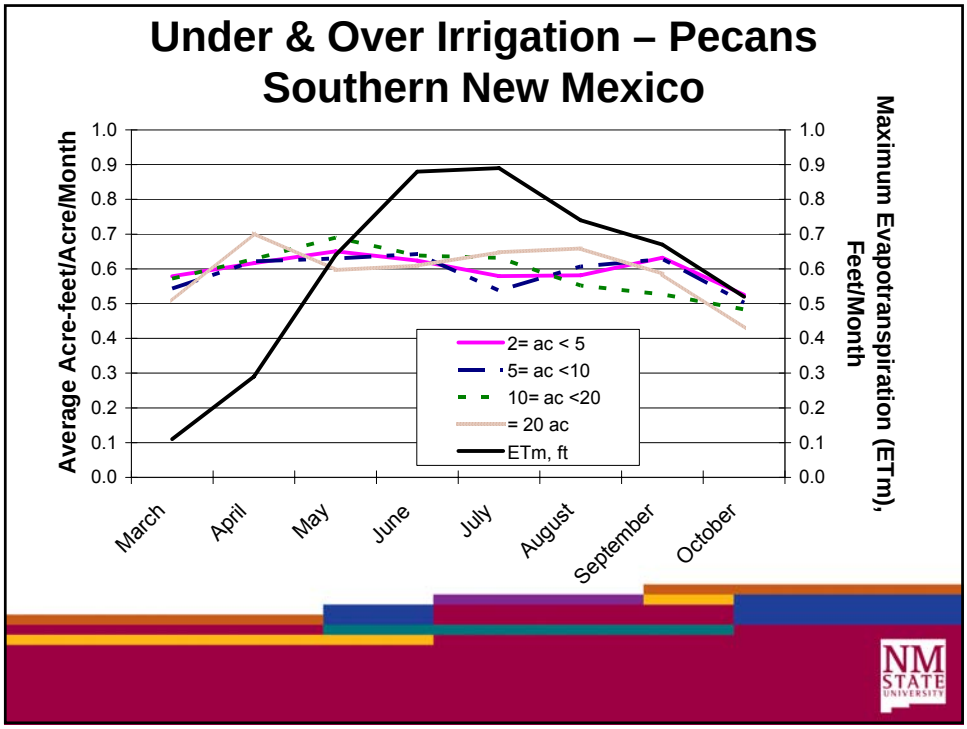
Will "improved" agricultural irrigation make more water available to other users?

The Case of Drip Irrigation…

- Technology that can increase on-farm efficiency.
- Precise water application to plant's root zones.
- Southwestern farmers typically deficit irrigate.
  - Yields are suppressed
  - On-farm efficiency relatively high
  - Unmet demand for water in crop production
- Drip irrigation = ↑ consumptive use = ↑ yields
- **↓ water for downstream & future users**

The Case of Irrigation Scheduling…

- Applying water to plants in line with consumptive use needs.
- Proper scheduling can significantly increase yields & crop quality.
- Optimal scheduling can also result in
  - ↑ consumptive use
  - **↓ water for downstream & future users**



The Case of Canal Lining…

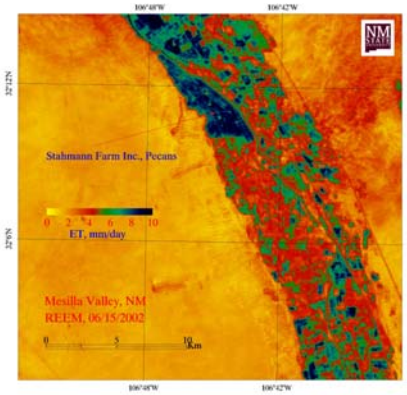
- Canal lining reduces water "lost" during the delivery process.
- Canal lining = more efficient diversion
  - Transformation of diverted water into yields
  - In a deficit irrigated environment?
  - ↓ in-stream flow & ↓ return flows
  - ↓ water quality
  - ↑ net depletion
  - Dry wells?

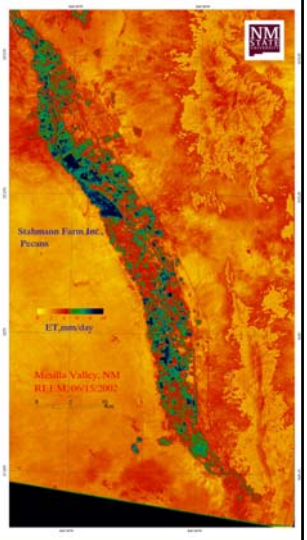
The Fallacy of the "Magic Bullets"

- Conservation "magic bullets" typically ↑ total depletions
- International in scope
- In a closed basin, "sloppy" water management upstream is often the source of someone else's downstream water supply
- Assumptions about ag irrigation & irrigators?

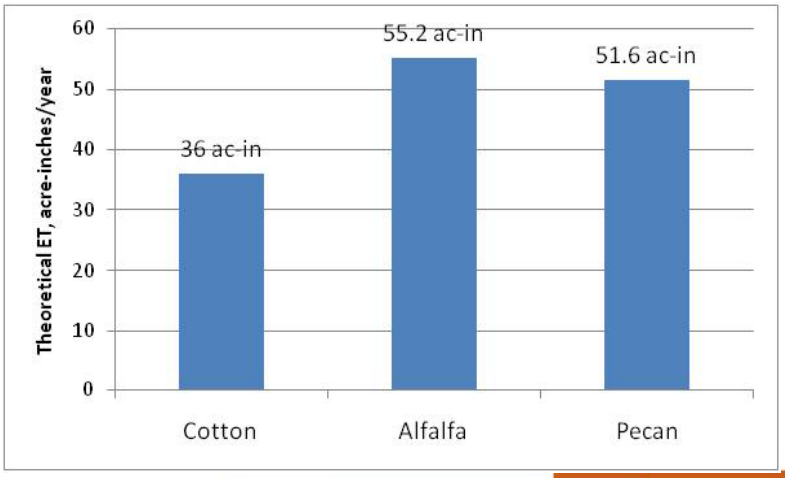
Evaluating Crop Water Use through Remote Sensing

by Samani, Bawazir, Bleiweiss, & Skaggs

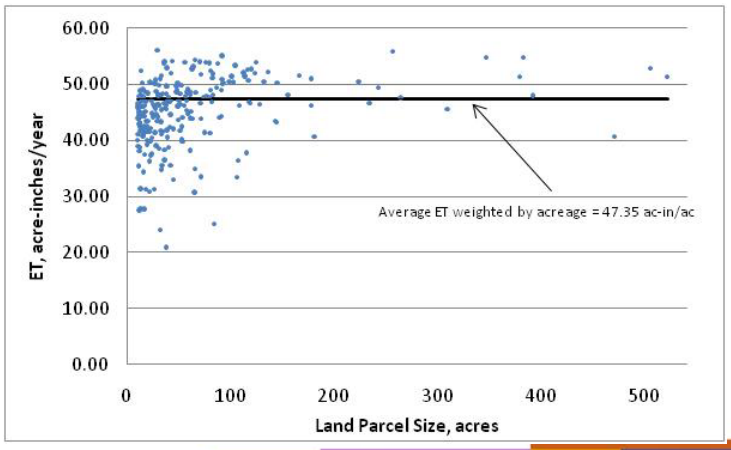




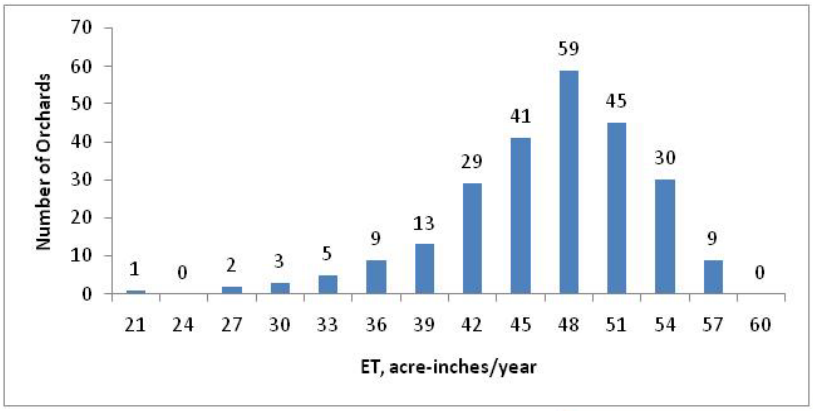
Theoretical annual ET for cotton, alfalfa, and pecans, New Mexico's Lower Rio Grande, 2002



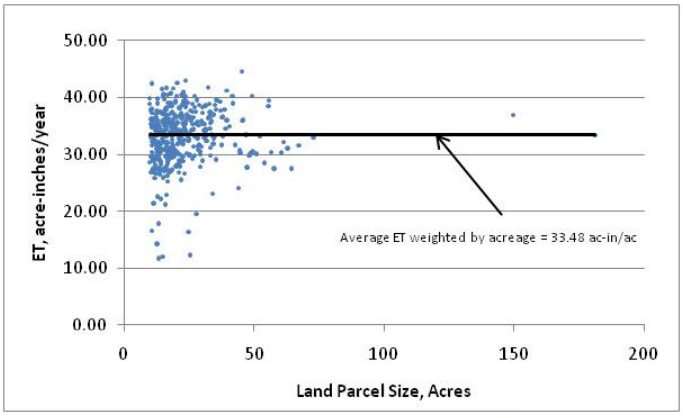
Remotely-sensed estimates of mature annual pecan ET, 246 orchards (> 10 acres) by orchard size, 2002.



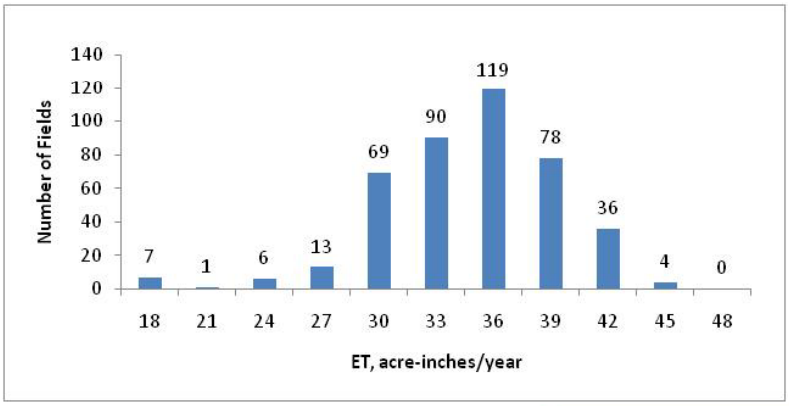
Distribution of remotely-sensed pecan annual ET, 2002, 246 mature orchards (> 10 acres)



Remotely-sensed estimates of annual alfalfa ET, 423 fields (> 10 acres) by field size, 2002.



Distribution of remotely-sensed alfalfa annual ET, 2002, 423 fields (>10 acres).



Conclusions

- Vast majority of farms are not irrigated at or near potential ET.
- Majority of producers do not achieve potential or near-potential yields.
- **Few** producers are irrigating & producing at potential ET & yield.
- *Improvements in ag irrigation infrastructure & technology will likely increase total consumptive use (and crop yields)*
- *"Water conservation" ?*

Why deficit irrigation?

- Current operating & structural limitations of existing irrigation system.
- Common property nature of irrigation system segments.
- Many producers are not dependent upon pecan production for their livelihoods.
  - Not interested or able to change on-farm irrigation system or practices.
- Increased land fractionalization = ↓consumptive use (↑ conservation)
- Increased #s of rural-residential farms = ↓consumptive use (↑ conservation)
- Less agriculture = ↓consumptive use (↑ conservation)

Acknowledgements

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