



# Monitoring Program Overview

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Amy Storm, August 25, 2020  
Senior Scientist, Larry Walker Associates

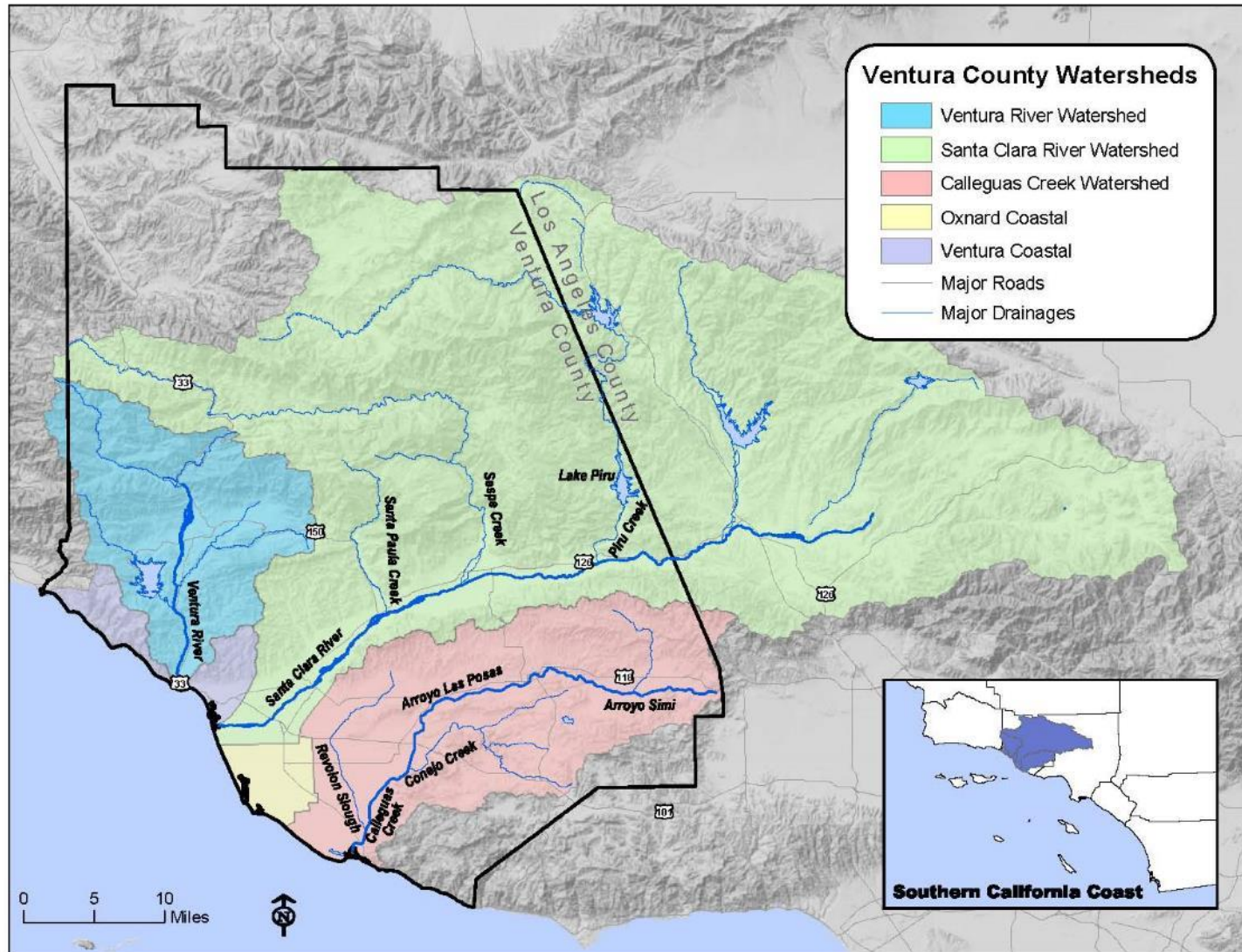


# Outline

- Ventura County and local agriculture
- County-wide Representative Monitoring Program
  - Site selection and evolution through three Conditional Waivers
  - Monitoring Program Cost
- Exceedance based monitoring
  - Source Investigations
  - Individual Discharge Monitoring



# Ventura County Major Watersheds and Agriculture



## 10 Leading Crops in Gross Value (2018)

Commodity	Gross Value (\$)
1. Strawberries	\$670,716,000
2. Lemons	\$244,173,000
3. Celery	\$198,680,000
4. Nursery Stock	\$194,495,000
5. Raspberries	\$181,730,000
6. Avocados	\$103,252,000
7. Tomatoes	\$48,932,000
8. Cut Flowers	\$48,442,000
9. Peppers	\$43,519,000
10. Cabbage	\$36,972,000



# COUNTY-WIDE REPRESENTATIVE MONITORING PROGRAM

# Monitoring Site Selection

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Land use (primarily  
agricultural drainages)

Watershed/subwatershed  
representation

Acres of irrigated  
agricultural lands  
represented

Proximity to agricultural  
operations

Drainage into waterbodies  
included on the 303(d) list

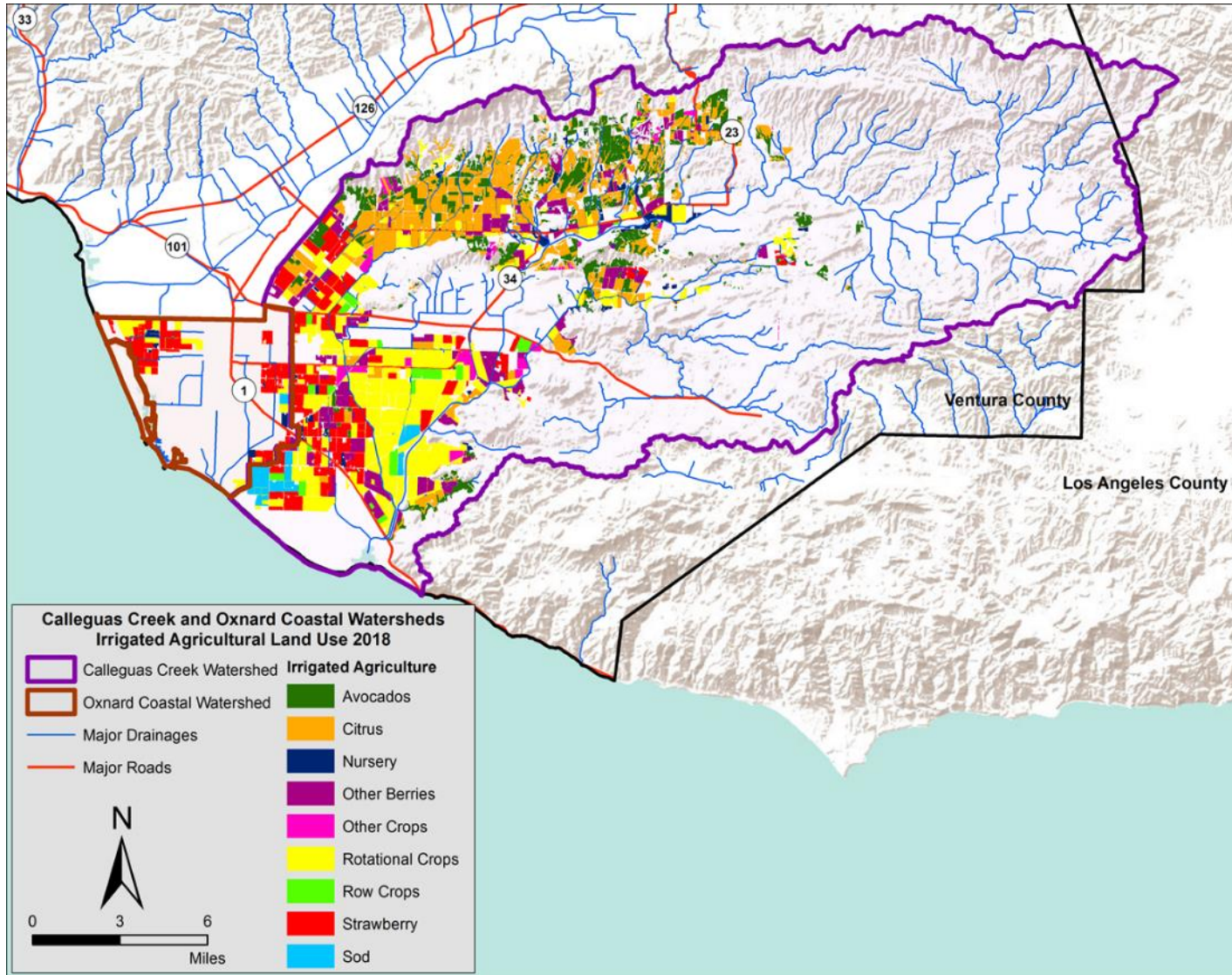
Size and complexity of  
watershed

Size and flow of  
waterbodies

Safe access during dry  
and wet weather



# Calleguas Creek and Oxnard Coastal Watersheds



## Calleguas Creek Watershed

- 219,520 ac. total
- Crops vary with topography
- ~50,000 irrigated ac.

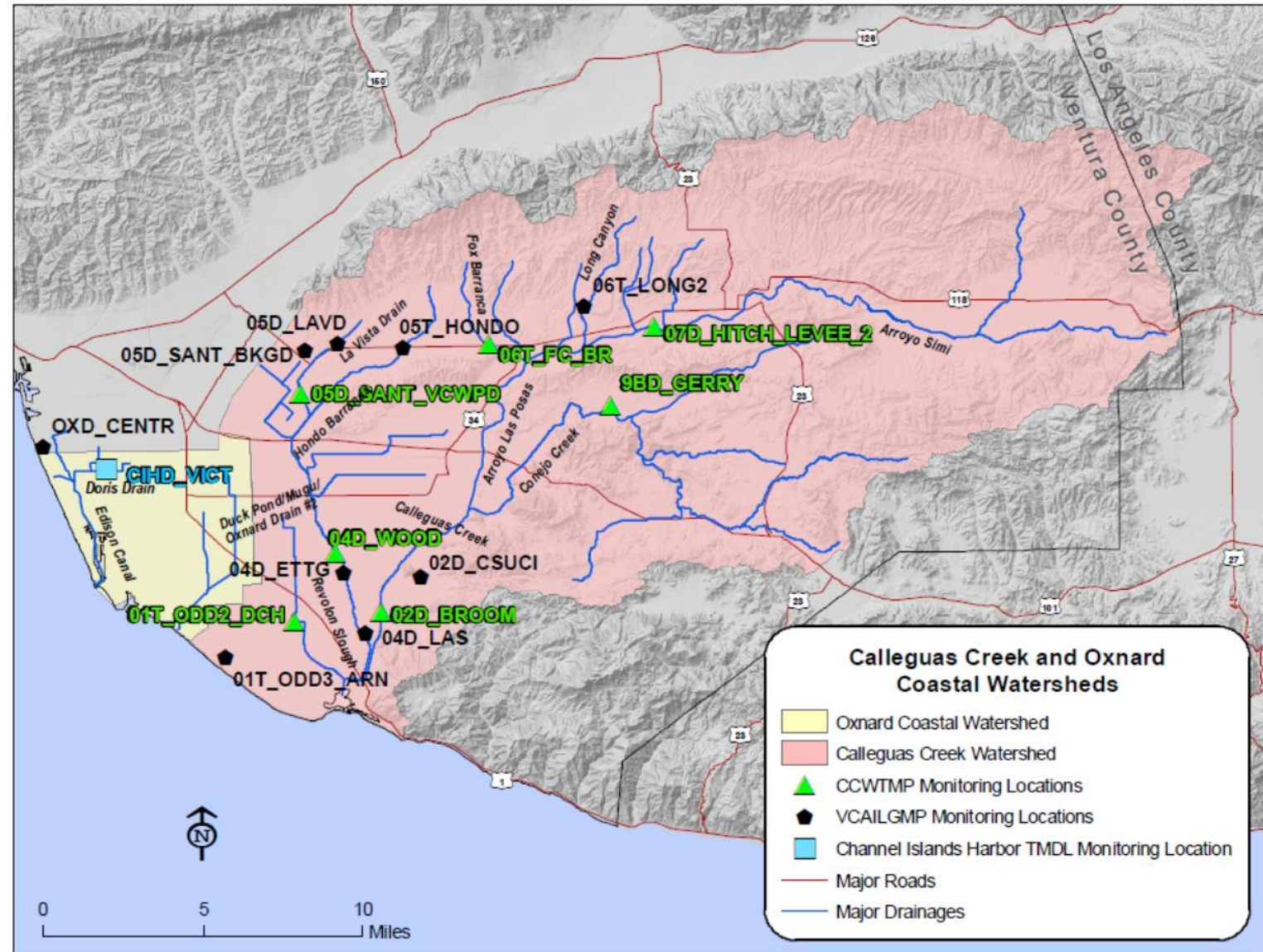
## Oxnard Coastal Watershed

- ~4,800 irrigated ac.



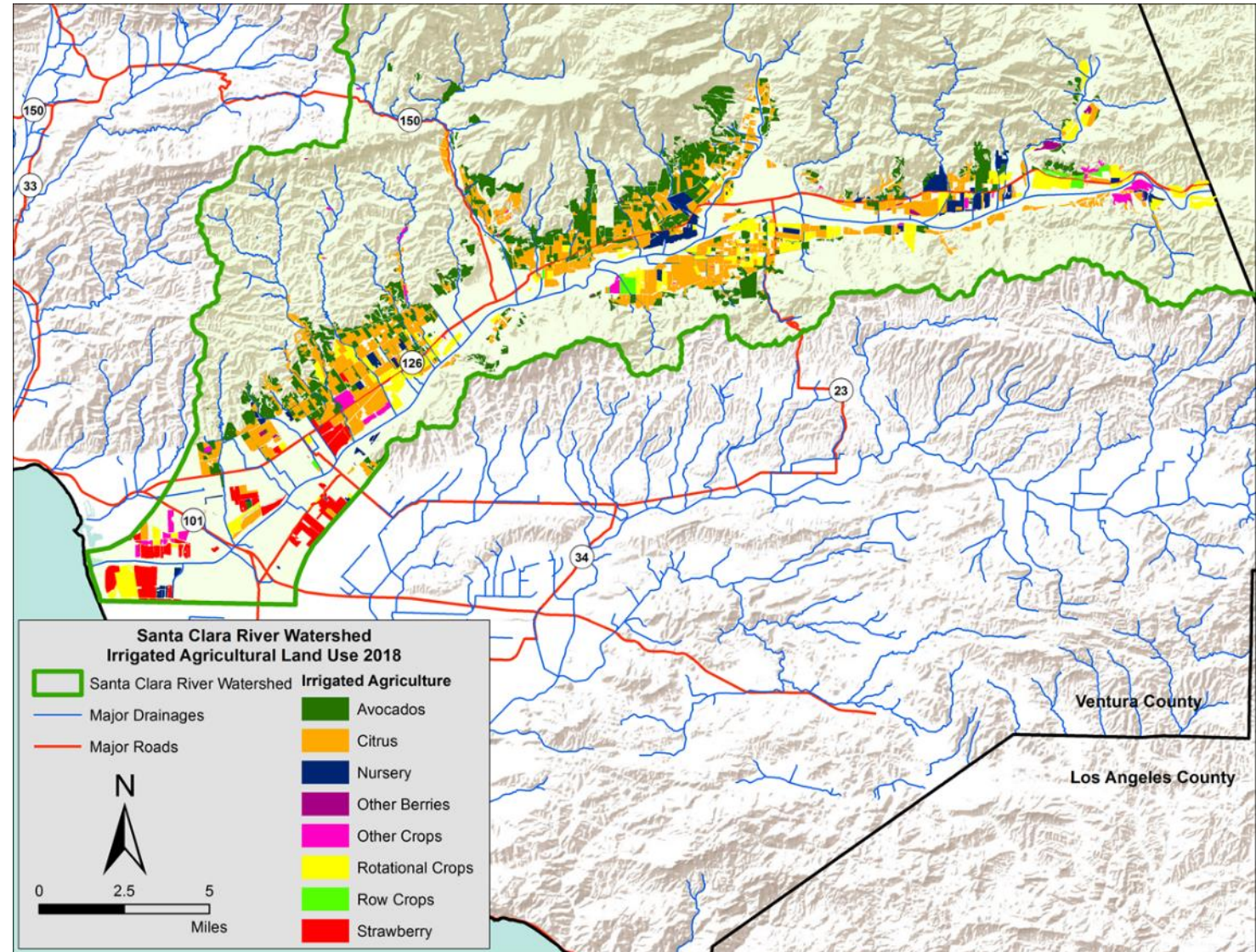
# Calleguas and Oxnard Coastal Sites 2010-2016 Waiver Period

- Map shows VCAILG Monitoring Program and Calleguas Creek Watershed TMDLs Monitoring Program Ag Land Use Sites together.
- CIHD\_VICT site added per Channel Islands Harbor Bacteria TMDL requirements.



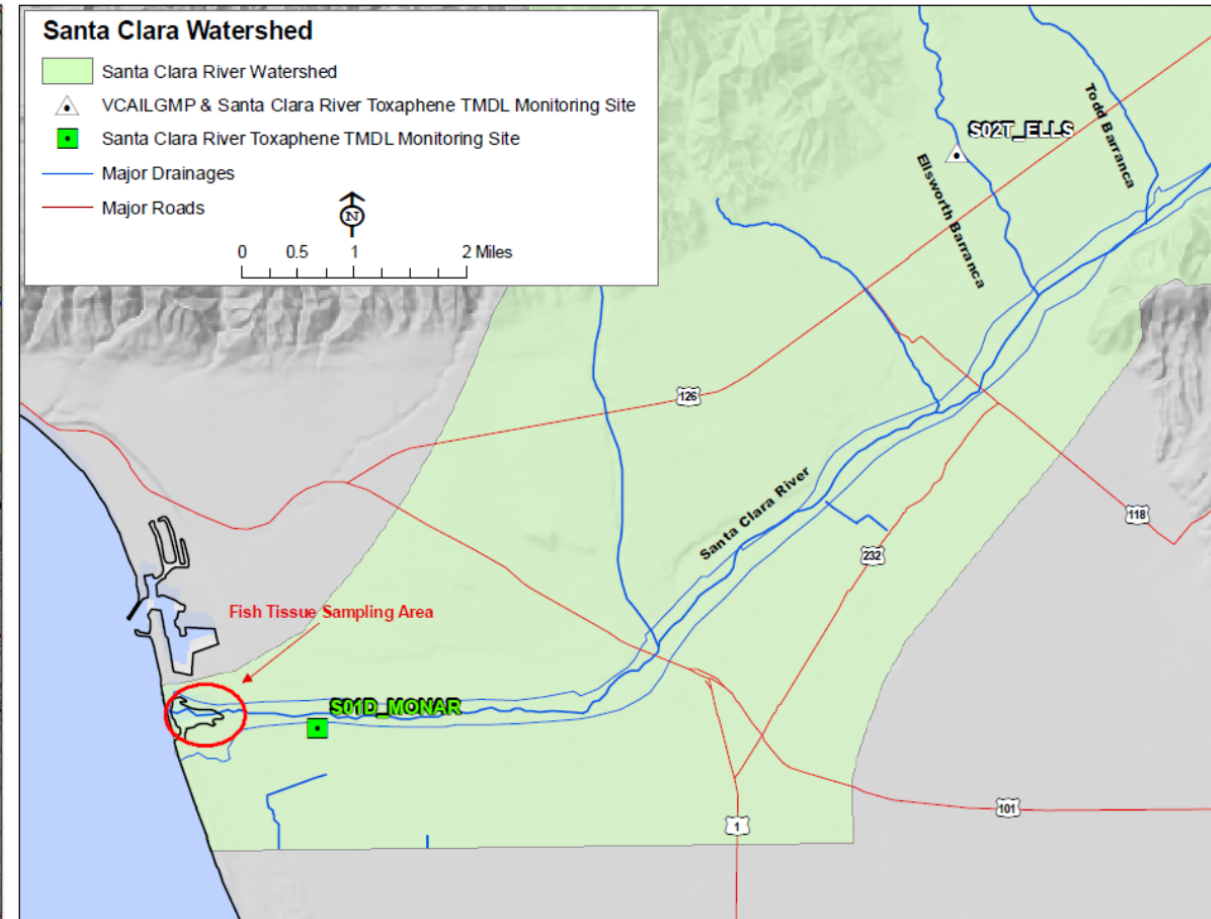
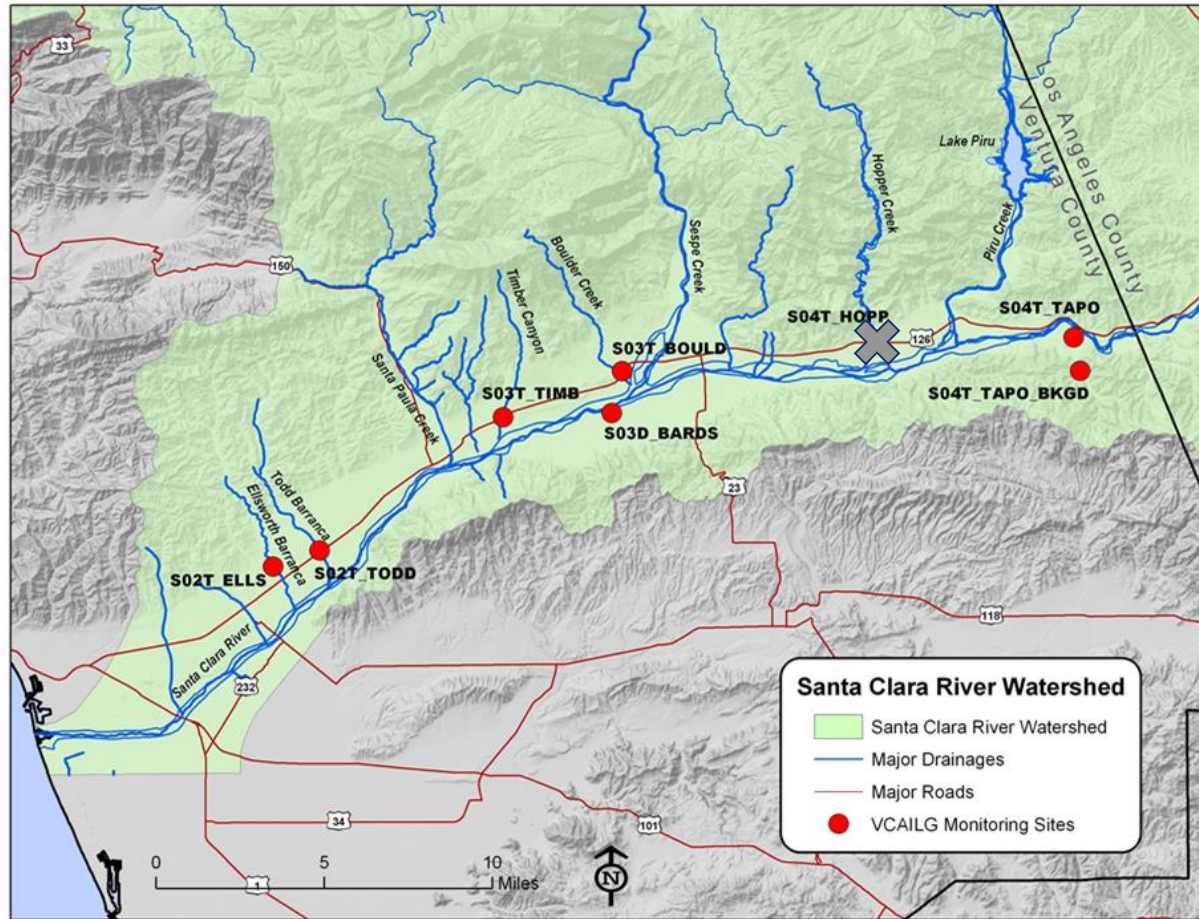


# Santa Clara River Watershed



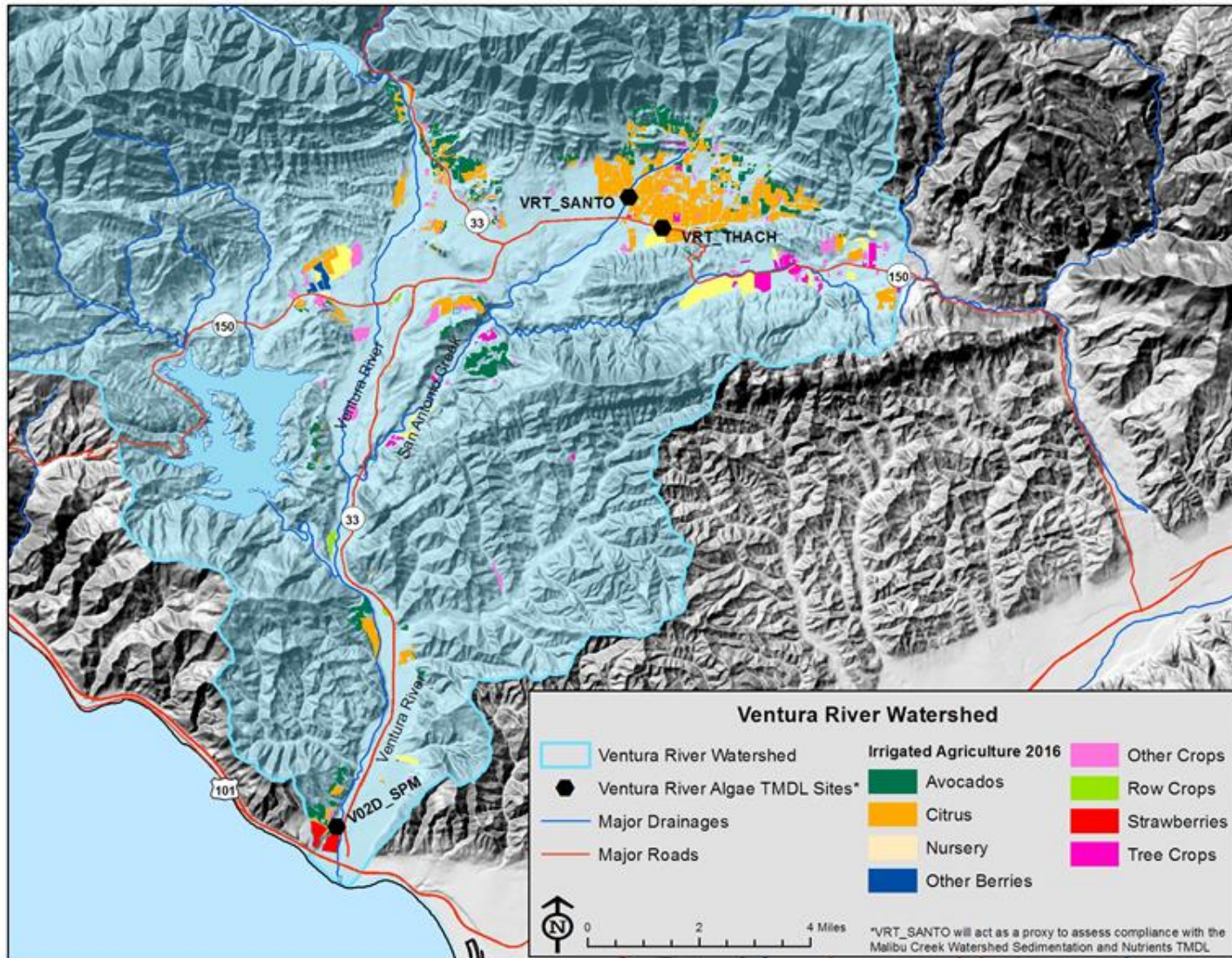


# Santa Clara River Watershed Sites





# VCAILG MP Ventura River Sites and Algae TMDL Sites Incorporated in 2016 Waiver





# County-wide Monitoring Program Costs

<b>Total Investment to Date</b>	>\$19,000,000
<b>Average Annual Program Cost</b>	\$1,400,000
<b>Average Annual Sample Collection and Analysis Cost for <u>County-wide Monitoring</u></b>	\$200,000 (Variable spending - TIEs, false starts, # sites dry vs. flowing)
<b>Average Percentage of total budget for TMDLs</b>	42% (During 2016-2021 Waiver)
<b>2020-2021 Grower Costs</b>	<u>Per Irrigated Acreage Rates</u> \$8.77 (no TMDLs) - \$27.47 (6 TMDLs)  <u>Median Farm Size (11 acres)</u> \$96.47 - \$302.17  <u>Average Farm Size (121 acres)</u> \$1,061.17 - \$3,323.87

# EXCEEDANCE BASED MONITORING



# Exceedance Based Monitoring

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## ■ Source Investigations

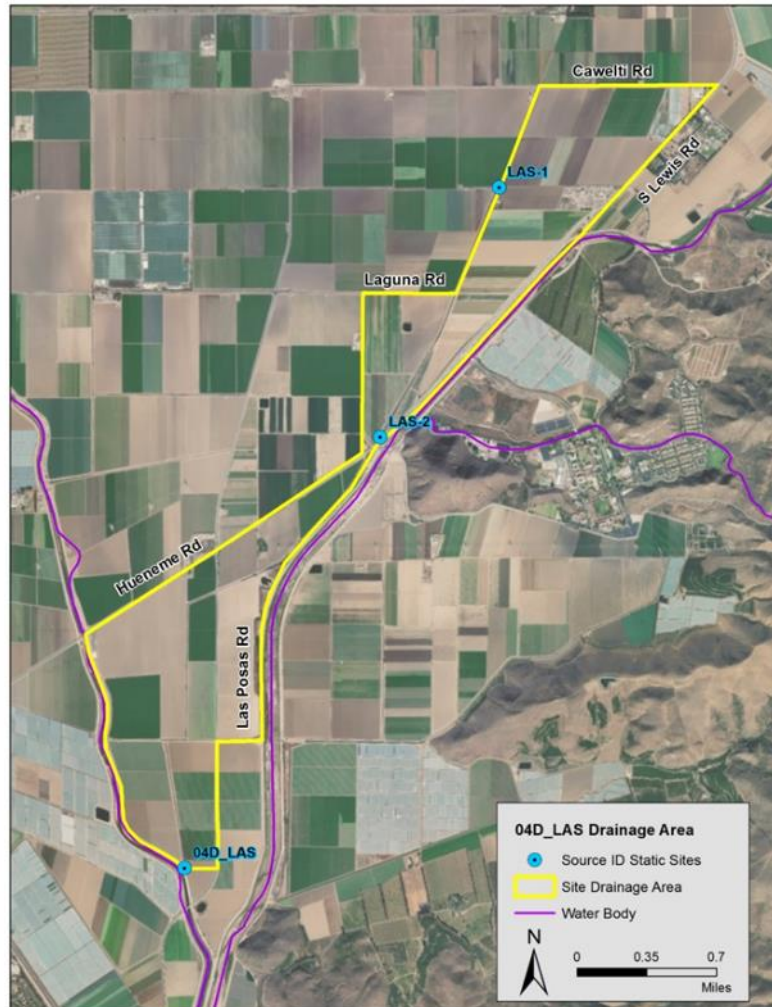
- Work Plan to Report submittal: October 2018 - September 2019
- Investigated sites with increasing dry weather trends
- Combined Static Site Monitoring with Opportunistic Sampling

## ■ Individual Discharge Monitoring

- Not required until exceedances occur after TMDL specific compliance deadlines pass

# South Revolon Slough (04D\_LAS) Nitrate Source Investigation

## Static Monitoring Sites



## Opportunistic Sites

Type of Sampling Location	Number of Sampling Sites Identified
Drainage from Agricultural Land	38
Agricultural Irrigation Supply Water [a]	23
From Communal Drainage Channel	12
Unknown	1
<b>Total</b>	<b>74</b>

[a] This category includes samples of water from leaking irrigation pumps and piping, irrigation storage ponds, and seepage from Calleguas Creek through the levee and into drainage ditches.





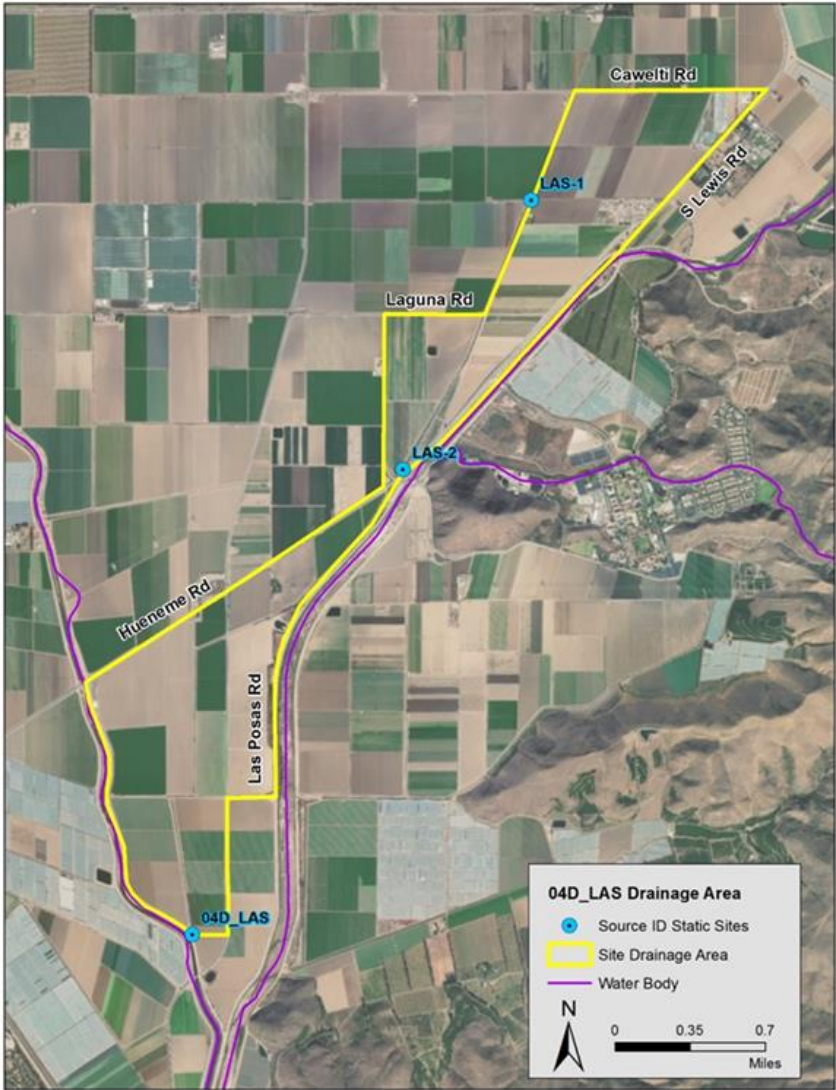




# South Revolon Slough (04D\_LAS) Nitrate Source Investigation

## Static Monitoring Sites Results

Site	Number of Visits	Number of Samples Analyzed	Nitrate-N Concentration (mg/L)		Benchmark Exceedances		
			Range	Avg.	Number	%	Status
LAS 1	5	4	5 to 8	7	0	0%	Meets benchmark
LAS 2	6	6	40 to >50	48	6	100%	In Exceedance
04D_LAS	4	4	40 to >50	48	4	100%	In Exceedance
Overall	15	14	5 to >50	36			



# Opportunistic Monitoring Results South Revolon

Sample Type	Number of Samples Analyzed	Nitrate-N Concentration (mg/L)		Benchmark Exceedances <sup>[a]</sup>	
		Range	Avg.	Number	Percent
Drainage from Agricultural Land					
Not Reaching Communal Drainage Channel <sup>[b]</sup>	23	3 (est) to >50	19	N/A	N/A
Direct Discharges into Communal Drainage Channel <sup>[c]</sup>	38	2 to >50	30	27	71%
Discharges of Agricultural Supply Water					
Not Reaching Communal Drainage Channel <sup>[b]</sup>	22	0 to 15	4	N/A	N/A
Direct Discharges into Communal Drainage Channel <sup>[c]</sup>	16	0 to 4 (est)	3	0	0%
Samples from Communal Drainage Channel	36	7 (est) to >50	38	35	97%



# South Revolon Source Investigation Findings Summary

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## ■ Crop type

- At time of SI, fields were all in row crops
- No correlation between benchmark exceedance and any particular crop

## ■ Irrigation type

- All field runoff exceedances, except 1, generated from overhead irrigation
- Prioritize efficient irrigation, proper management, and keeping water on property

## ■ BMPs

- Compared SI results to reported BMP implementation surveys from 2018
- Level of BMP implementation consistent across farms with discharges both above and below the water quality benchmark.

# Source Investigation Grower Follow-up

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- Notifications issued to growers and landowners when discharge exceeded benchmark
- Targeted to individual farmers in SI area with discharges exceeding the benchmark
- Opportunity to facilitate partnerships with RCD and NRCS for site evaluations and BMP implementation programs
- Proactively collaborated on funding program to assist identified growers in BMP implementation (local grant opportunities)

# Source Investigation Costs

	South Revolon (nitrate)	Mugu Lagoon (nitrate + copper)
Total Source Investigation Costs	\$58,907	\$67,744
Irrigated Acres in Drainage Area (some variation by year)	1,093	8,099
Per Acre Cost 2018-2020 (2 years)		
<div> VCAILG Program  + Source Investigation  Total </div>	<div> \$48.81  + \$53.70  <b>\$102.51</b> </div>	<div> \$51.85  + \$8.31  <b>\$60.16</b> </div>
Grower Costs 2018-2020 (2 years)	<div> <u>Median Farm Size</u>  (11 acres)  <b>\$1,127.61</b>  <u>Average Farm Size</u>  (121 acres)  <b>\$12,403.71</b> </div>	<div> <u>Median Farm Size</u>  (11 acres)  <b>\$661.76</b>  <u>Average Farm Size</u>  (121 acres)  <b>\$7,279.36</b> </div>



# Individual Discharge Monitoring Considerations

## Monitoring Plans and Prep

- Notification of need to sample
- Education and outreach
- Development of individual plans
- Sample site selection and documentation
- Who is sampling?
  - Distribution of bottles, COCs, field logs, gloves, etc.
  - Instructions

## Sampling Execution

- Storm: all at once
- Dry: based on irrigation
- Proper collection – site and technique
- Storage, hold times, transport, lab capacity
- COVID considerations

## Reporting

- Receipt of results
- Lab billing
- Identification, compilation and reporting
- Tracking of continuing or termination of sampling

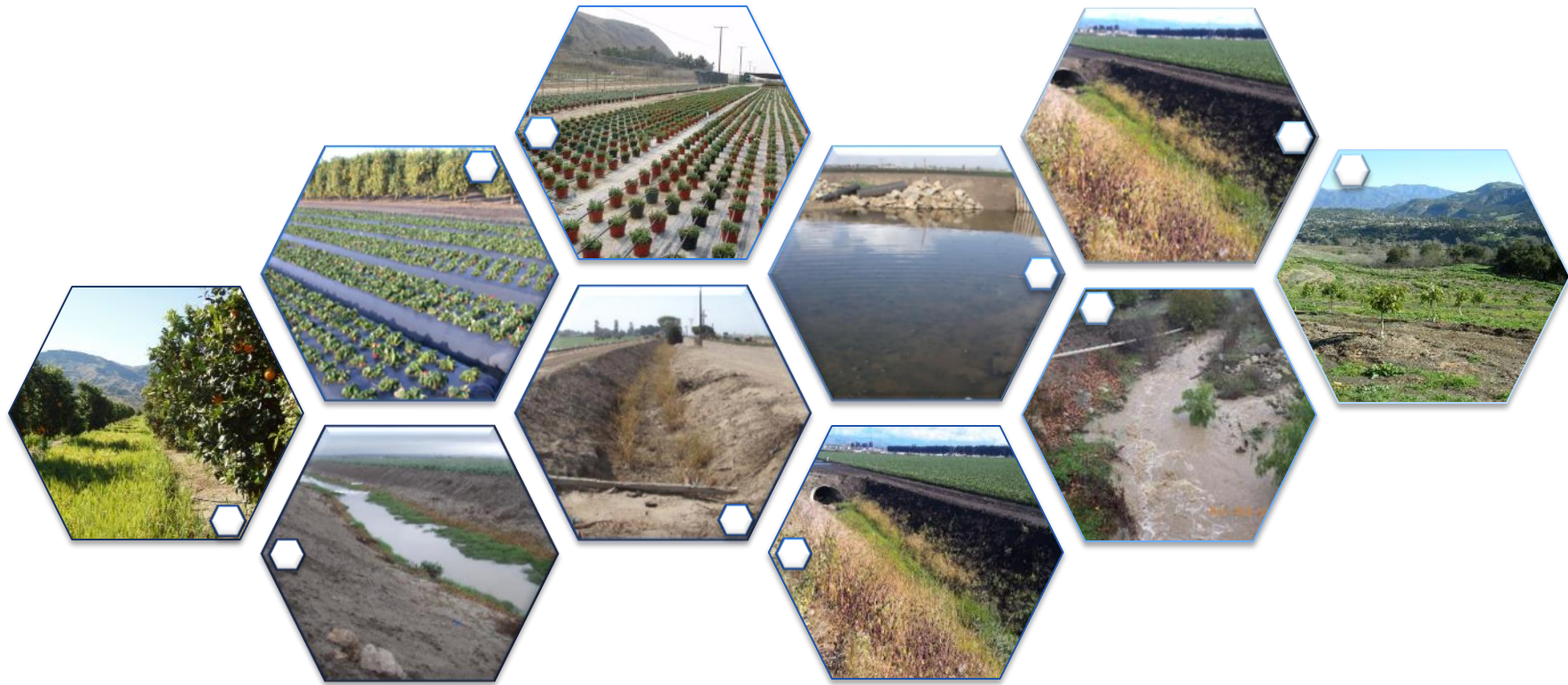
~\$175 for total N, total P analysis + sample pickup

\*No consideration for the numerous direct or indirect costs, high variability depending on which and how many constituents.

\$1,969 (121 ac average farm) or \$179 (11 ac median farm) for entire VCAILG 2020-21 assessment (Ventura River)

# Questions?

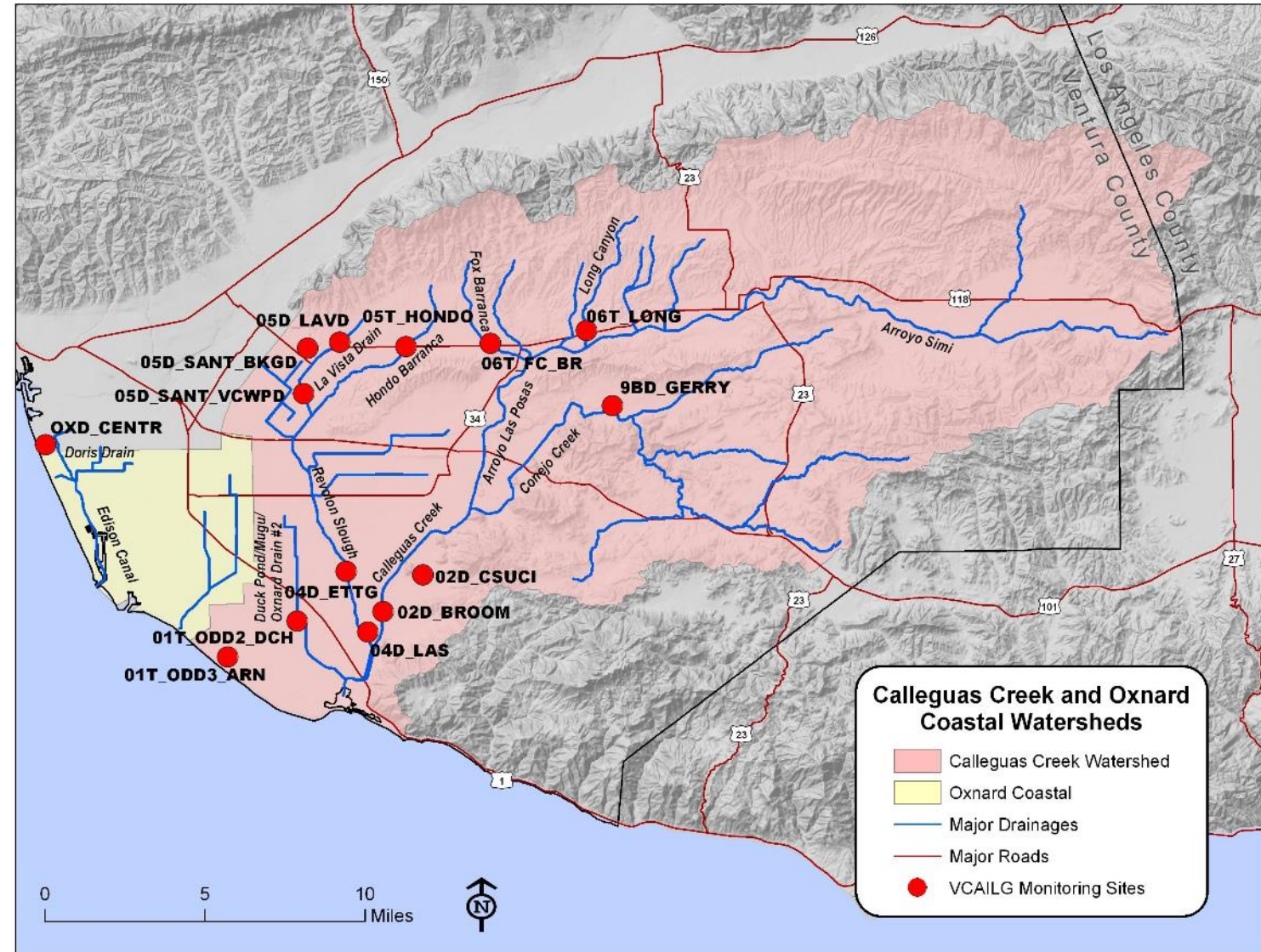
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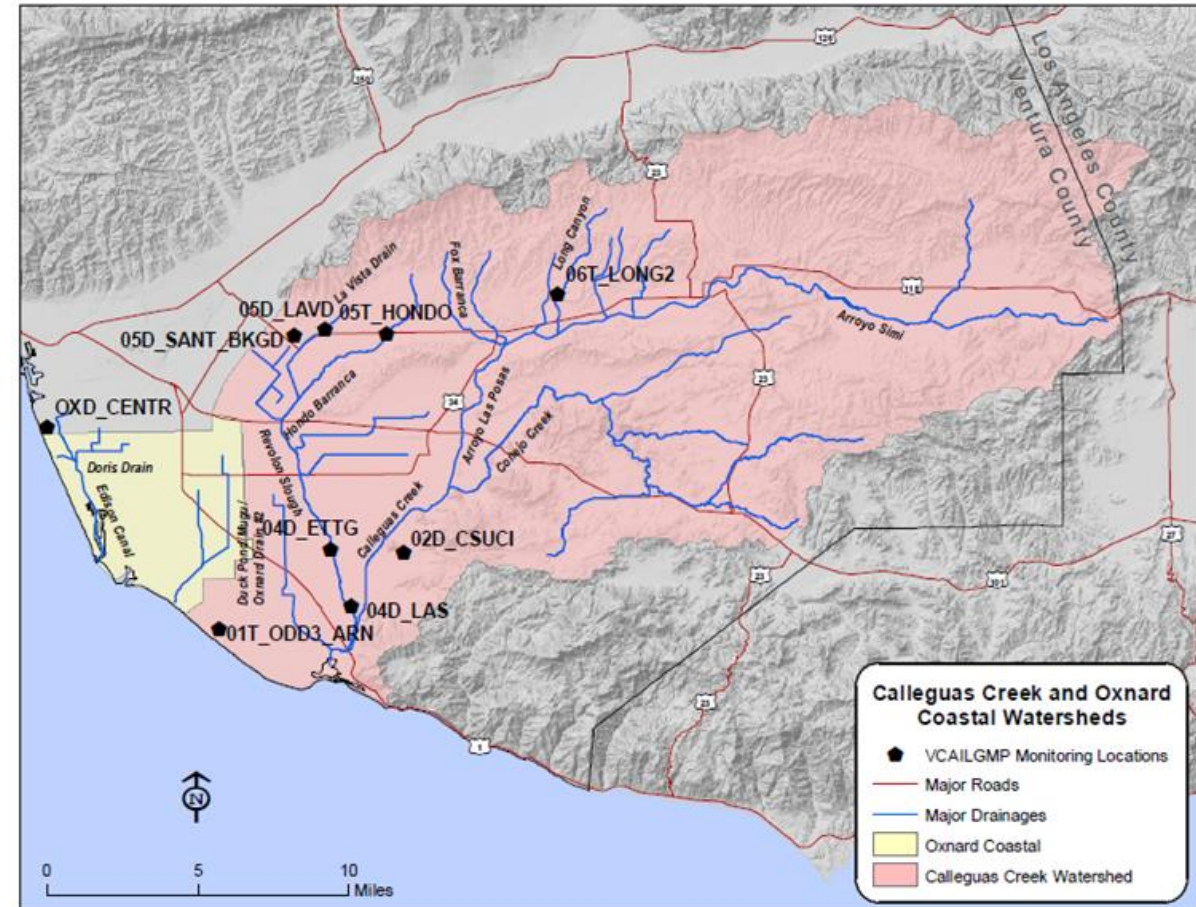
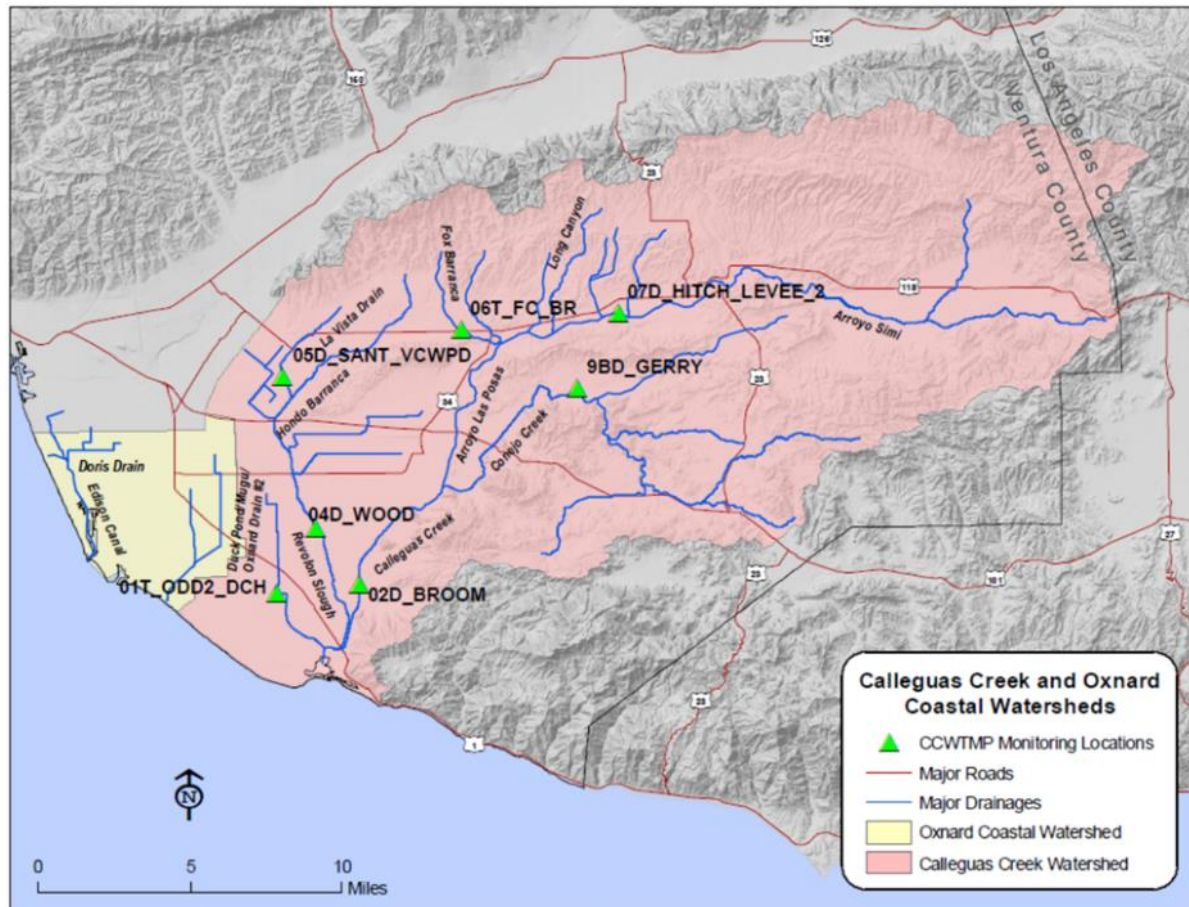
# VCAILG MP Calleguas Creek & Oxnard Coastal Sites 2005-2010 Waiver

- Waiver adopted in 2005
- Monitoring began in 2007





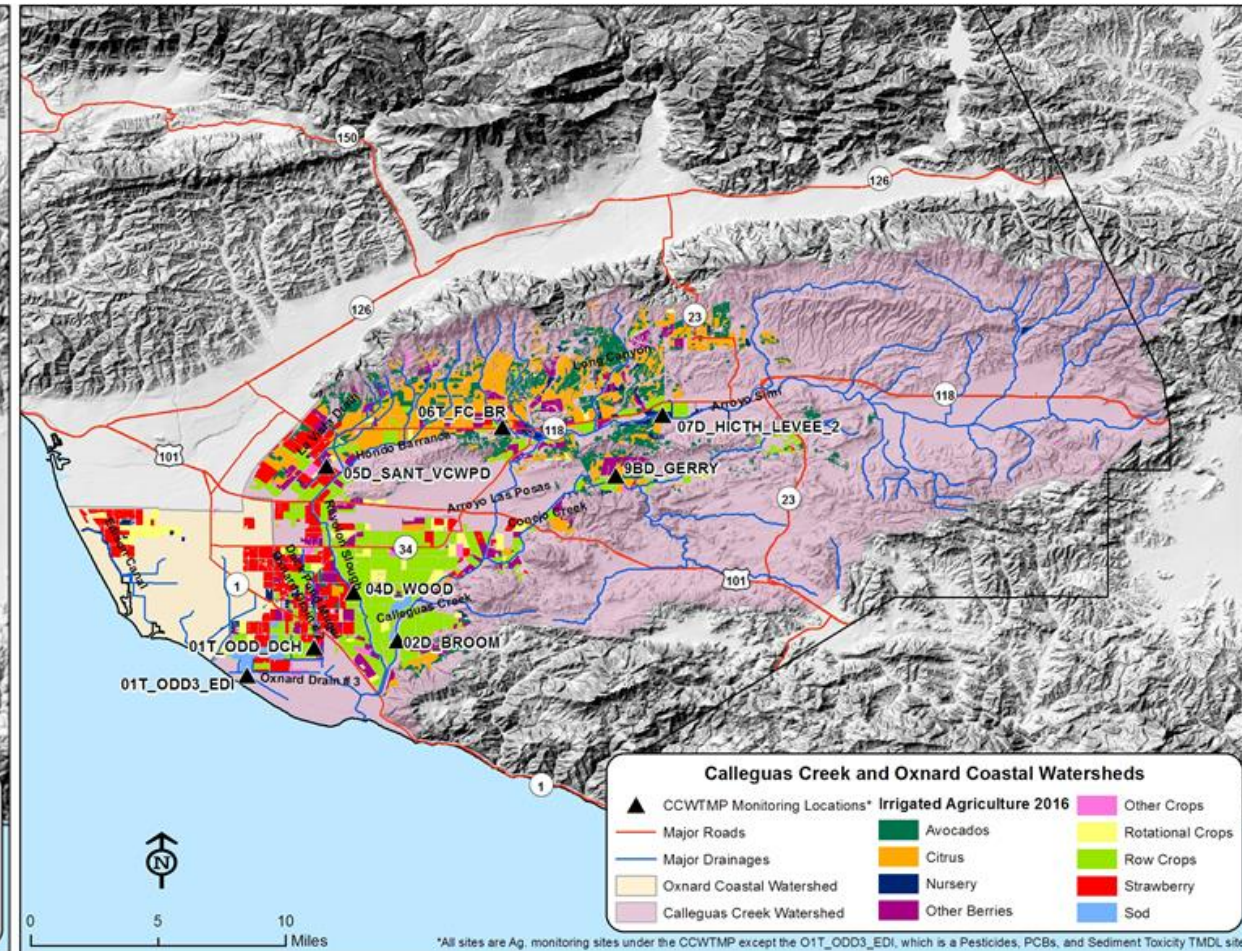
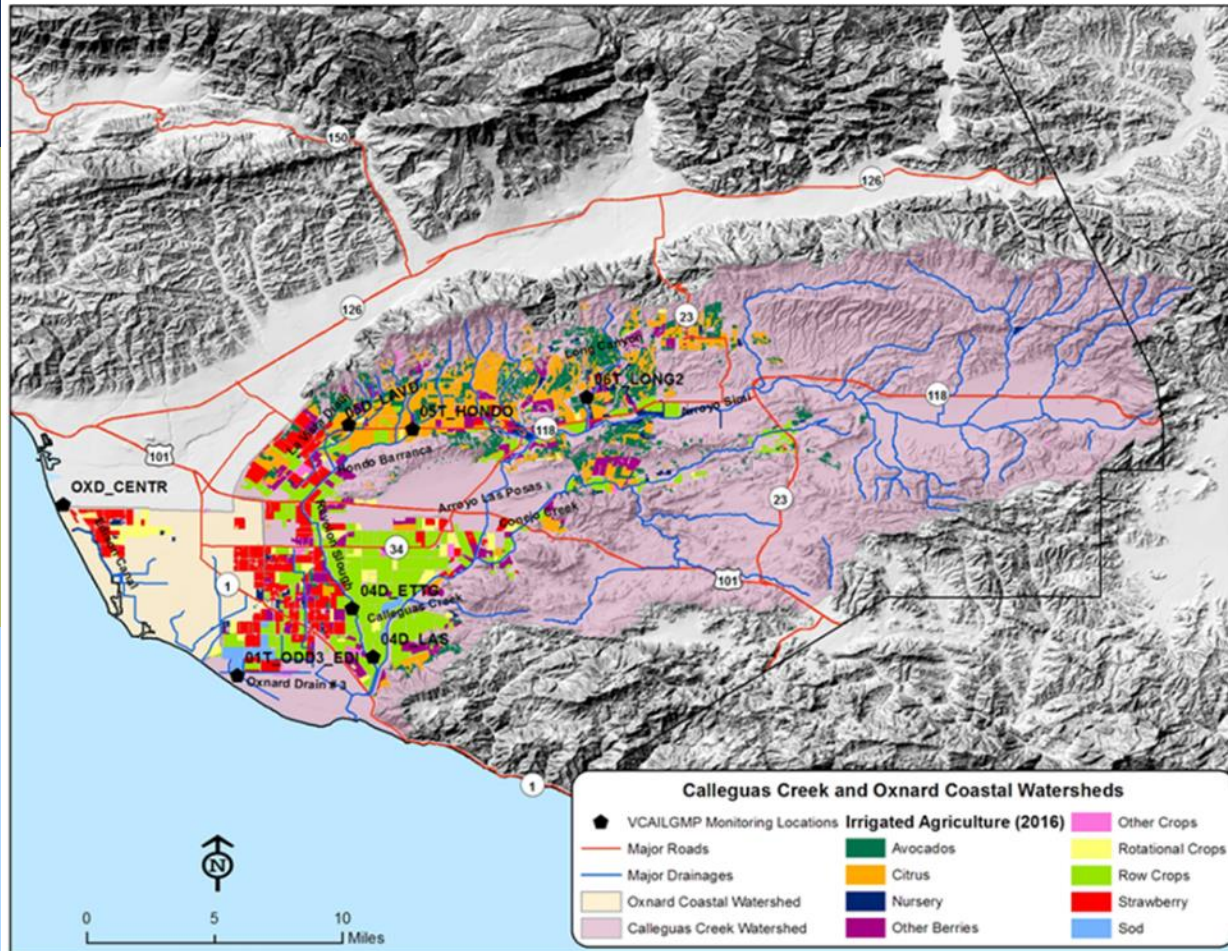
# Calleguas Creek and Oxnard Coastal Sites 2010-2016 Waiver and CCW TMDLs Ag Land Use Sites





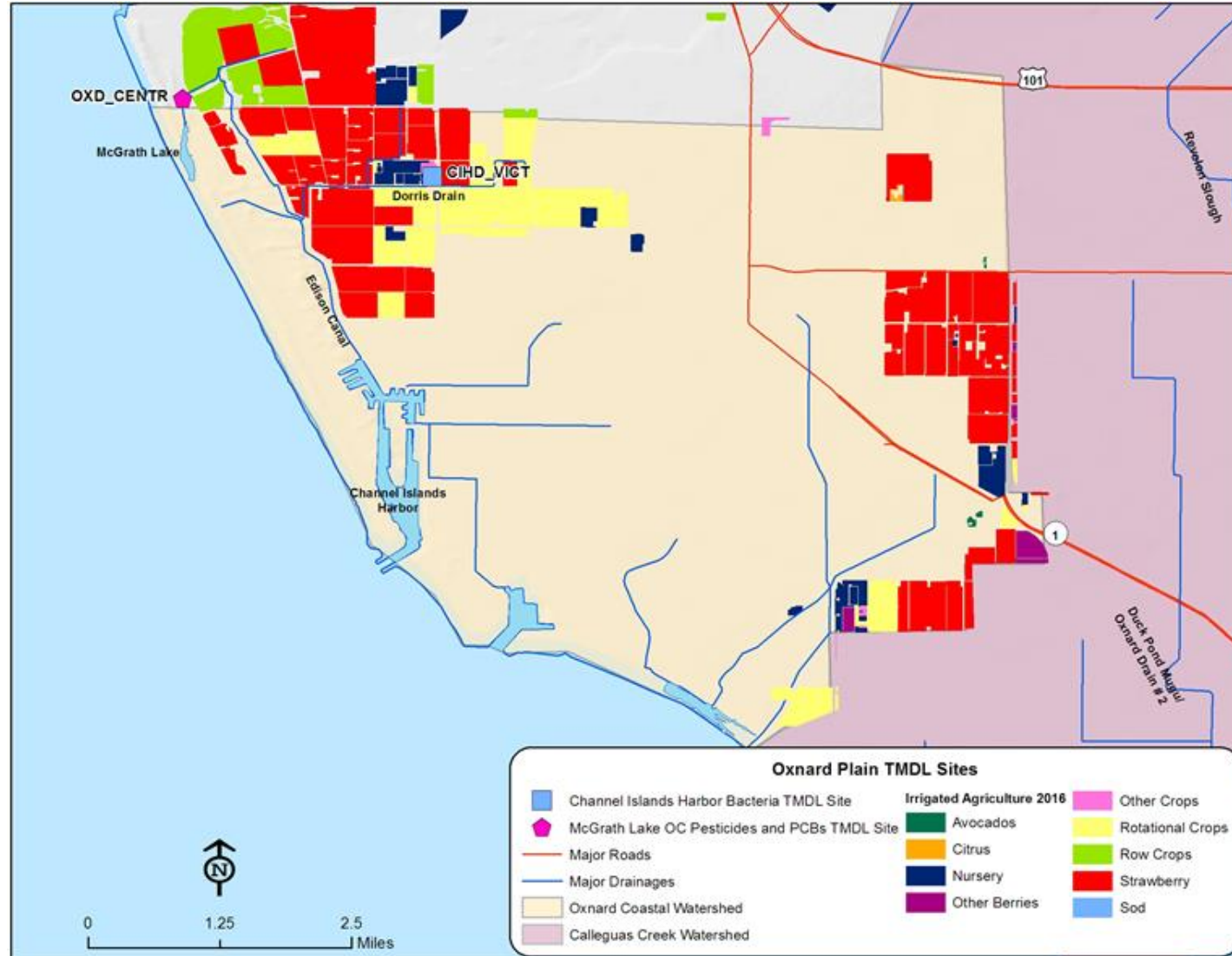
# Calleguas and Oxnard Coastal VCAILG MP Sites 2016-2021 Waiver Period

# Calleguas TMDLs Ag Land Use Sites





# Oxnard Coastal TMDL Sites



# Calleguas/Oxnard Coastal Sites with Crops and Drainage Area

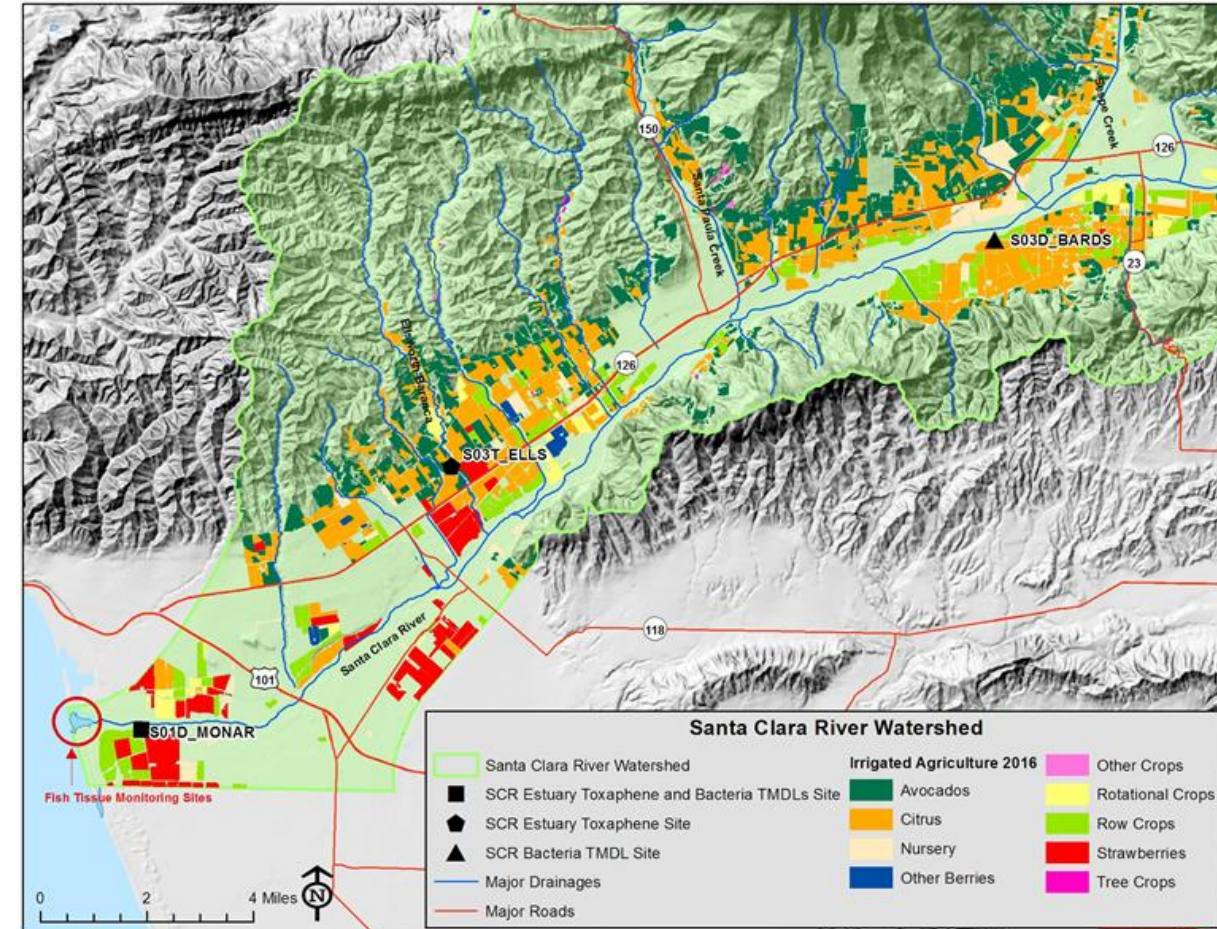
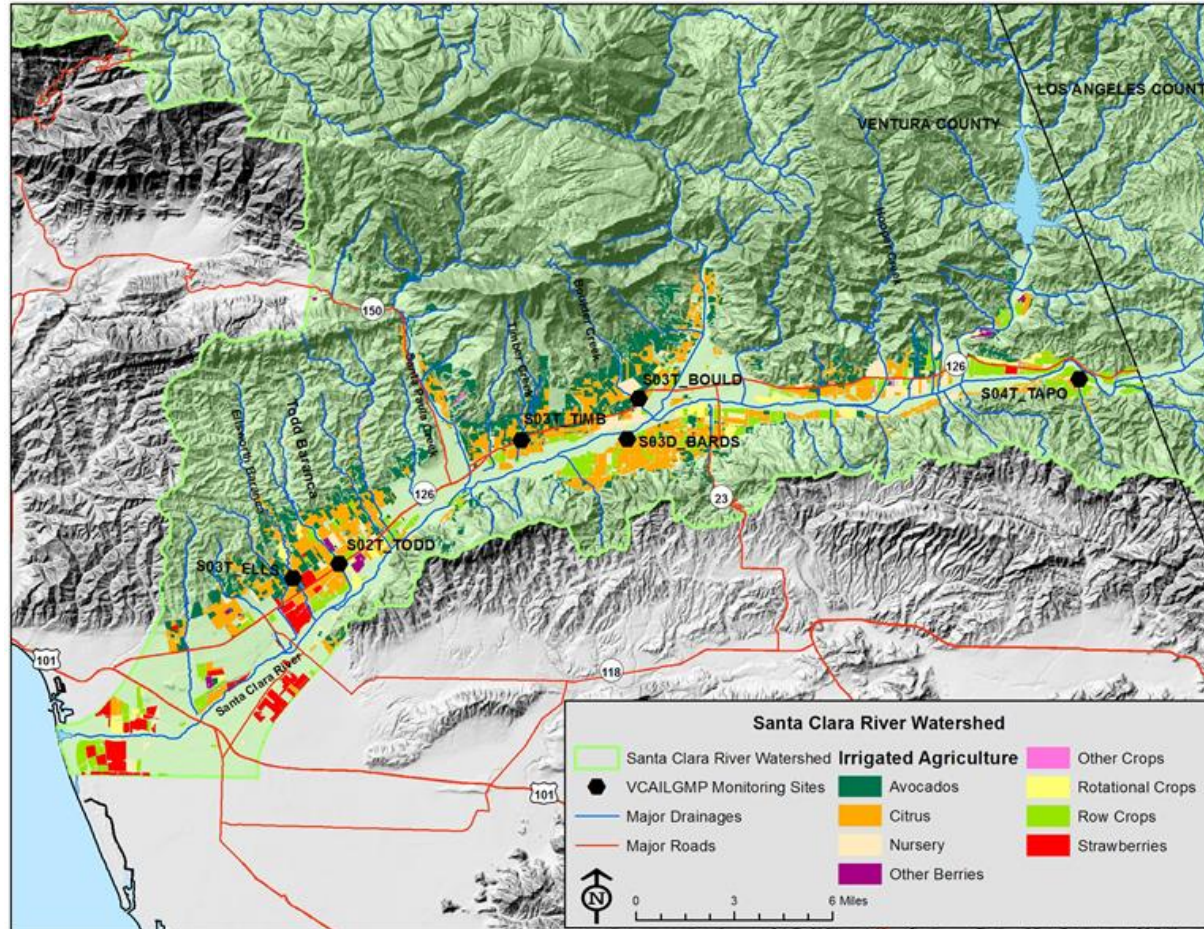
Site ID	Nursery	Orchard	Row Crop	Sod	Straw-berries	Other Berries	Other Crops	Site Drainage Area (ac.)
01T_ODD3 EDI			564	448				643
04D_ETTG	1	243	3,173		286	127	40	3,309
04D_LAS			1,849	93	309			1,339
05D_LAVD		392	48			132	272	877
05T_HONDO	4	1,693	91				721	3,928
06T_LONG2	39	1,210	32			165	21	2,813
OXD_CENTR	88		1,376		538			1,243
CIHD_VICT			41		93			99

\*Some acreage is double or triple counted due to multi-cropping practices.

Data Source: Ventura County Agricultural Commissioner's Office, November 2018.



# Santa Clara River Waiver and TMDL Sites 2016-2021



# Santa Clara River Sites with Crops and Drainage Area

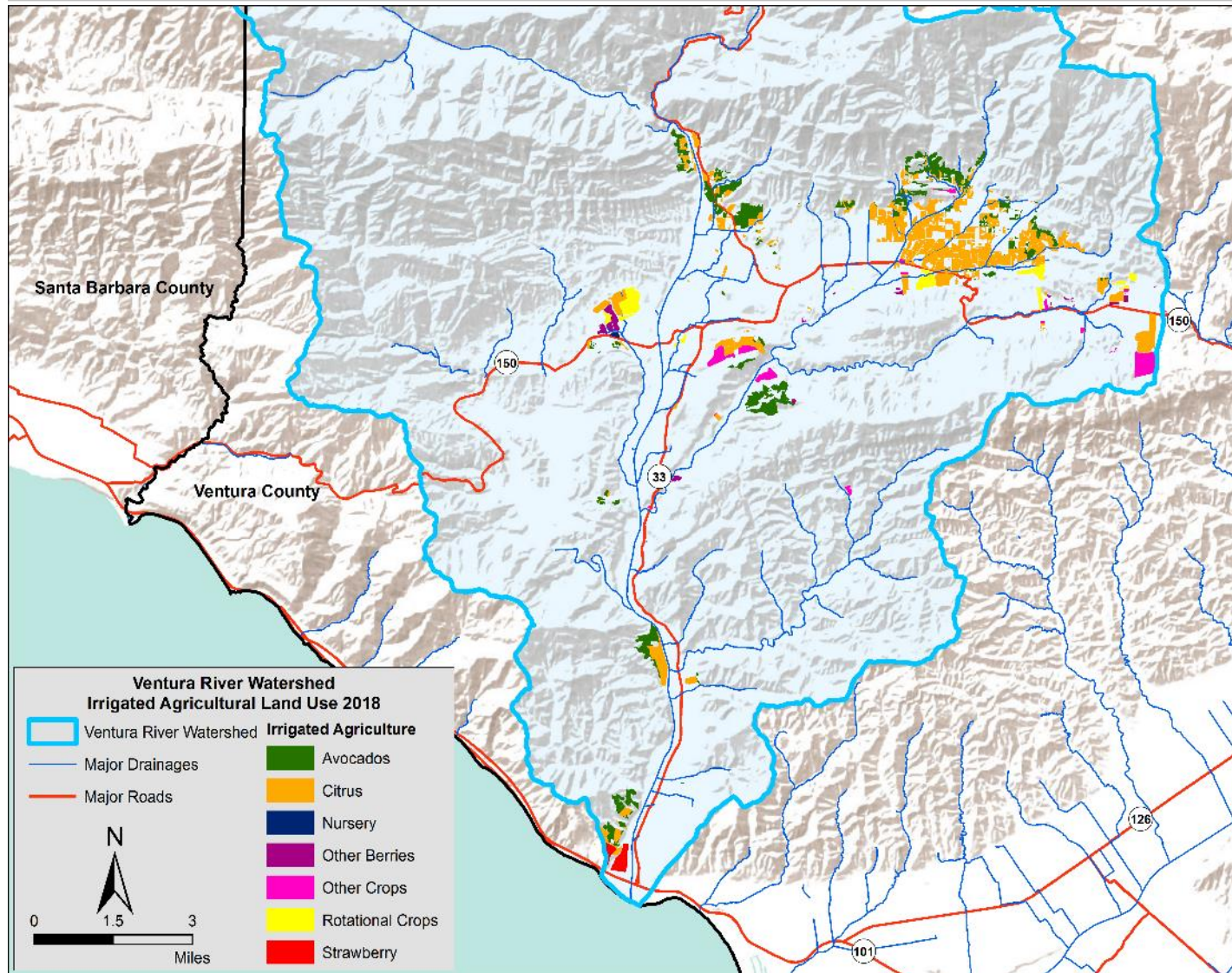
Site ID	Nursery	Orchard	Row Crop	Sod	Straw-berries	Other Berries	Other Crops	Site Drainage Area (ac.)
S02T_ELLS		848	78			3	192	9,015
S02T_TODD	47	333	119			2	6	5,748
S03D_BARDS		953	41				2	2,214
S03T_BOULD	172	899	8					3,764
S03T_TIMB		683	6			1		2,183
S04T_TAPO	19	34	32			1		3,686
S01D_MONAR			240		241			209

\*Some acreage is double or triple counted due to multi-cropping practices.

Data Source: Ventura County Agricultural Commissioner's Office, November 2018.



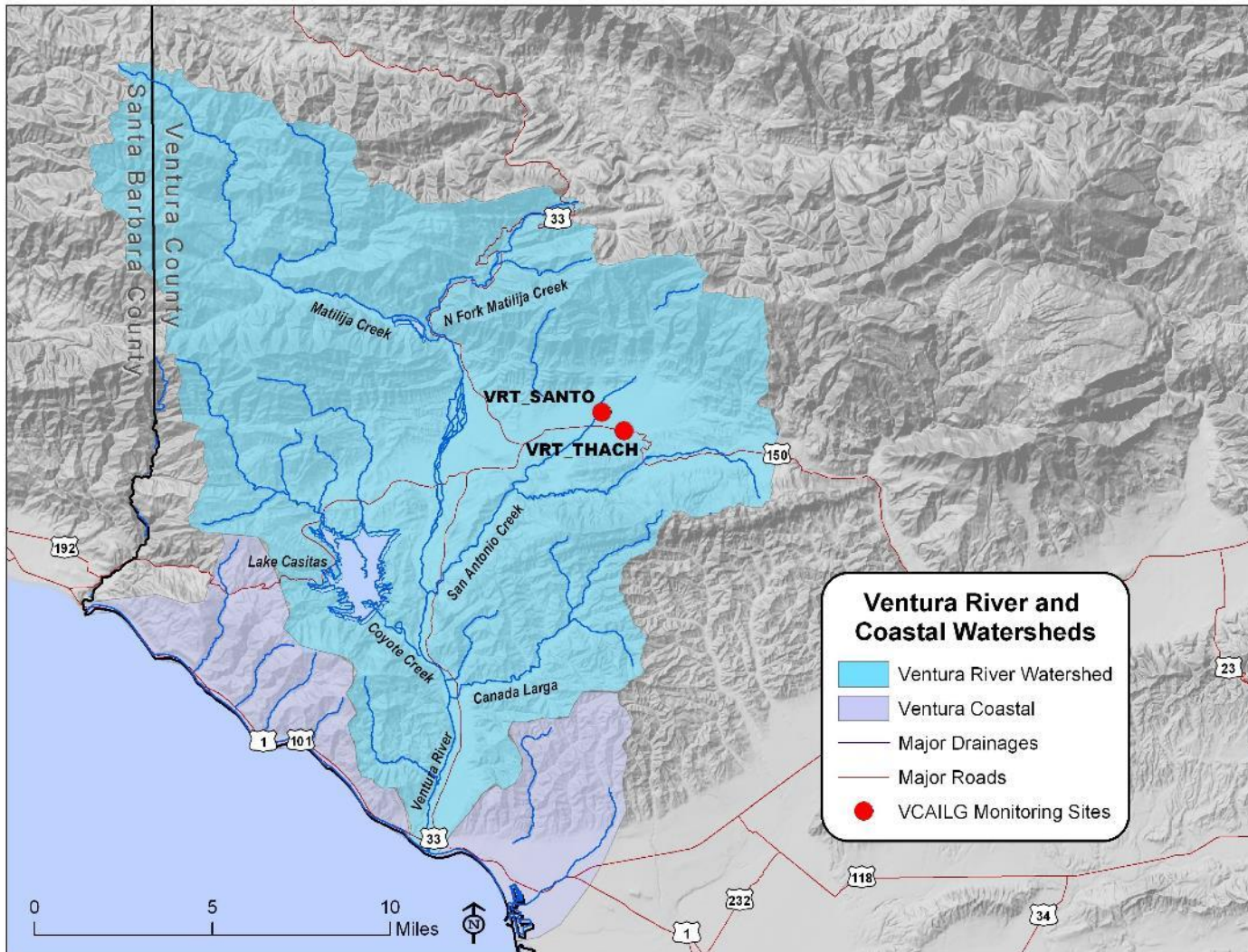
# Ventura River Watershed



- ~5,400 irrigated ac.



# VCAILG MP Ventura River Sites 2005-2016



# Ventura River Sites with Crops and Drainage Area

Site ID	Nursery	Orchard	Row Crop	Sod	Straw-berries	Other Berries	Other Crops	Site Drainage Area (ac.)
VRT_SANTO		564						7,220
VRT_THACH	2	819						6,003
V02D_SPM		72			35			137

Data Source: Ventura County Agricultural Commissioner's Office, November 2018.