California's Surface Water Ambient Monitoring Program

Central Coast Region

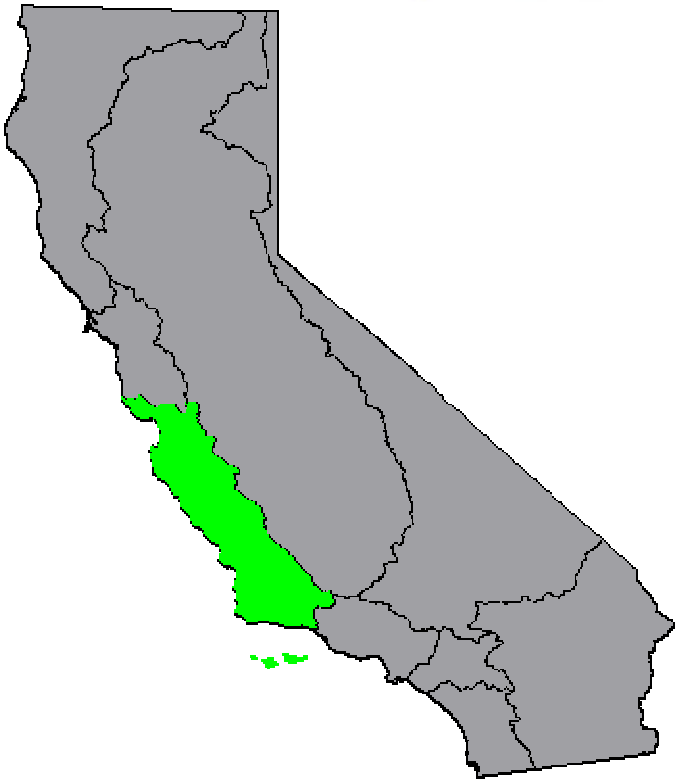
CALIFORNIA Water Boards

SWAMP
Surface Water Ambient Monitoring Program

CCAMP

Central Coast Ambient Monitoring Program
Central Regional Water Quality Control Board

Monitoring and Assessing Watersheds for Health and Function



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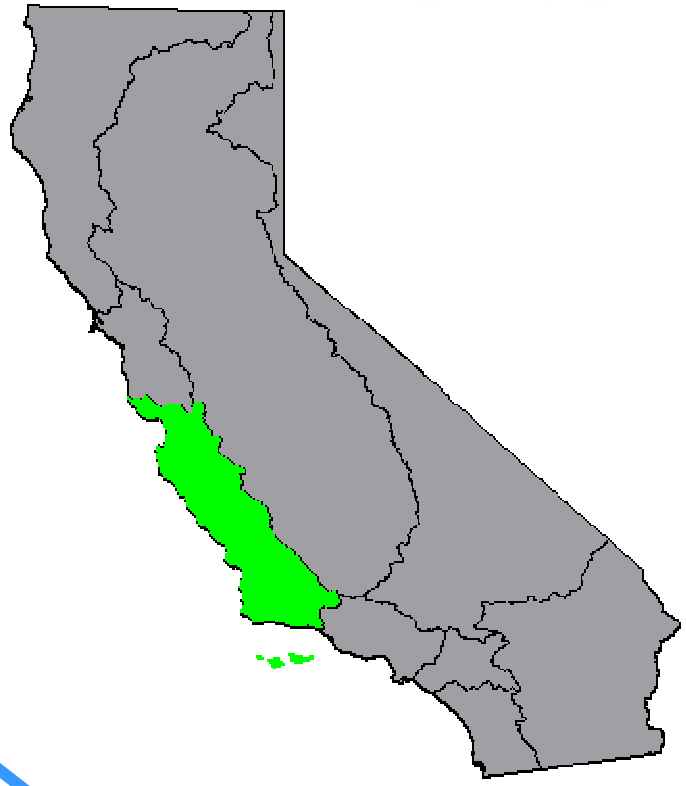

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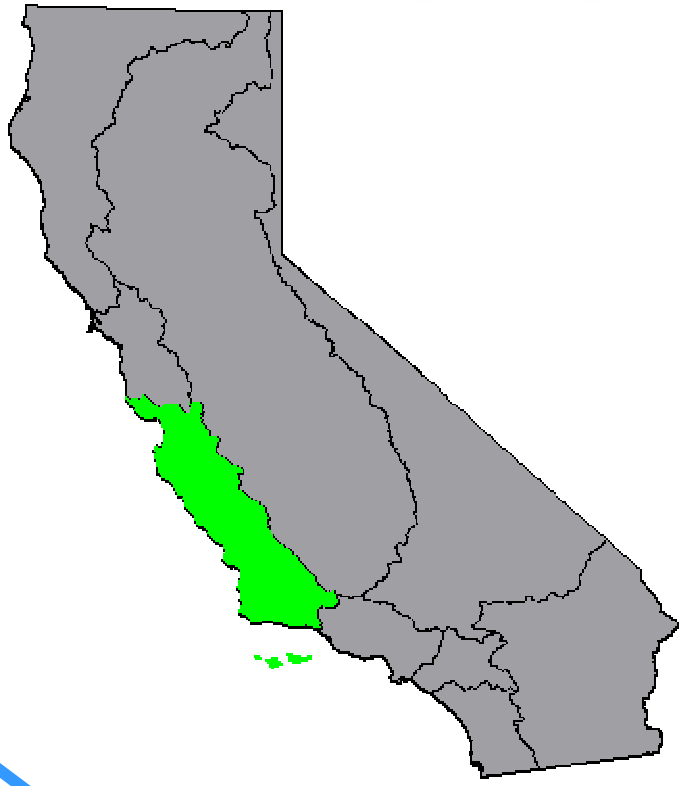

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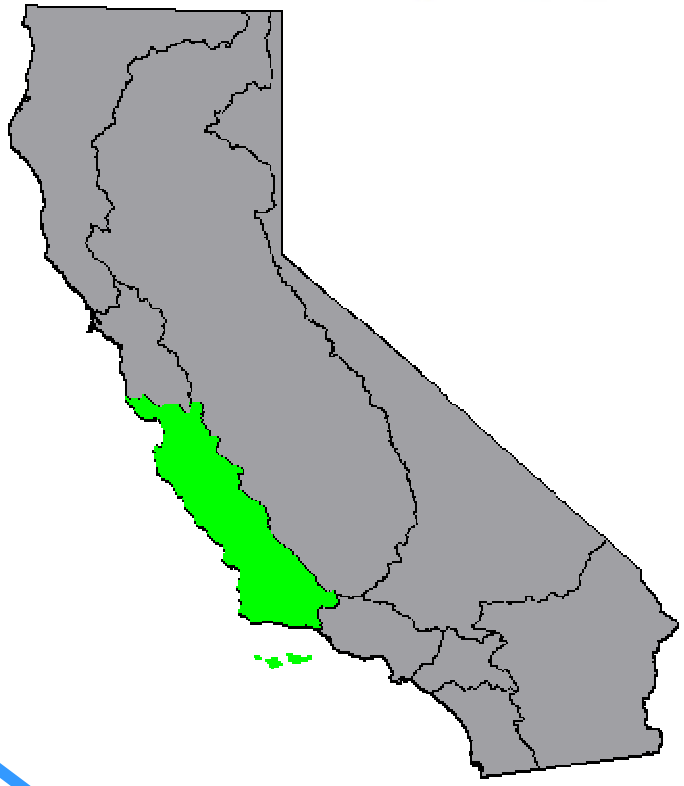

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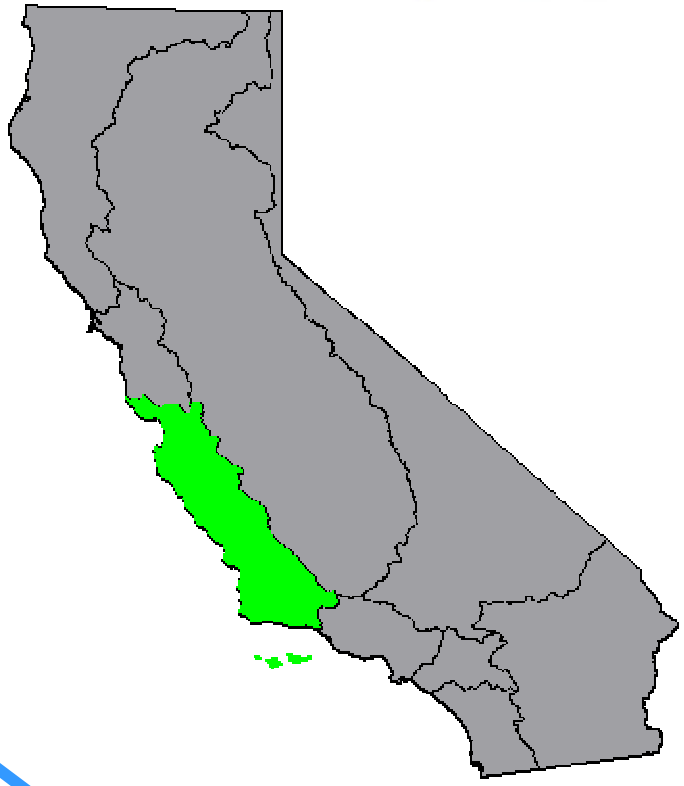

Karen Worcester

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Our Vision for the Central Coast…

Healthy Watersheds

Central Coast Goals for Healthy Watersheds

- **Goal 1: By 2025 80% of aquatic habitat is healthy; and the remaining 20% exhibits positive trends in key parameters**
- **Goal 2: By 2025 80% of lands within any watershed will be managed to maintain proper watershed functions, and the remaining 20% will exhibit positive trends in key watershed parameters**
- **Goal 3: By 2025 80% of groundwater will be clean, and the remaining 20% will exhibit positive trends in key parameters**

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Focus Today

CCAMP Program Overview

Using Data

Integrating Data

Viewing Data

Addressing our goals

SWAMP
Surface Water
Ambient Monitoring
Program

CCAMP Program Overview

Coordination with other monitoring and assessment programs

- Monterey Bay National Marine Sanctuary
- Central Coast Water Quality Preservation Inc.
- City of Salinas Stormwater Program
- Central Coast Long-term Environmental Assessment Network
- Local Agency, Volunteer and University programs

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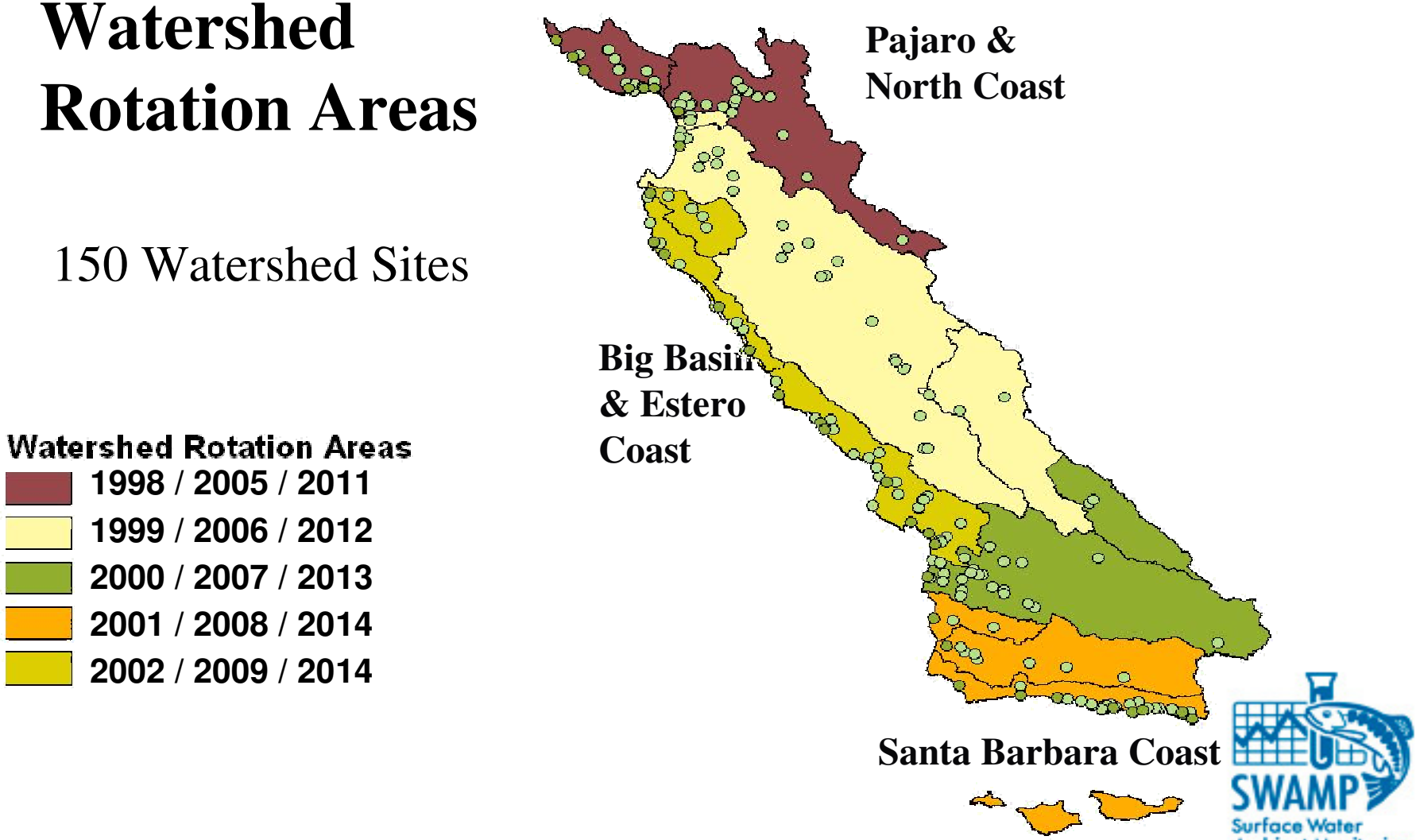
CCAMP Program Overview

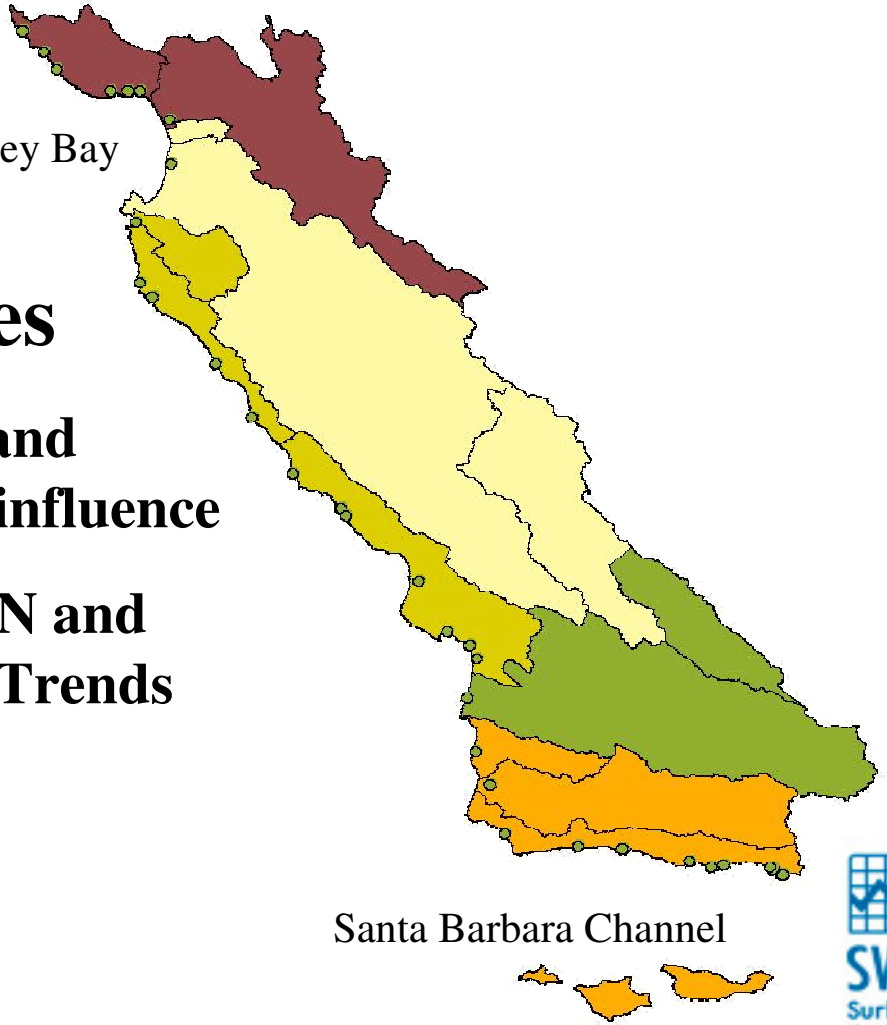
Watershed Rotation Areas

150 Watershed Sites



Thirty monthly sites in each rotation area since 1998

CCAMP Program Overview



Coastal Confluences

Trend monitoring at river and stream mouths above tidal influence

Coordination with CCLEAN and SWAMP Stream Pollution Trends (SPOT) program

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Monthly monitoring at thirty-three sites since 2001

CCAMP Program Overview

Conventional Water Quality

Monthly Monitoring at Watershed Rotation and Coastal Confluence Sites

- Nutrients
- Salts
- Bacteria
- Probe measurements
- Flow

CCAMP Program Overview

Benthic Invertebrates and Habitat

Collected annually at a subset of CCAMP sites

- 100 CCAMP sites throughout Region (so far…)
  - Minimum of 2 separate sample events at each site
- Other bioassessment data collected by CCWQP, City of Salinas, County of Santa Barbara, SWAMP

CCAMP Program Overview

Toxicity

Annually at a subset of CCAMP sites

Water Toxicity (3 test species)

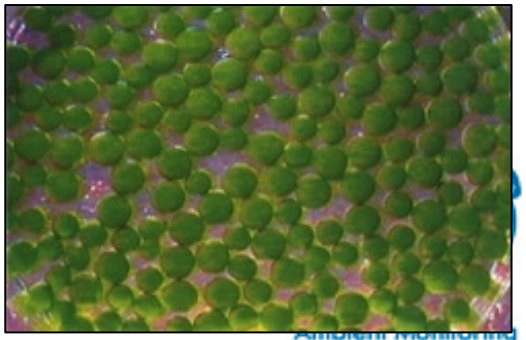
Biannually - wet & dry weather flow

- 143 CCAMP sites

Sediment Toxicity (Invertebrate only)

Annually – coincident with bioassessment

- 57 CCAMP sites



Other toxicity data from CCWQP, SWAMP, U.C. labs, research

Program

Detecting change

CCAMP has nearly completed two full watershed rotations and seven years of coastal confluence monitoring

Power to detect trend increases with years of data

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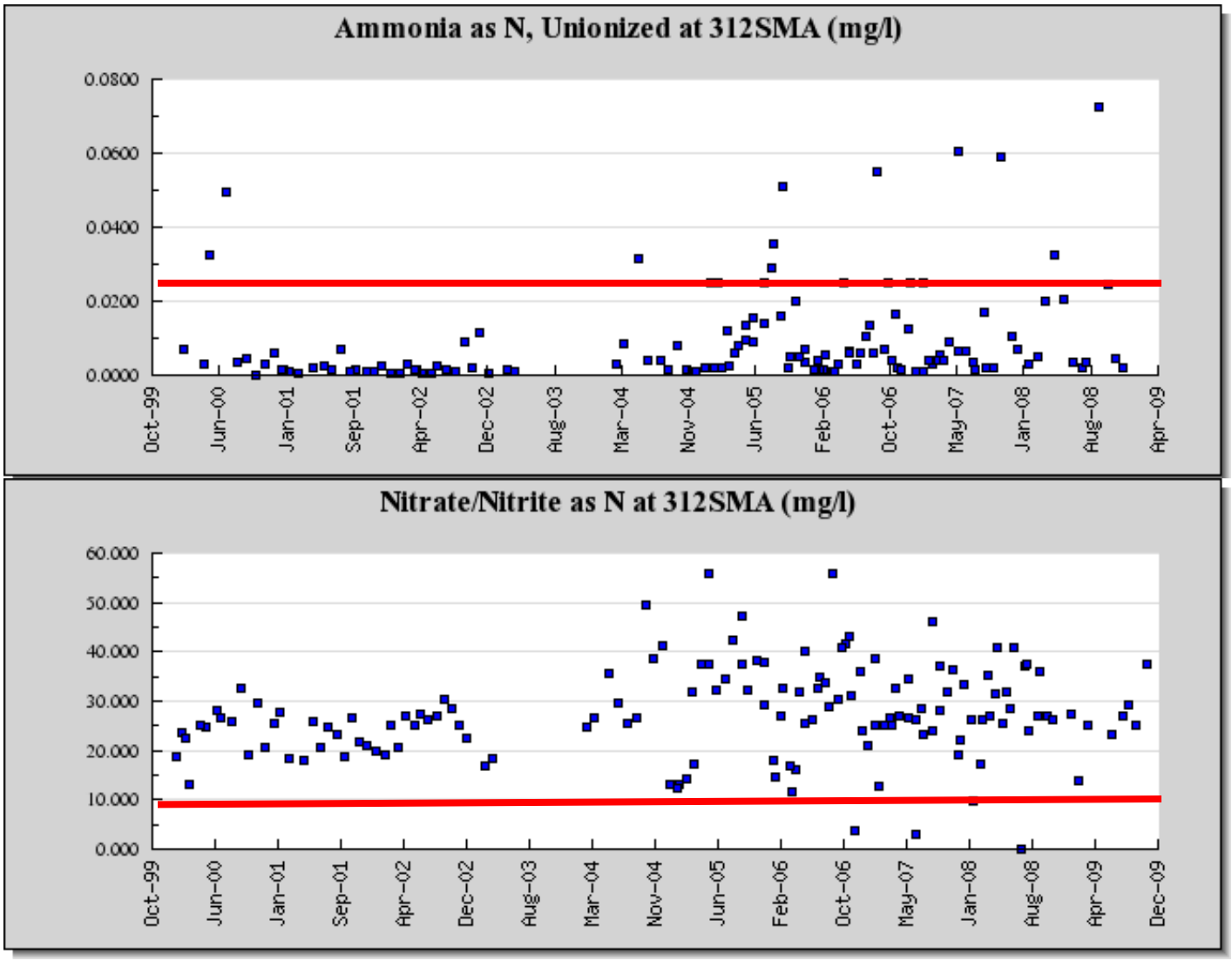
Coastal Confluence trend monitoring

Increasing Concentrations at Santa Maria River mouth



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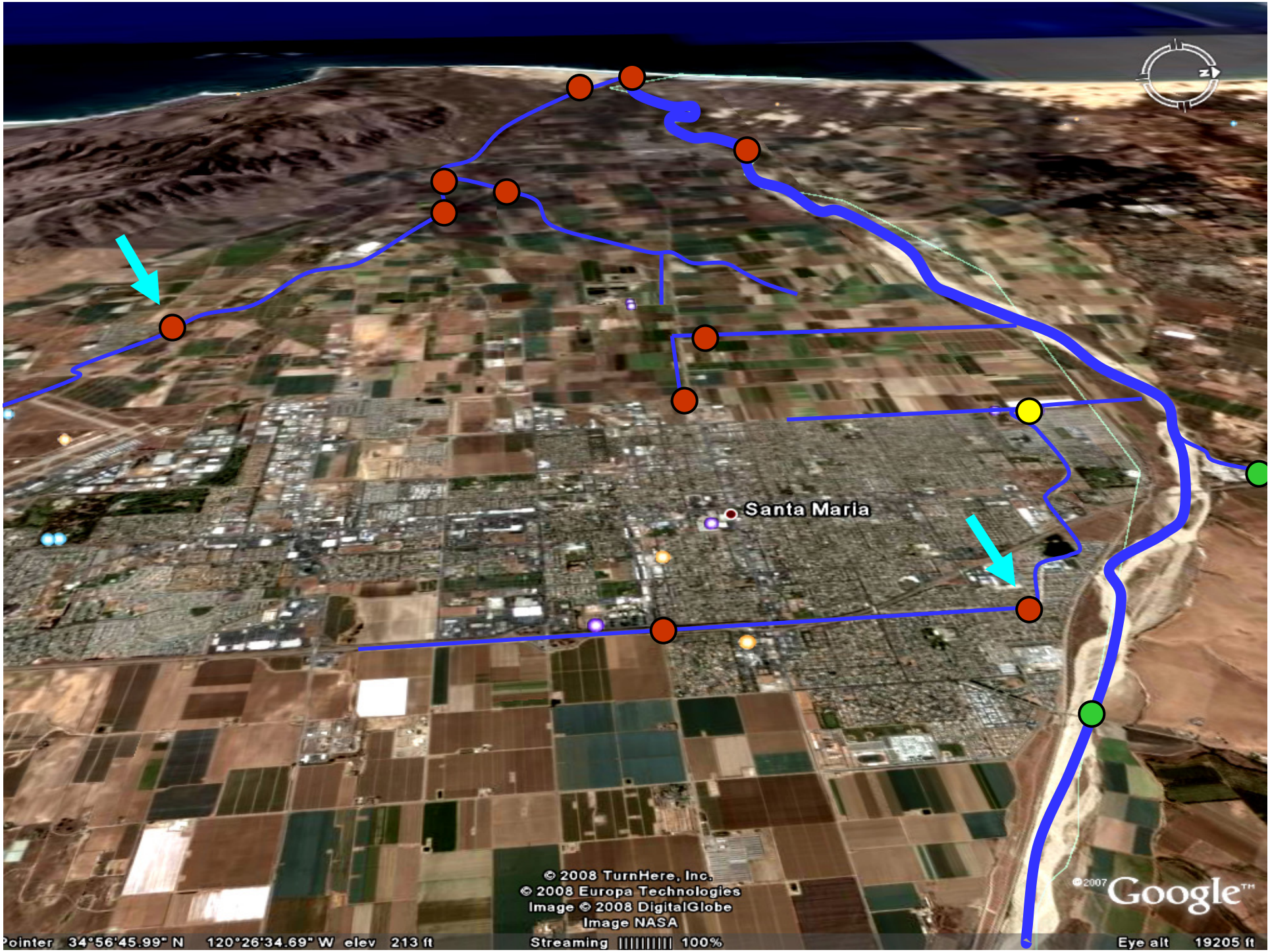
Santa Maria
© 2008 TurnHere, Inc.
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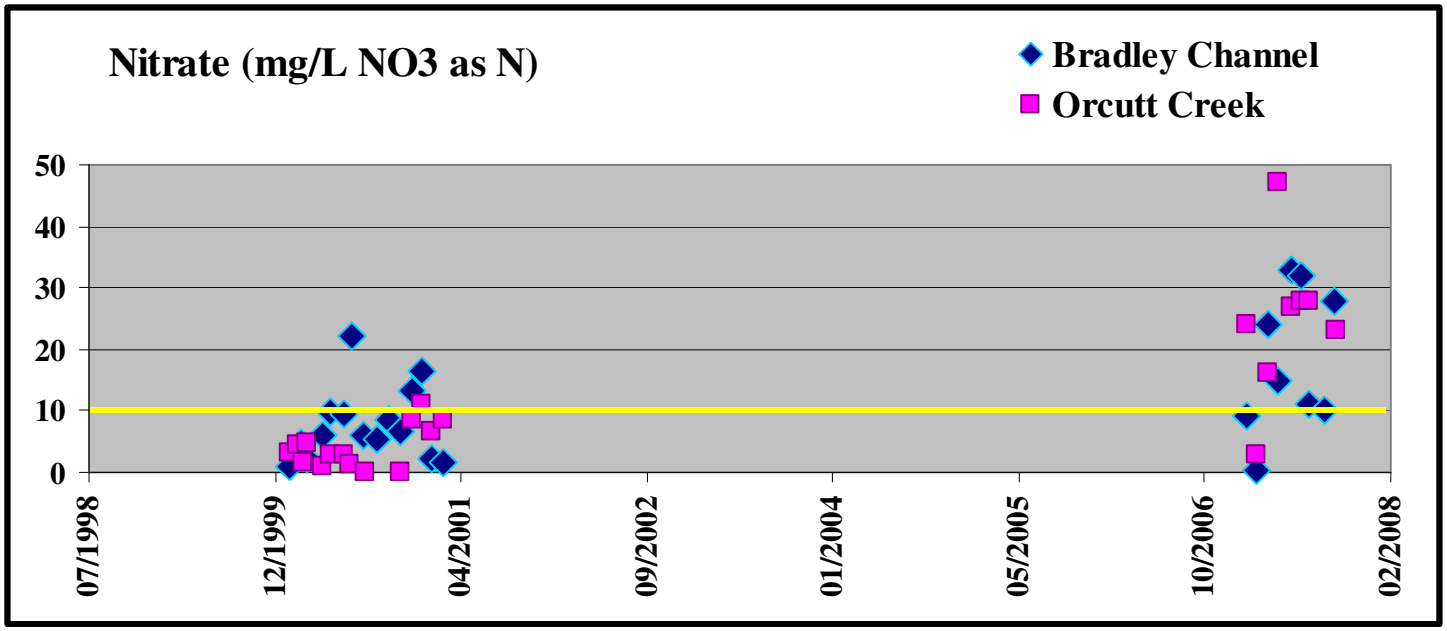
Pointer 34°56'45.99" N 120°26'34.69" W elev 213 ft
Streaming 100%
Eye alt 19205 ft

CCAMP data from Bradley Channel and upper Orcutt Creek, 2000 and 2007



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Emerging Problems – Partnering with other researchers and agencies

- Endocrine disruption
  - Nonylphenol in fish
  - PBDE in sea otters
  - Bioassays in wastewater
- Pathogens
  - Bacterial and protozoal pathogens in sea otters
  - E. coli O157 in central coast watersheds
- Toxic algae
  - Pinto Lake in Watsonville
  - Sea otters mortalities
  - Nutrient loading to Monterey Bay

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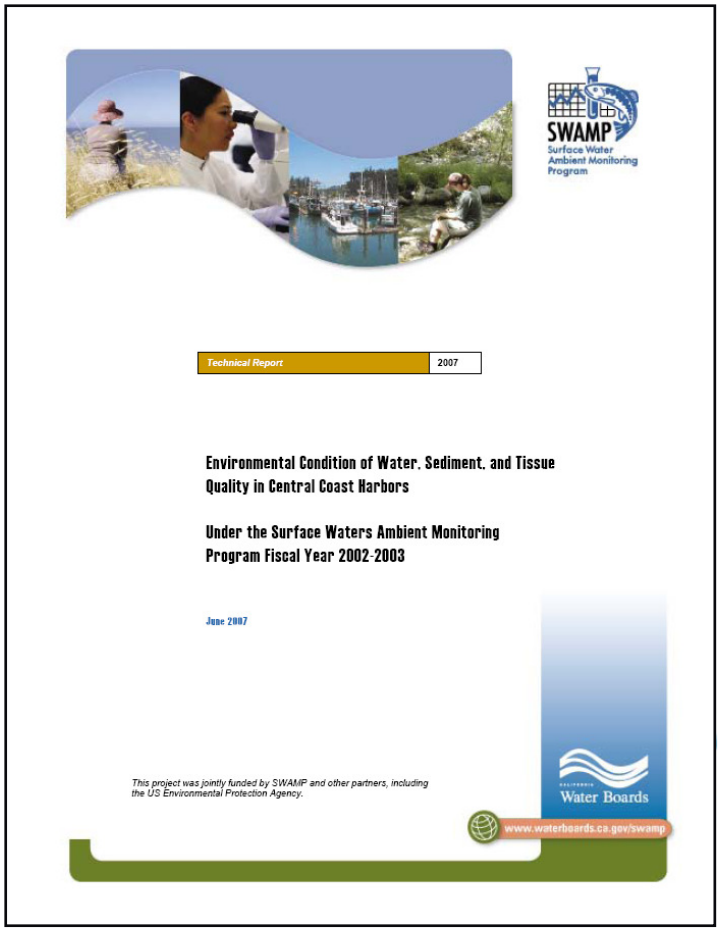
CCAMP Data Products

Assessment reports available on CCAMP website

www.CCAMP.org/reports

Peer reviewed:

- Seven Hydrologic Unit Reports
- Central Coast Harbors Condition Report
- Related scientific articles



Using Data

Hydrologic Unit Reports
Beneficial Use Impairment Questions

- Is there evidence that it is unsafe to swim?
- Is there evidence that aquatic life is impaired?
- Is there evidence that it is unsafe to eat the fish?
- Is there evidence of an aesthetic nuisance?
- Is there evidence that water is unsafe to drink?
- Is there evidence that water is unsafe for agricultural use?

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Using Data

Hydrologic Unit Reports
Beneficial Use Impairment Questions

- Is there evidence that it is unsafe to swim?
- **Beneficial Use:** Water Contact Recreation (REC-1)
- **Assessment Objective(s):** Screen for indications of bacterial contamination by determining percent of samples at sites and waterbodies exceeding adopted water quality objectives and EPA mandated objectives
- **CCAMP Monitoring Approach:** Monthly monitoring for indicator organisms (e.g. *E. coli*, fecal coliform); compilation of other data
- **Criteria:**
  - 10% of samples over 400 MPN/100 ml fecal coliform
  - 10% of samples over 235 MPN/100 ml *E. coli*

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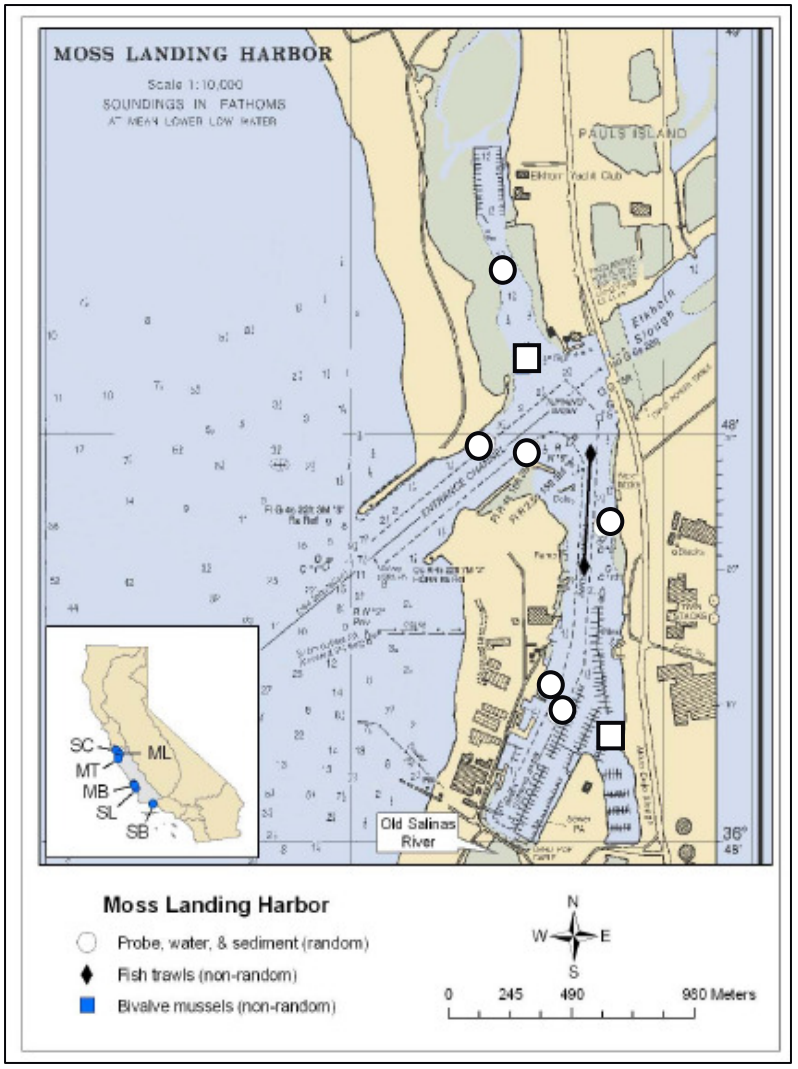
Using Data

Central Coast Harbors Condition Report

All Central Coast Harbors

- Probabilistic study design
- Min 6 sites per harbor
  - Water Chemistry
  - Sediment Chemistry
  - Amphipod Toxicity
  - Benthic Infaunal Community

- Fish trawls & mussel bags
  - Fish and Mussel Tissue
    - ✓ Metals , Organics, Butyl-tins
  - Fish Community Composition



Using Data

Central Coast Harbor Report Condition Ranking

		Water		Sediment		Tissue	
	Value	Area (%)	Station (%)	Area (%)	Station (%)	Fish (%)	Bivalves (%)
All Harbors	Good	84.5	75	62.6	48.3	75	68.7
	Fair	9.5	16.7	21.8	23.3	-	-
	Poor	1.3	5	15.6	28.3	25	31.3
Santa Cruz	Good	-	50	-	16.7	62.5	62.5
	Fair	-	50	-	33.3	-	-
	Poor	-	0	-	50	37.5	37.5
Moss Landing	Good	-	50	-	50	87.5	50
	Fair	-	16.7	-	0	-	-
	Poor	-	33.3	-	50	12.5	50
Monterey	Good	-	100	-	0	62.5	62.5
	Fair	-	0	-	66.7	-	-
	Poor	-	0	-	33.3	37.5	37.5
Morro Bay	Good	-	83.3	-	66.7	87.5	87.5
	Fair	-	10	-	23.3	-	-
	Poor	-	0	-	10	12.5	12.5
Port San Luis	Good	-	100	-	66.7	75	75
	Fair	-	0	-	16.7	-	-
	Poor	-	0	-	16.7	25	25
Santa Barbara	Good	-	33.3	-	16.7	75	75
	Fair	-	50	-	0	-	-
	Poor	-	16.7	-	83.3	25	25

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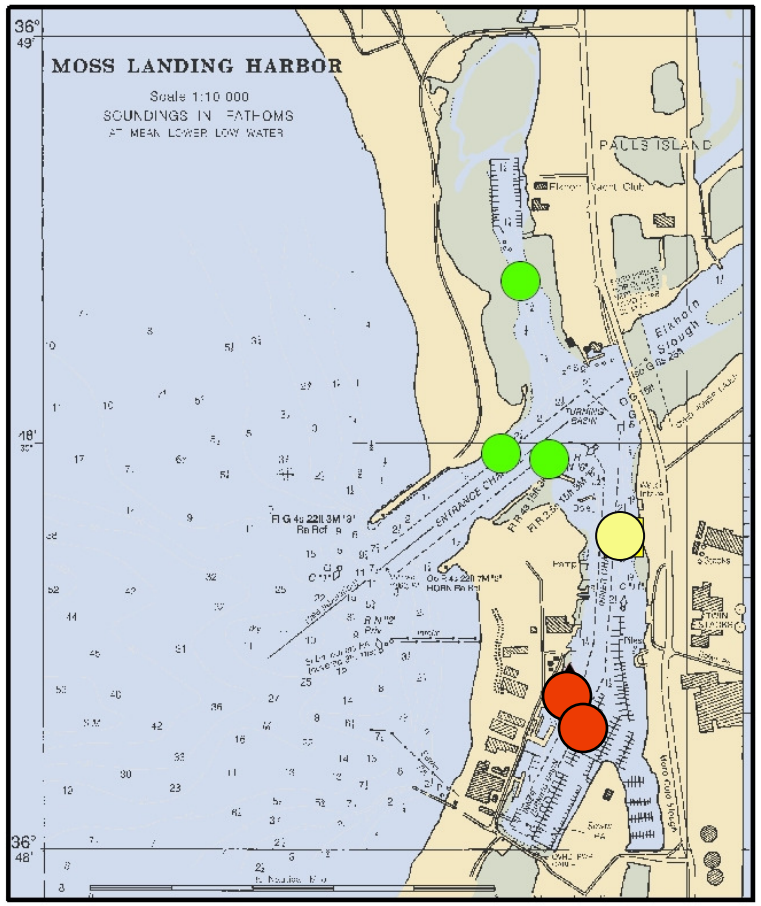
Using Data

Moss Landing Harbor

Harbor Water Quality Index

- **2 stations in poor condition**
  - **High levels of NO_3, PO_4**
  - **Low water clarity**



Moss Landing

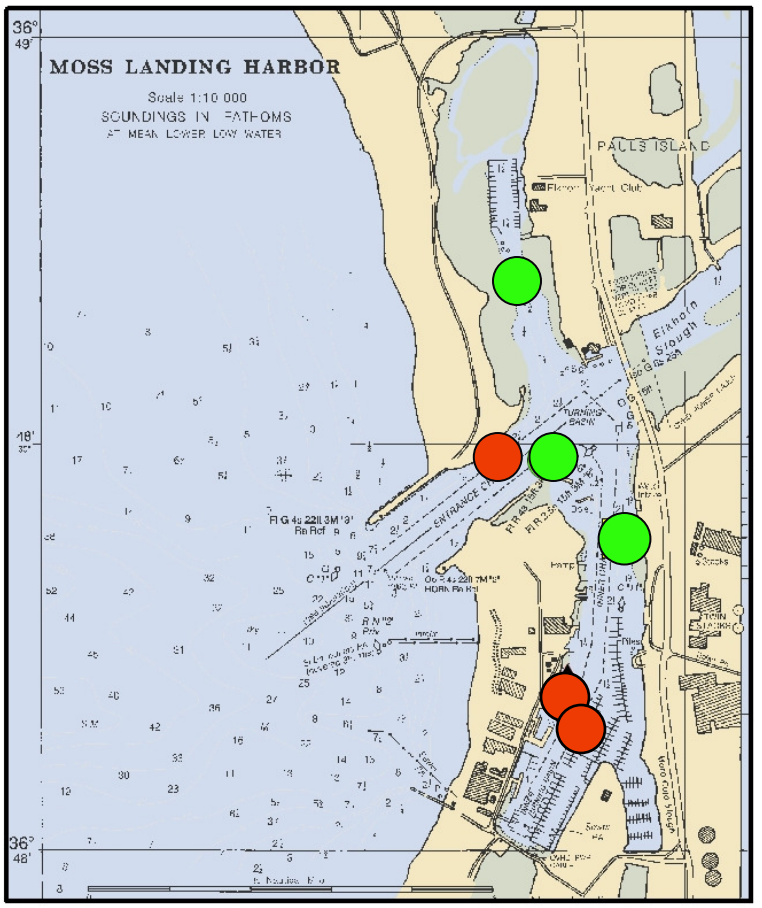
Ambient Monitoring Program

Using Data

Moss Landing Harbor

Harbor Sediment Quality Index

- 3 stations in poor condition
  - Boat slip sites
    - Amphipod toxicity
    - High levels of DDT, PCB's and chlordanes
  - Harbor entrance site
    - Amphipod toxicity



Moss Landing

Surface Water Ambient Monitoring Program

Using Data

Pollutant Loading to the Coast

Flow modeling used to estimate fresh water and pollutant loads to the coast for use by the research community

* Anthropogenic Nutrient Loading in Algal Bloom Dynamics
* Marine Protected Area risk
* Pathogen risk for marine mammal studies

www.ccamp.org/Reports

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Using Data

Inform Enforcement Actions

- CCAMP staff documented toxicity, nutrients, chlorine & broccoli in storm drain to Salinas Reclamation Canal

- Direct follow-up with enforcement & storm water staff resulted in identification and elimination of industrial discharge to the storm water system and a $104,000 fine

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Using Data

303(d) / 305(b) Integrated Report

- In 2005 USEPA mandated that a single state-wide Integrated Report be prepared to meet requirements of CWA Sections 303(d) and 305(b)
- 303(d) requires a list of impaired water bodies
- 305(b) requires a report on the condition of water quality
- California Listing Policy defines how water bodies are determined “impaired”

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CCAMP 303(d) Listing Tools

- Scans data for exceedances
  - Applies site, water body, regional, state and national criteria
- Produces “Lines of Evidence”
  - Specific to analyte, beneficial use, water body and project
  - QA documentation
  - References on criteria, data used
  - Spatial and temporal representation

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303(d) / 305(b) Integrated Report

- Central Coast Region developed the most comprehensive report in the State
- Major data sources from the Region were reformatted into a single format (MBNMS and other agencies collaborated)
- 18 data sources, 345 water bodies assessed, 3708 decisions, over 10,000 Lines of Evidence

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Using Data

2010 Region 3 CWA Section 303(d) List of Impaired Waters
Top 10 Pollutant Listings

Pollutant	Number of Listings
Fecal Coliform	87 (54 new)
pH	54 (All new)
E. coli	54 (All new)
Low DO	51 (44 new)
Nitrate	46 (18 new)
Toxicity	45 (41 new)
Turbidity	37 (All new)
Sodium	38 (All new)
Chloride	30 (All new)
Chlorpyrifos	26 (22 new)
Un-ionized ammonia	20 (9 new)

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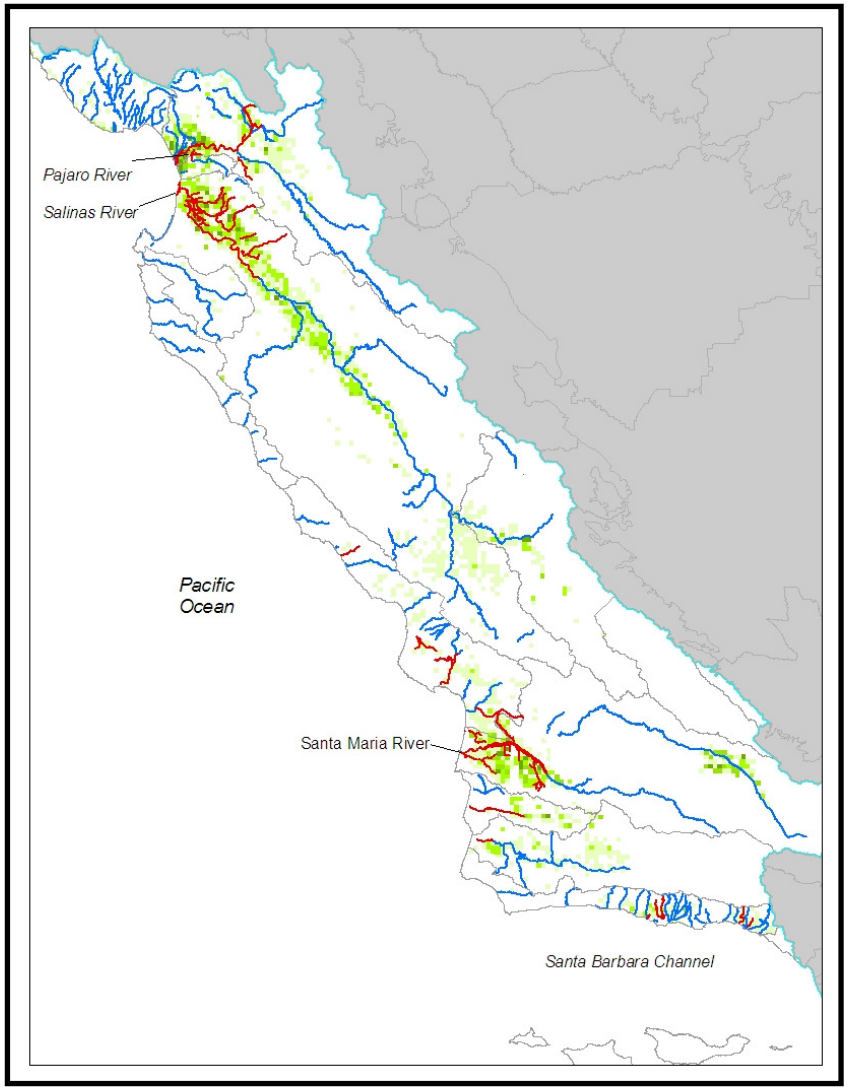
Region 3 Proposed 2010 Nitrate Listings



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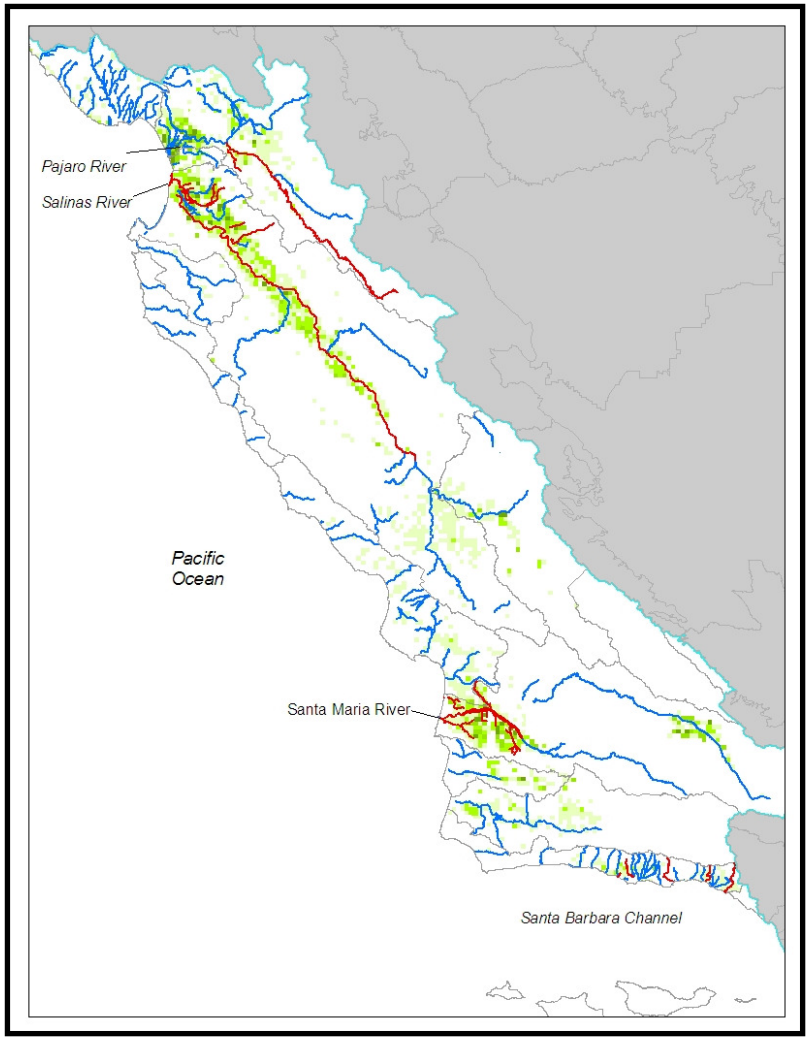
Region 3 Proposed 2010 Toxicity Listings



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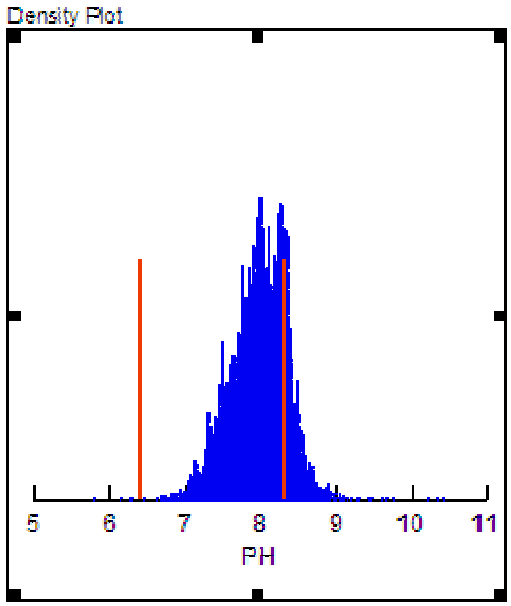
Inform Basin Plan Amendments

- **Basin Plan pH objectives to protect Aquatic Life are 7.0 - 8.5. Recreation, agriculture, and domestic supply objectives are 6.5 - 8.3**
- **Objectives are low given Central Coast geology**
- **CCAMP pH data 1998-2007**
  - 10,499 pH measurements
  - 192 different monitoring sites
  - Mean pH value in R3 is 8.00

Basin Plan Objectives for pH may need revision



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Developing guideline Nitrate criteria for Aquatic Life Protection

- CCAMP Diurnal oxygen data and other parameters used to define reference data pool
- Tetratech Nutrient Numeric Endpoint (2008) approach used to evaluate guideline value
- Guideline value set at 1.0 mg/L as N to protect Aquatic Life beneficial uses
- Other measures of oxygen super-saturation, algal growth, and chlorophyll are secondary indicators of bio-stimulation
- Technical report is currently under external peer review for SWAMP publication

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Other Applications

- TMDL Development and Monitoring
- Monitoring Program Design
- Regulatory Decision Making
- Grants Funding Decision Making
- BMP and Regulatory Action Effectiveness
- Education and Outreach

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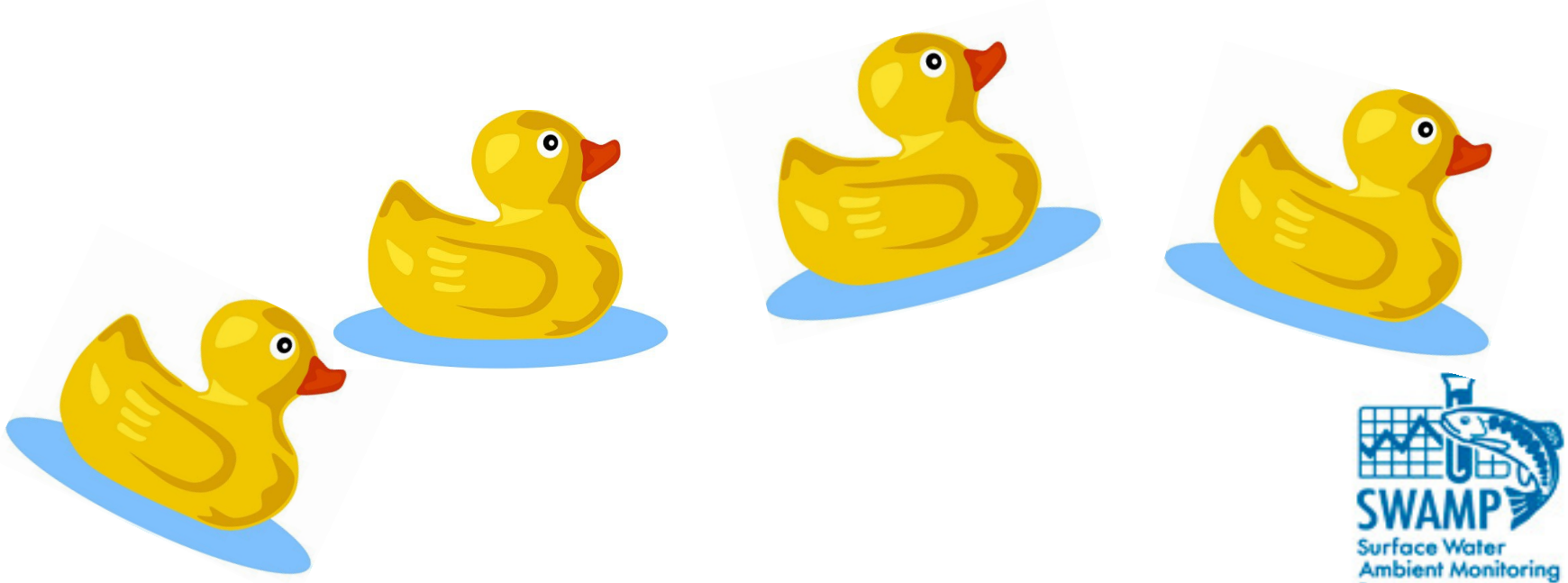
Integrating Data

California Data Upload and Checking System (CalDUCS)

"Getting our data ducks in a row"



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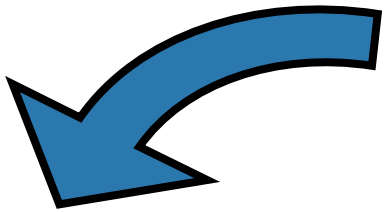
California Data Upload and Checking System (CalDUCS)

- Originated to handle Ag program data
- Additional NPS funding through MBNMS
- Online interactive format checking
- Online Help system
- Prepares files for
  - SWAMP
  - CCAMP 303(d) scanning tools
  - CCAMP web site



http://www.ccamp.org

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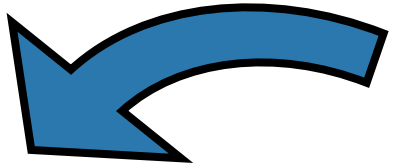
Viewing Data

- CCAMP website has allowed access to our data since 2000
- Recent innovations have greatly improved online data viewing tools
- Improvements are still being made to version you will see today



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Addressing Our Goals

Healthy Aquatic Life

Proper Watershed Function

Clean Groundwater

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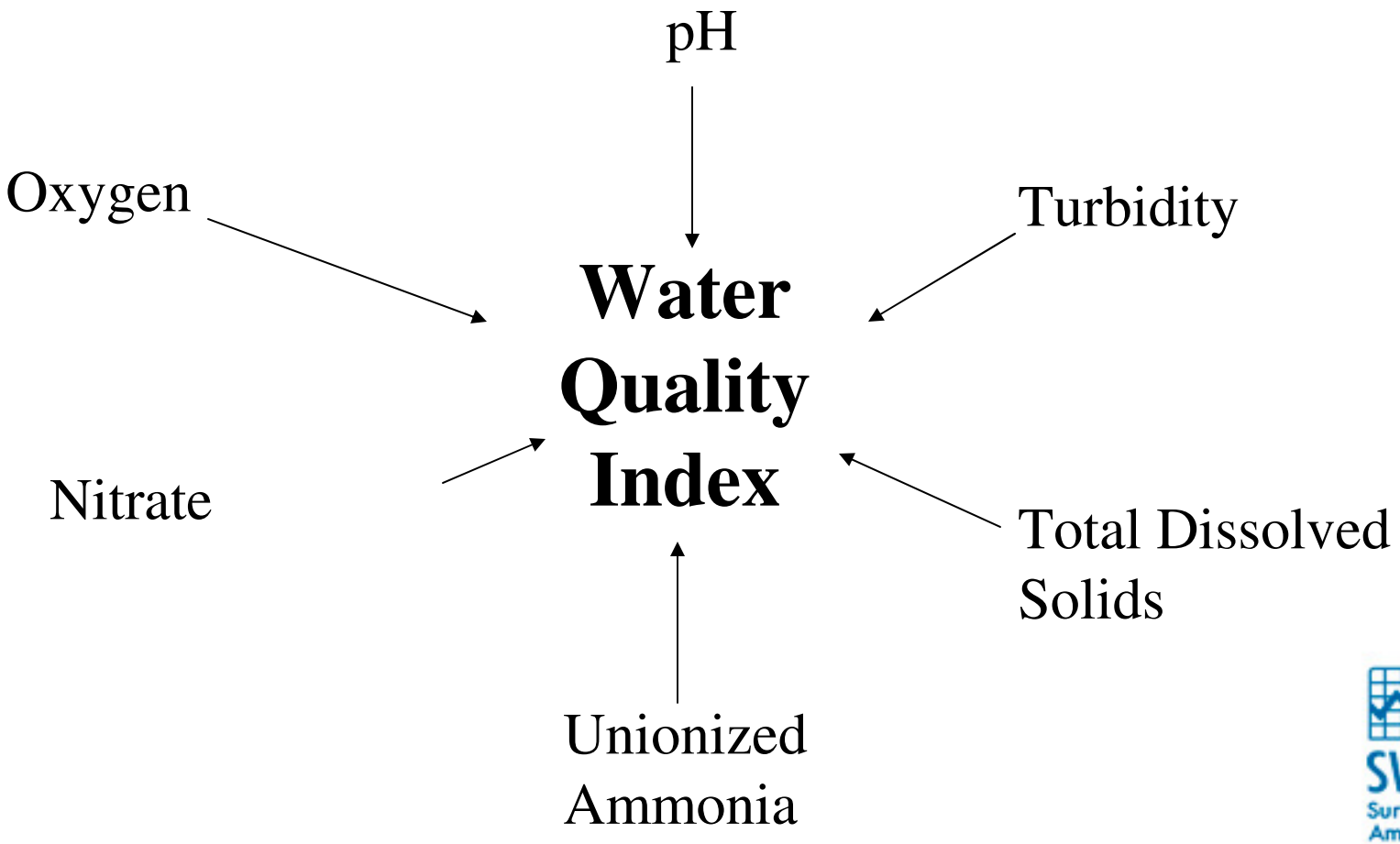
Addressing Our Goals

Combining field and lab measurements into a single index score expressing water quality health



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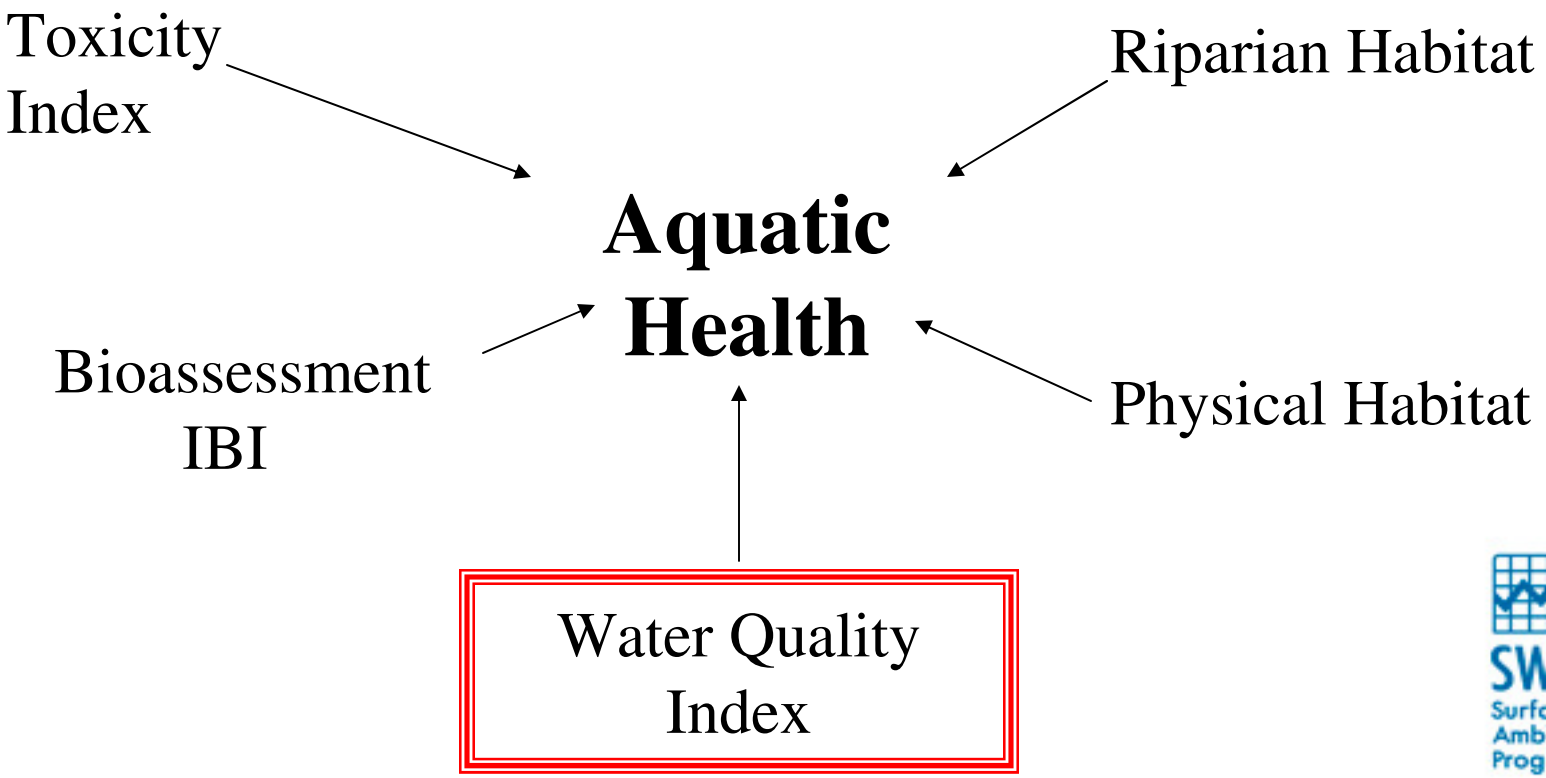
Combining key parameters into a single score expressing health



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rubber duckie clipart

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- **Vision Report Cards**
- CCAMP Data
- Success Stories
- Games
- Vision Wiki
- Vision Data Upload (password required)

- Cal/EPA
- State & Regional Water Boards
- Laws/Regulations
- Plans/Policies
- Programs

Aquatic Health Index 2009

Goals | Places | Time Frame

Healthy Aquatic Habitat By 2025, 80 percent of Aquatic Habitat is healthy, and the remaining 20 percent exhibits positive trends in key parameters.

Aquatic Health Index 

Aquatic Health Index Components

Toxicity		more...
Biostimulatory Risk		more...
Benthic Invertebrates		more...
Riparian Condition		more...
Pathogens		more...
Impaired Waters		more...

This page is currently just a placeholder
Select Goals-Groundwater and then nitrate to see the most recently added data.

Internet | 100%

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Central Coast Regional Water Quality Control Board - Windows Internet Explorer

http://www.ccamp.us/Vision/Central_Coast_Vision.html

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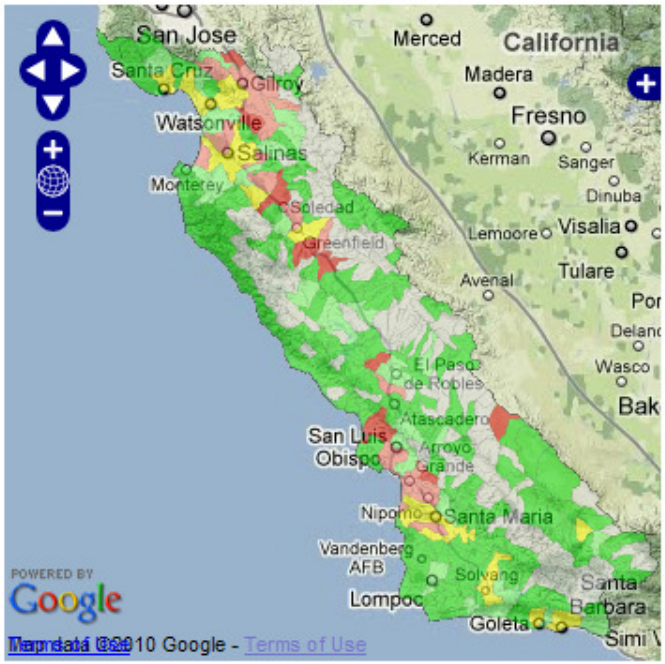
Groundwater Index 2009



Goals | Places | Time Frame

Clean Groundwater – By 2025, 80 percent of groundwater will be clean, and the remaining 20 percent will exhibit positive trends in key parameters.

Groundwater Heath Index

Groundwater Health Index Components

- Nitrate
- Salts
- Other Contaminants
- Cleanup Metrics?

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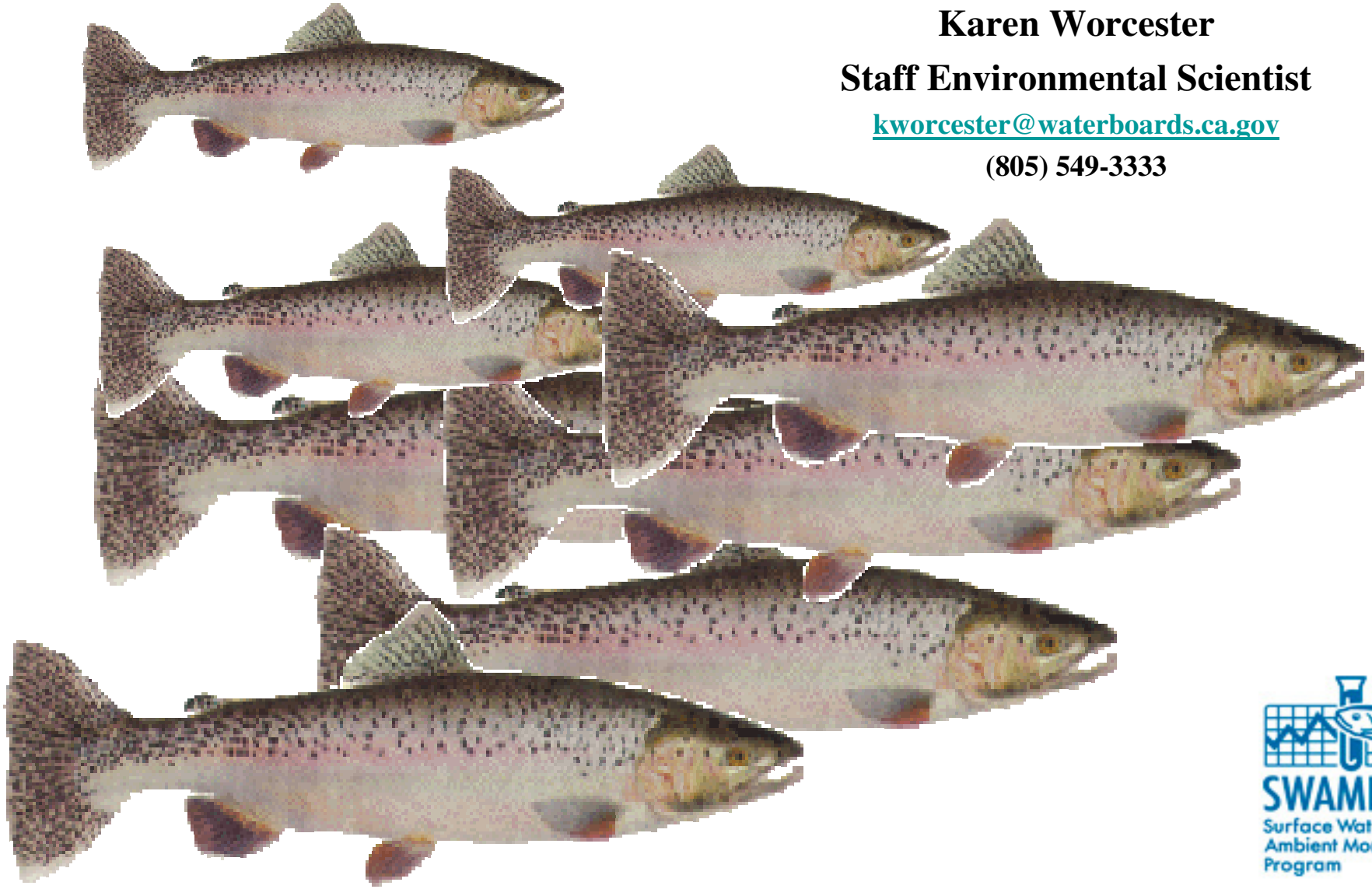
Thanks!

Karen Worcester

Staff Environmental Scientist

kworcester@waterboards.ca.gov

(805) 549-3333



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Lines of Evidence

Region	**3**
Waterbody Segment	**Salinas Reclamation Canal**
Pollutant	**Ammonia as N, Unionized**
Matrix	**Water**
Beneficial use(s)	**Region 3 Aquatic Life**
Water Quality Objective/Criteria	**Central Coast Waterboard Basin Plan General Objective, Chapter III, Section II.A.2 General Objectives for Inland Surface Waters, Enclosed Bays, Estuaries.**
Evaluation Guideline	**Basin Plan General Objective (page III-4) states that the discharge of wastes shall not cause concentrations of unionized ammonia (NH3) to exceed 0.025 mg/l (as N) in receiving waters.**
Sample Count	**25**
Exceedance Count	**7**
Data References	**Data for this assessment unit was collected by one monitoring project: CCAMP (Salinas)**
Spatial Representation	**Data for this line of evidence for Salinas Reclamation Canal was collected at 2 monitoring sites [309ALD-Salinas Reclamation Canal at Boranda Road, 309ALU-Salinas Reclamation Canal at Airport Road]**
Temporal Representation	**Data was collected over the time period 11/30/1999-12/12/2006**
Water Body Specific Information	**Staff is not aware of any special conditions that might effect interpretation of the data.**
Data Quality Assessment	**Excellent**
QAPP Information	**All data was collected following the Standard Operating Procedures and Data Quality Objectives outlined in the SWAMP QAMP, (Puckett, 2002).**

SWAMP
Surface Water Ambient Monitoring Program