AGRICULTURAL POLLUTION CONTROL
IN VENTURA COUNTY

FACULTY ADVISOR: DR. ANDREW PLANTINGA

ADAM JORGE | CHASE LECROY | HANSA SRINIVASAN

PROJECT ACRONYM KEY

NPS	--	NONPOINT SOURCE
CWP	--	CONDITIONAL WAIVER PROGRAM
BMP	--	BEST MANAGEMENT PRACTICES
VCAILG	--	VENTURA COUNTY AGRICULTURAL IRRIGATED LANDS GROUP

THE CONDITIONAL WAIVER PROGRAM

Agriculture is the leading nonpoint source of waterway impairment in the United States. Over 120,000 miles of US waterways are contaminated by nutrients, pesticides, and sediments of agricultural origin.

To address agricultural nonpoint source (NPS) pollution in California, Regional Water Quality Control Boards work with stakeholders to develop voluntary pollution control programs in exchange for waiving pollutant discharge permit requirements.

This policy tool has become known as the Conditional Waiver Program. The requirements under the CWP are different in each State Water Resources Control Board region to address the individual needs of impaired waterways. In Ventura County, the Los Angeles Regional Water Quality Control Board waives pollutant discharge permit requirements in exchange for grower adoption aggressive land management strategies. The 2010 – 2015 Conditional Waiver requirements involved three main components:

1. *Grower attendance of mandatory field management education workshops.*

2. *An intensive water quality monitoring and reporting program.*

3. *Implementation of scientifically-sound best management practices.*

IMPLEMENTATION OF BMPs

BMPS CONTROL POLLUTANT MIGRATION IN A NUMBER OF WAYS:

1. Reducing excessive application of fertilizers and pesticides

2. Controlling erosion by keeping soil on farms during irrigation and storm events

3. Preventing over-watering and minimizing nutrient-rich irrigation runoff

SIGNIFICANCE

Though BMPs have been proven to effectively reduce pollutant concentrations in individual situations and case studies, there is little quantitatively defensible data demonstrating their effectiveness at a larger regional or watershed scale. It is therefore especially difficult to prove BMP implementation program efficacy at a countywide level.

Most studies evaluating BMP efficacy are model based, and there is little non-experimental data collected across an entire county.
Data collected under the Ventura County CWP therefore presents a unique opportunity to statistically assess the specific impacts of BMPs on agricultural nonpoint source pollution.

This project constitutes a novel attempt to assess the overall usefulness of data gathered under the Ventura County CWP's monitoring requirements. Evaluation of these products simultaneously represents a critique of Conditional Waiver requirements, and provides a constructive space to recommend further actions to both VCAILG and its regulating body, the Los Angeles Regional Water Quality Control Board. This research represents an original attempt to use the water quality and BMP implementation data collected under California's CWP to provide a quantitative assessment BMP efficacy in Ventura County irrigated lands.

RECOMMENDATIONS

THE AG-VENTURA FOUR POINT PLAN

Augment and enhance the water quality monitoring program.

Increase BMP survey frequency and broaden survey scope.

Encourage development of nutrient management plans to decrease nitrogen pollution, estimate nutrient uptake efficiencies, and model pollutant fate.

Further explore increasing institutional capacity at the Farm Bureau, and apply for federal funding through Clean Water Act Section 319 and Environmental Quality Incentives Program grants.

RESULTS

The relationship between water quality and BMP adoption was explored via multiple regression analysis. Other variables controlled include:
+ climate conditions
+ crop type
+ location

THE NITRATE regressions showed no significant variables. It is therefore not possible to conclude that the considered factors have a detectable effect on either nitrate concentrations or total nitrate loading. Regression results suggest that water management BMPs are more likely able to control nitrate pollution than the fertilizer management practices employed.
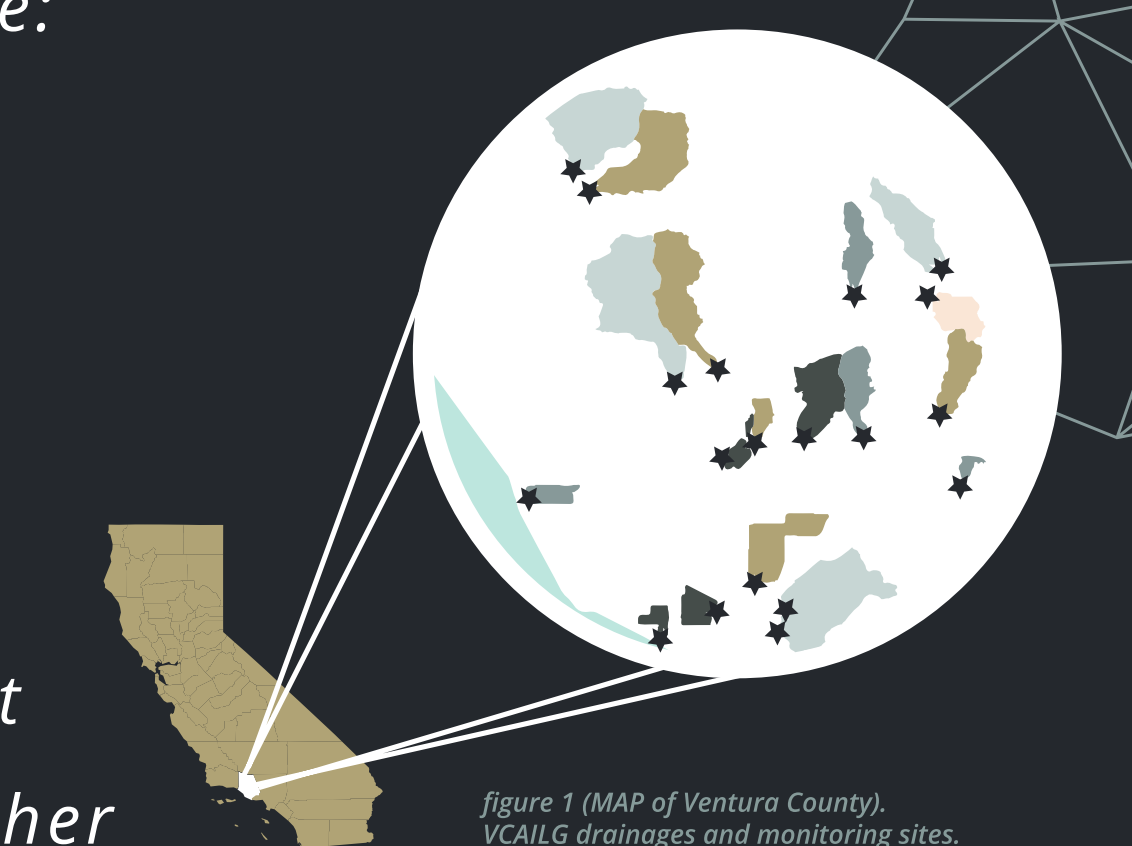

Figure 1 (Map of Ventura County). VCAILG drainages and monitoring sites.
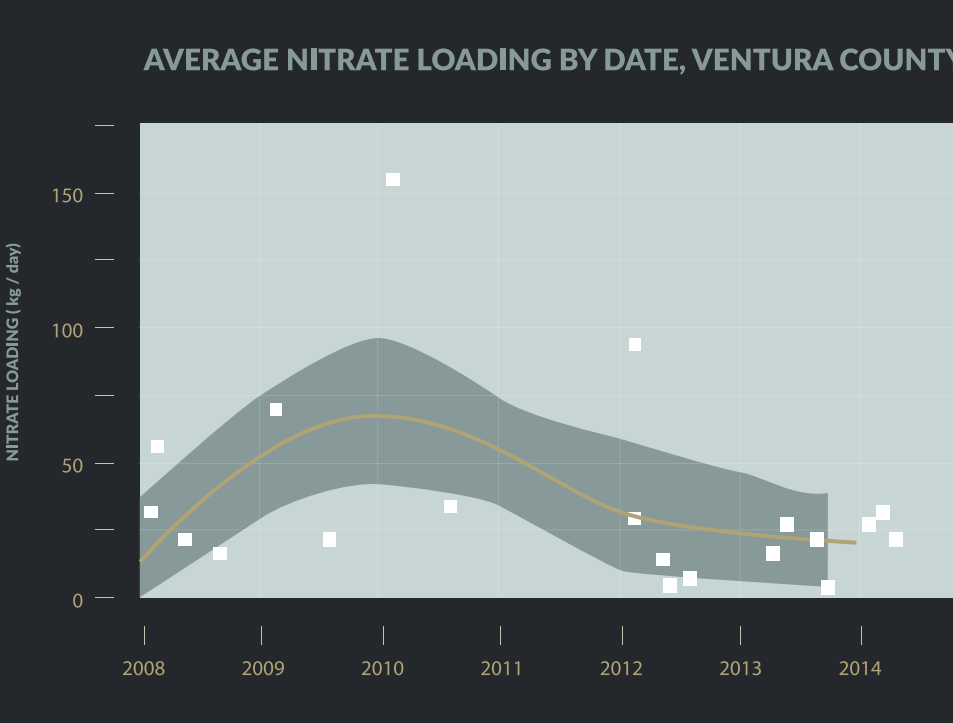
AVERAGE NITRATE LOADING BY DATE, VENTURA COUNTY

Figure 2. (Average Nitrate Loading by Date…) Average nitrate loading by date for all sampling sites in Ventura County, with a LOESS-smoothed curve and 95% confidence interval.
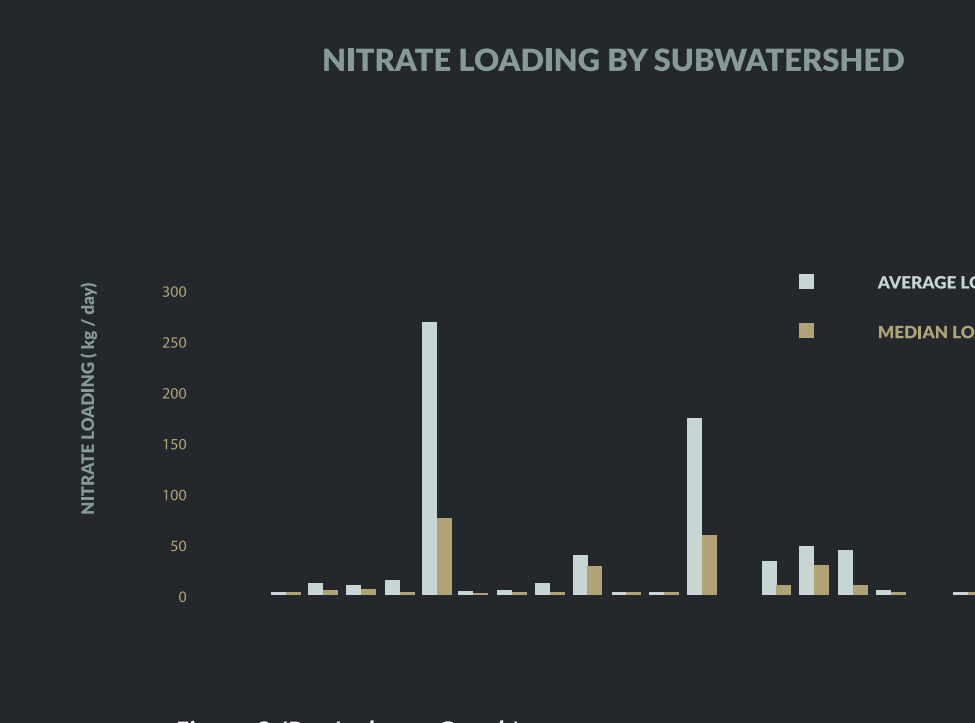
NITRATE LOADING BY SUBWATERSHED

Figure 3 (Bartolumn Graph). Average and median nitrate loading by sub-watershed in Ventura County, 2007–2014. Loading could not be calculated for sub-watersheds THACH and QQ03ANN because no flows were recorded during the period for which data was available.

No BMPs were significant predictors of organochlorine **PESTICIDE** detection. Two sediment management BMPs were significant and showed an unexpectedly positive effect on organophosphate pesticide detection. Climatic variables were significant for both pesticides. Regression results are inconsistent with theory and are confounded by unobserved factors. Based on these results, it is not possible to conclude that BMPs have an effect on pesticide detection.

ORGANOCHLORINE PESTICIDE DETECTION BY SUBWATERSHED

ORGANOPHOSPHATE PESTICIDE DETECTION BY SUBWATERSHED

Figures 4 & 5 Total number of pesticide hits by sub-watershed for Ventura County.
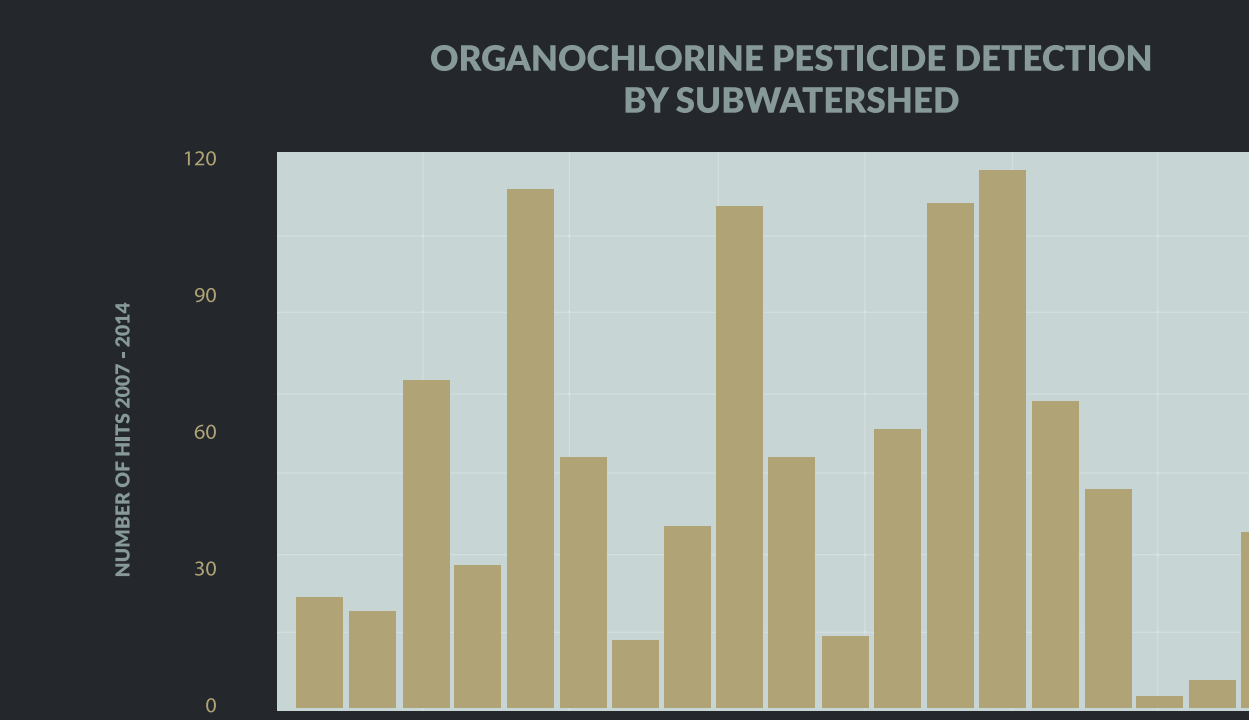
DATA DEFICIENCIES

Despite the information available, data quality and quantity problems still hampered the analysis:

1. Few samples per year are recorded

2. Irrigation, nitrate application rate, and pesticide use data are highly relevant but unavailable

3. A majority of BMPs were either adopted by nearly all farms or split between no adoption and full adoption. The lack of low to mid-range rates makes evaluating relationships difficult.

Data collected under the CWP is unable to provide the statistical confidence necessary to inform management decisions.