A Study Comparing Ways to Estimate Crop Evapotranspiration in the Delta

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Overview

Origin and Purpose of the Study

Study Sponsors and Participants

Organization of the Research

Primary Findings

Potential Implications and Applications

What’s Next?
The Challenge

Lack of Accurate and Timely Understanding of Crop CU Hampers Water Management and Regulation

Estimating Crop Consumptive Use is Inherently Difficult in the Complex Setting of the Delta

- It’s Big and Varied (Elevations, Soils, Winds, Water Quality, etc.)
- Land Uses and Crop Covers Evolve Constantly
- Most Models Treat the Delta as a Black Box
Crop Consumptive Use Is Important

CU is Most Critical in Shortage Conditions (like 2015)

- “Delta Island Consumptive Use” Estimates
- Delta Mass Balance (Water Volume and Quality)

- Export Project Management
- Water Rights Administration and Transfers
- Agricultural and Restoration Planning
Origin of Study Proposal

The SWRCB Convened Interested Parties in February 2015

The “Coalition of the Willing” Surveyed the Current State of the Science

- Reviewed Proof-of-Concept Research
- Surveyed Challenges Faced by Proposed Transfers
- Recognized Impact of Microclimates
- Identified Seven Reported Estimation Methods

Volunteers Agreed to Collaborate to Meet the Challenge
Organizing Principles

- Include a Broad Array of Stakeholders
- Maintain Neutrality and Credibility
- Assure Representation of Multiple Perspectives
- Attract Funding, “Skin-in-the-Game” and Consistent Review of Progress

- Focus on Practical Application and Informative Comparisons (not Pure Science)
- Improve Utility of all Methods Through Peer-to-Peer Collaboration (not a Beauty Contest to Pick a Winner!)
Financial Sponsors

- State Water Resources Control Board
- Department of Water Resources
- Delta Stewardship Council
- Delta Protection Commission
- Delta Conservancy
- North Delta Water Agency
- Central Delta Water Agency
- South Delta Water Agency
Research Participants
Organizing the Research

- Sponsor for Each Method Subject to Comparison
  - Two Department of Water Resources Models
  - Five Energy Balance Methods Relying on Analysis of Satellite Images

- Campaign to Capture Field-level Calibration Data

- Central Team to Collect, Organize and Maintain Data

- Land Use Survey (supported by “ground truthing” and independent QA/QC team)

- Combined Blind Tests, Common Datasets and Collaborative Interaction
Primary Findings

The Ensemble Mean of all Methods Confirms Delta Crop CU at + 1.4 Million Acre-feet/Year

Accuracy of All Methods Improved with Collaboration (All Methods Were Brought within 11% of Mean)

Remote Sensing Methods Provide Reasonably Reliable Basis for Accurately Estimating Crop ET

Study Process Illuminated some Systemic Differences Between Methods
Additional Insights

- The Science of Remote Sensing and the Frequency of Observation are Both Advancing Rapidly

- Applications of Estimation Methods Vary Widely in Cost, Expertise, Invasiveness, Frequency, and Consistency

- A Significant Portion of CU in the Delta is from non-Agricultural Uses
Policy Implications and Applications

Study Demonstrates Capacity to Estimate Crop ET at the Field Level

- Are Estimates “Close Enough for Government Work”?
- What is the Process/Value of Government Converging on a CU Method across Agencies?
- How Will Scientific Research be Adapted to Practical Use?
- How Can Policy Encompass Uncertainties in Estimates?
- How Closely Does Crop CU Correlate with Diversion Measurement?
What’s Next?

- Further Explore Prospects for Improvements and Convergence Among Methods
  - Fodder for Ph.D. Theses

- Need More Research to Develop Useful Comparison of CU in Fallow Fields
  - Pilot Field Study is Currently Underway

- This Study Should Boost Parallel Research in Adapting Remote Sensing to non-Crop Water Use
  - May 3 - Brown Bag Presentation
What’s Next?

- Moving Scientific Research to Practical Field Application
  - Open ET

- Evaluation of Hypothesis that Remote Sensing Could Augment Diversion Measurement in the Delta
  - Still Out on the Horizon
Conclusion:

We’ve Made Important Progress on a Gnarly Problem...and Still Have Work to Do
Questions?

Complete Crop CU Study Information Available Here

https://www.waterboards.ca.gov/water_issues/programs/delta_watermaster/crop_c_u_study.html
Extra Slides
Primary Findings

- ET from Agricultural Lands

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Graph showing thousands of acre-feet with data points indicating Delta Service Area and Legal Delta. The graphs below show the percentage of total ET by land use for CalSIMETAW, DETAW, DisALEXI, ITRC, SIMS, UCD-METRIC, and UCD-PT.
Primary Findings

Land Use and Mean ET

2016