MBNMS
Sanctuary Advisory Council
Water Quality Update

Friday, October 23, 2015

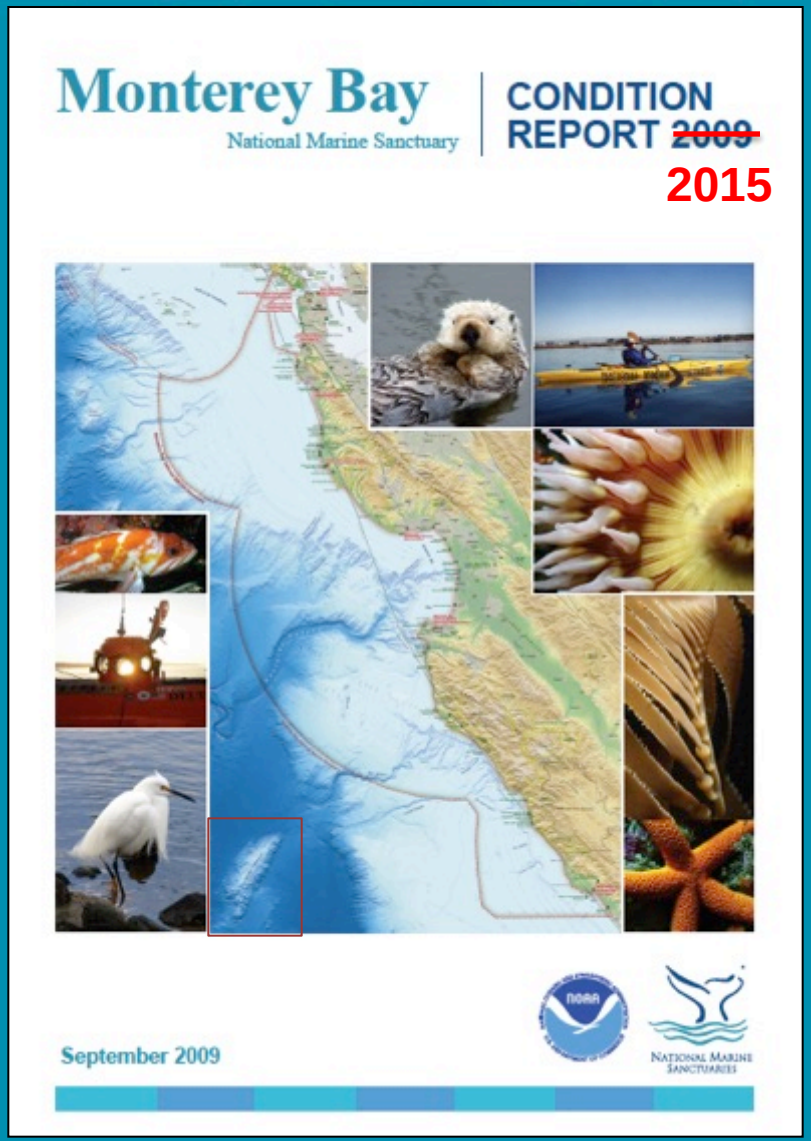
Bridget Hoover

Director, Water Quality Protection Program

Presentation Overview

- Summary of 2015 Condition Report WQ findings
- Summary of Multi-year Snapshot Day Report
- Summary of 2014 Areas of Special Biological Significance (ASBS) results

Updating MBNMS Condition Report

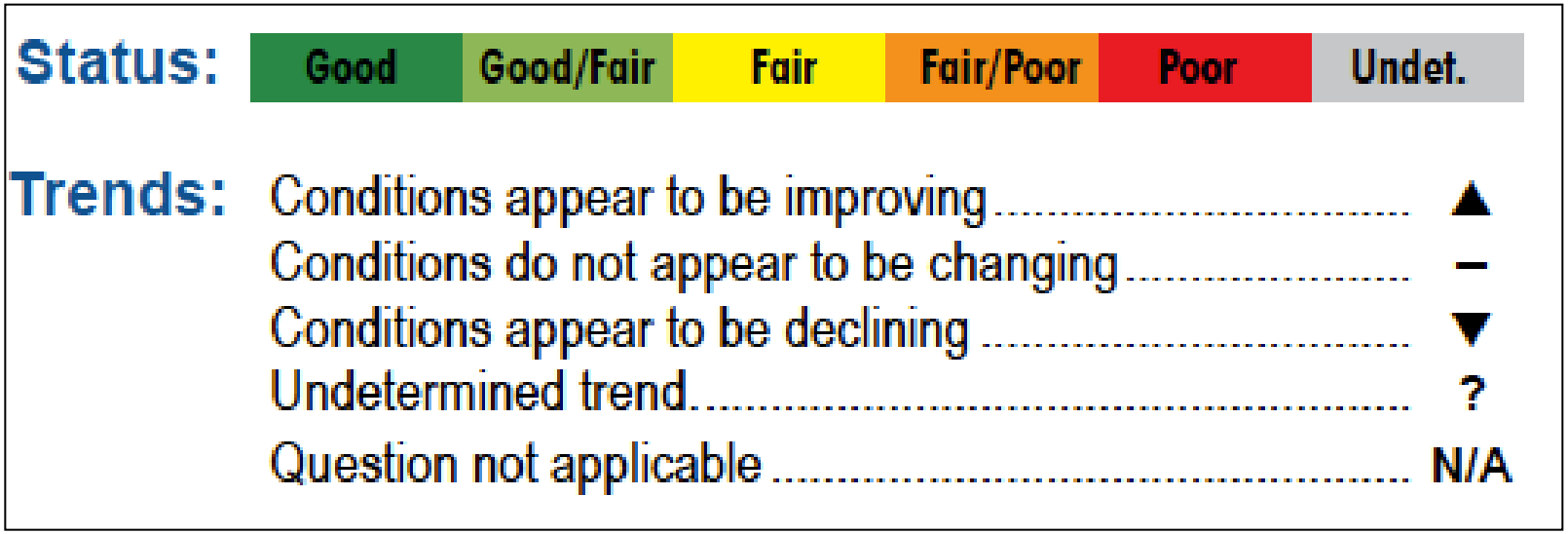


2015 Condition Report Addendum:

- **updates our understanding of the health of the sanctuary**
- **uses new information that has become available since 2009**
- **evaluates health of the seamount environment for the first time**
- **incorporates new information, expert judgment, and review from 50+ regional scientists and partner agencies staff**

2015 Update to Status and Trend Ratings

Each standard question is answered using a "status & trends" reporting system.



Status Rating:

Does new information indicate that the status has changed since 2009?

Recent Trend: The trend since last condition report (~ 2009).

Does new information indicate that the trend is different from the 2009 report?

Water Quality

#	Questions/Resources	Estuarine Rating	Nearshore Rating	Offshore Rating	Seamount Rating
WATER					
1	Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality?	▼	▼	▼	?
2	What is the eutrophic condition of sanctuary waters and how is it changing?	▼	▼	▼	?
3	Do sanctuary waters pose risks to human health?	?	?	?	?
4	What are the levels of human activities that may influence water quality and how are they changing?	▲	▲	▲	?

Elkhorn Slough and Nearshore: continued inputs of nutrients and contaminants are impacting water quality

- Nutrient enrichment causing problems in some areas (e.g., hypoxia, algal mats, new and increasing HABs)
- Lower risk to human health due to improved beach water quality (due to improved sewer infrastructure)
- Improvements in water quality expected from restoration projects, changes in land management, and other management efforts to change human activities.

Offshore: changes in oceanographic conditions observed recently, but unknown if there will be long-term impacts or just short-term anomalies. Concerns about debris, contaminants and global climate change, but need more information on impacts of these stressors.

Seamount: Little water quality data collected in DSMZ. Need more information.

NEW INFORMATION
Water Quality and Human Health

- Improvements to sewer infrastructure has resulted in **improved water quality at some beaches** and has reduced risk to human health.
- **Pollutants** in some types of seafood (e.g., mussels, fishes) is still a concern in nearshore and Elkhorn Slough.
- Toxins from **Harmful Algal Blooms (HABs)** in shellfish and finfish is a health concern for humans and a cause marine mammal and seabird stranding.

- Improvements in water quality expected from restoration projects, changes in land management, and other management efforts to change human activities.

Habitat

#	Questions/Resources	Estuarine Rating	Nearshore Rating	Offshore Rating	Seamount Rating
HABITAT					
5	What is the abundance and distribution of major habitat types and how is it changing?	—	▼	▲	—
6	What is the condition of biologically-structured habitats and how is it changing?	▲	—	?	?
7	What are the contaminant concentrations in sanctuary habitats and how are they changing?	▼	▼	▼	?
8	What are the levels of human activities that may influence habitat quality and how are they changing?	▲	?	▲	?

Elkhorn Slough:

- Contaminants entering watershed from agriculture; high DDT detected in sea otters, and POPs in fishes
- Restoration projects and changes in land management are expected to result in improvements in habitat

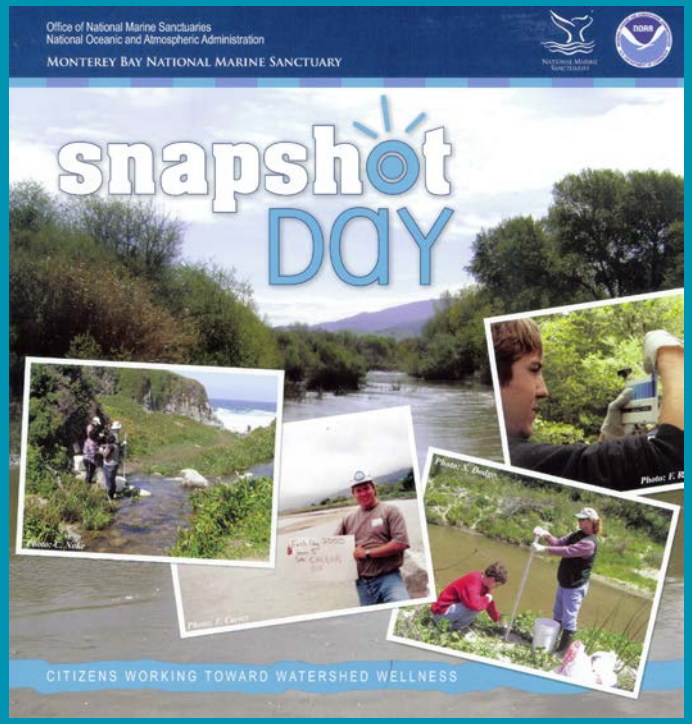
Nearshore:

- Localized modification/loss of coastal habitat from erosion, armoring, shoreline visitation, and accumulation of marine debris and contaminants (both legacy and current use).
- Some mitigating activities (cleanups, BMPs) but unclear how well that offsets impacts

Offshore:

- Modification/loss of benthic habitat from trawling (historic and current) and accumulation of marine debris and contaminants. More study of recovery after trawling needed to better assess status and trends since cessation/reduction of this activity.

Snapshot Day Report

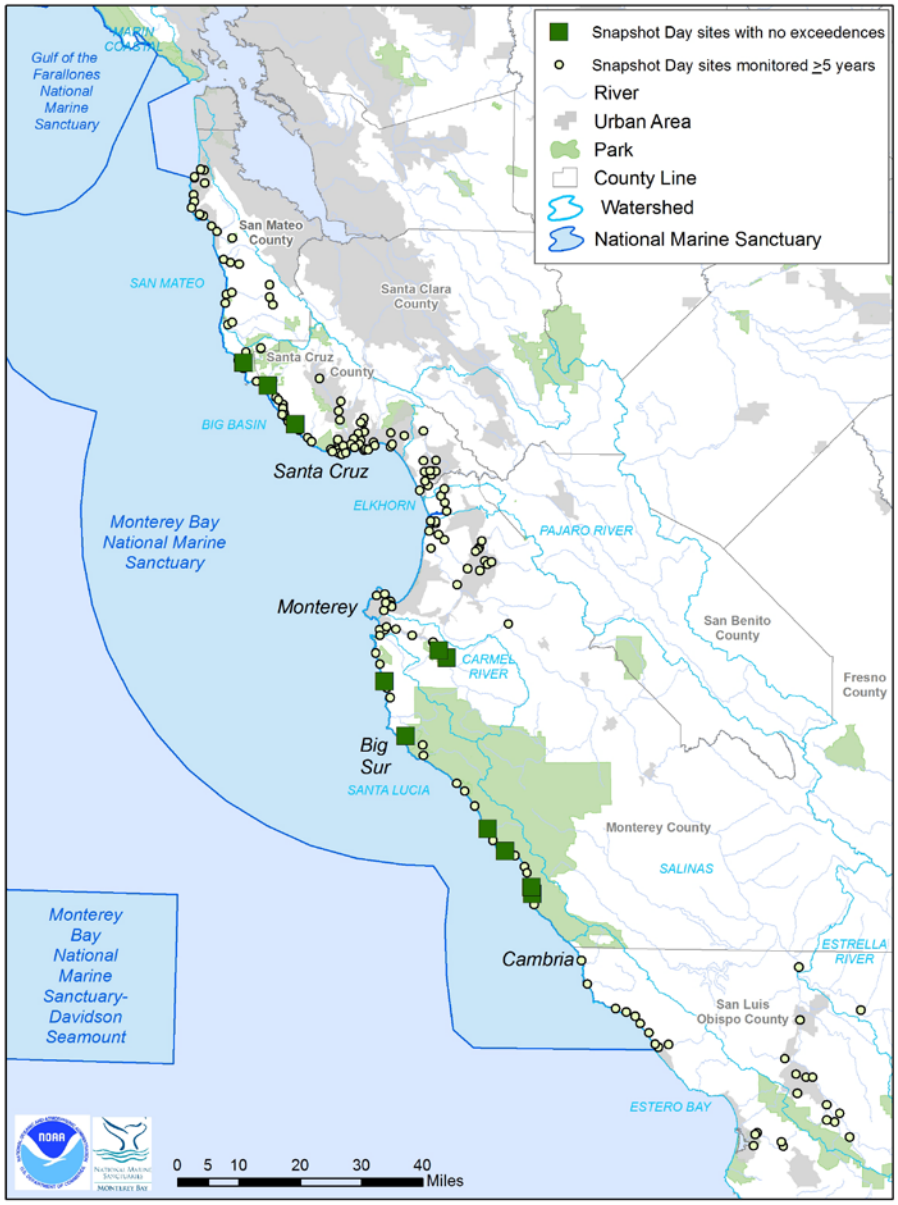


Questions:

1. Can Snapshot data determine trends in pollutant concentrations?
2. Are samples collected annually representative of those collected by professionals throughout the year?
3. Are central coast streams providing suitable living conditions for cold water fish and aquatic life?

- The annual number of sites ranges from 122 - 192
- Snapshot Day averages 198 volunteers each year
- Snapshot Day volunteers have donated over 13,000 hours of their time, equivalent to $243,084

http://montereybay.noaa.gov/monitoringnetwork/pdf/ss_multi00-13.pdf

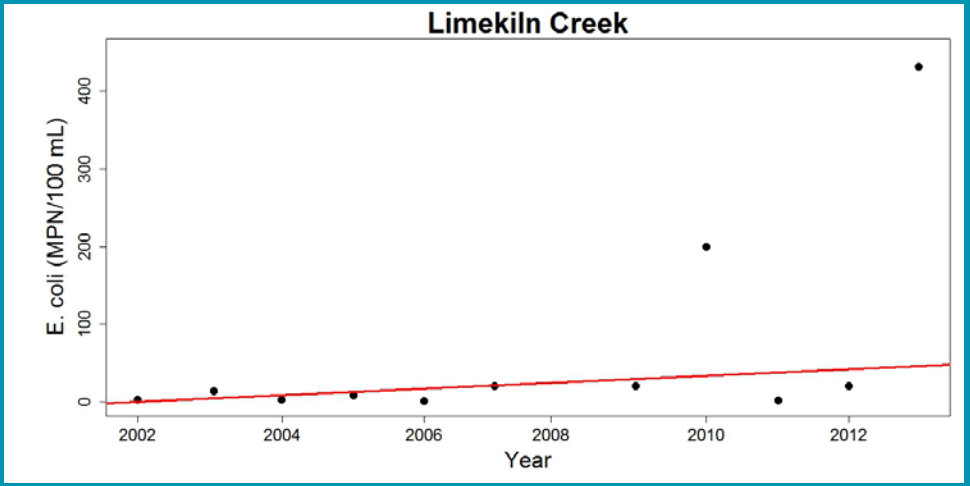


Snapshot Day sites with no exceedances

Can Snapshot data determine trends in pollutant concentrations?

YES (sites more than 5 yrs of data and p-value of .05)

- Trends calculated for *E.coli*, Nitrate and Orthophosphate
  - Nitrate – 1 increasing, 1 decreasing
  - Orthophosphate – 11 decreasing trends
  - *E.coli* –
    6 increasing,
    1 decreasing

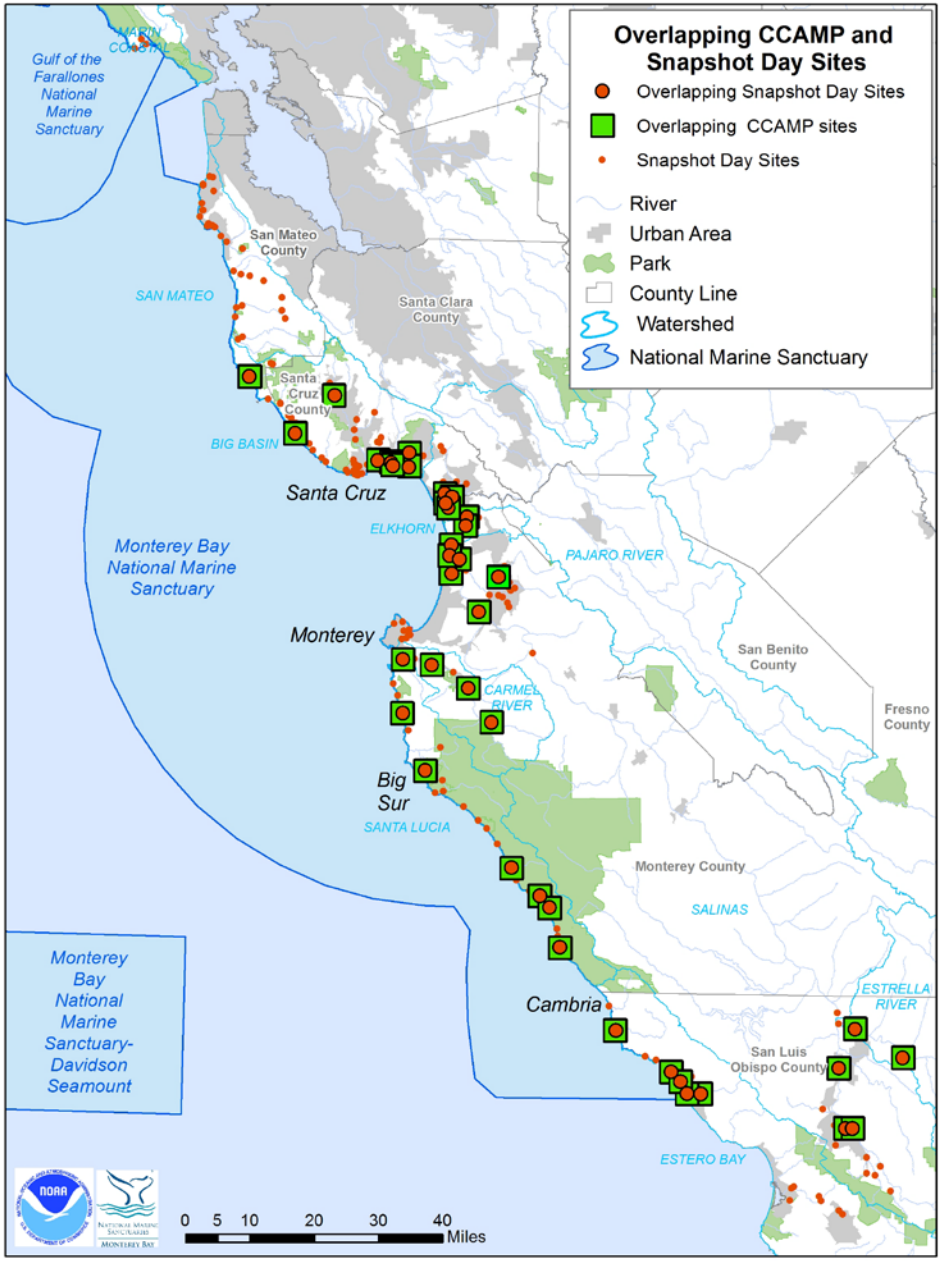


Are samples collected annually representative of those collected by professionals throughout the year?

Yes

- 40 overlapping sites with CCAMP
  - SSD sites monitored < 5 yrs or not rated by CCAMP were not included

	Nitrate-N		Orthophosphate-P		*E. coli*	
CCAMP Rating	Number of Overlapping Sites	Snapshot Day Percent Years Exceeded WQO	Number of Overlapping Sites	Snapshot Day Percent Years Exceeded WQO	Number of Overlapping Sites	Snapshot Day Percent Years Exceeded WQO
Excellent	19	0-13%	10	0-10%	12	0-44%
Good	7	0-14%	6	0%	9	0-50%
Fair	3	0-8%	6	0-36%	7	8-43%
Impacted	2	11-93%	5	0-46%	5	50-80%
Severely Impacted	6	85-100%	7	33-93%	2	71-100%



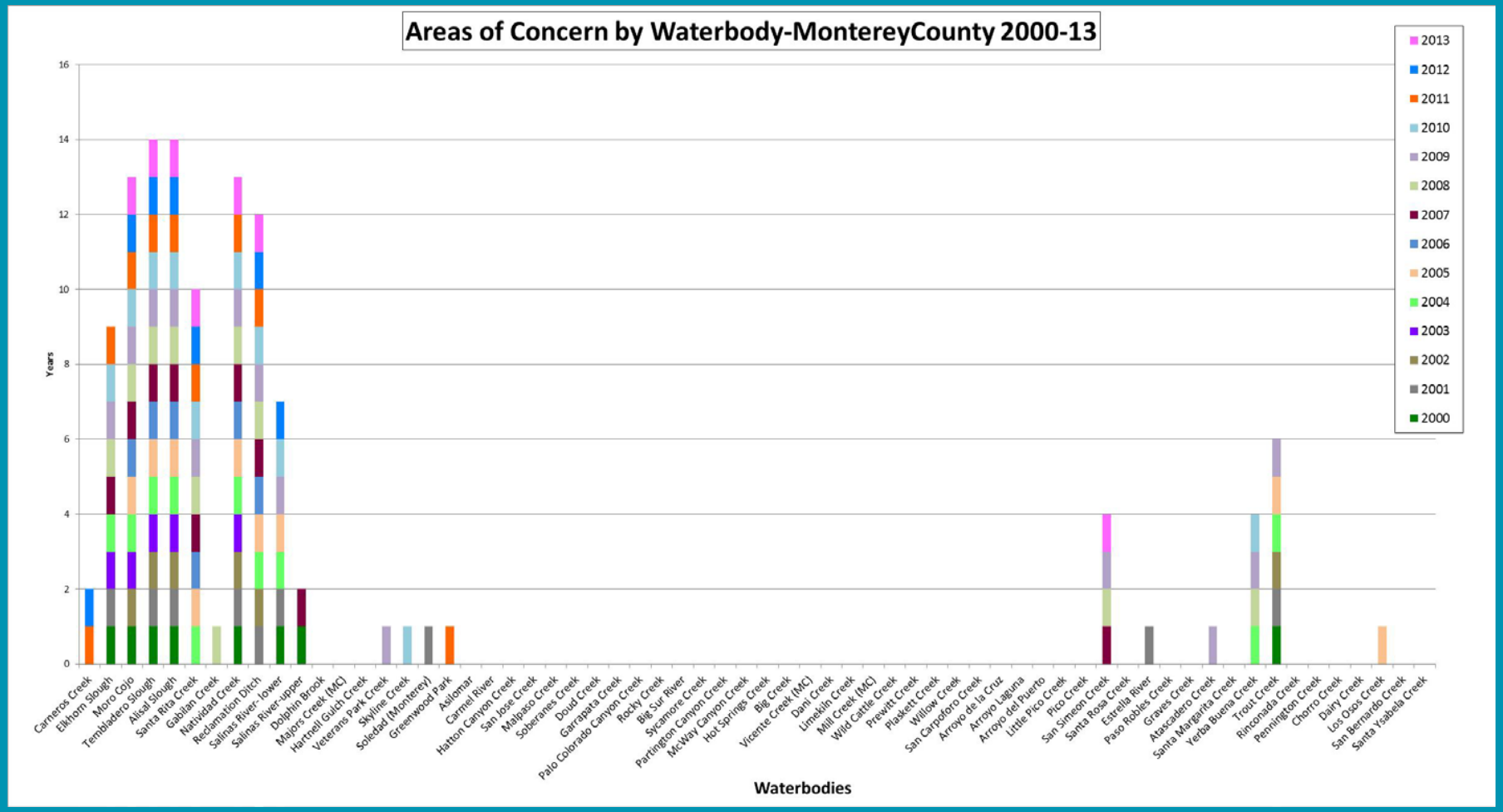
Overlapping Snapshot Day sites with CCAMP sites

Are central coast streams providing suitable living conditions for cold water fish and aquatic life?

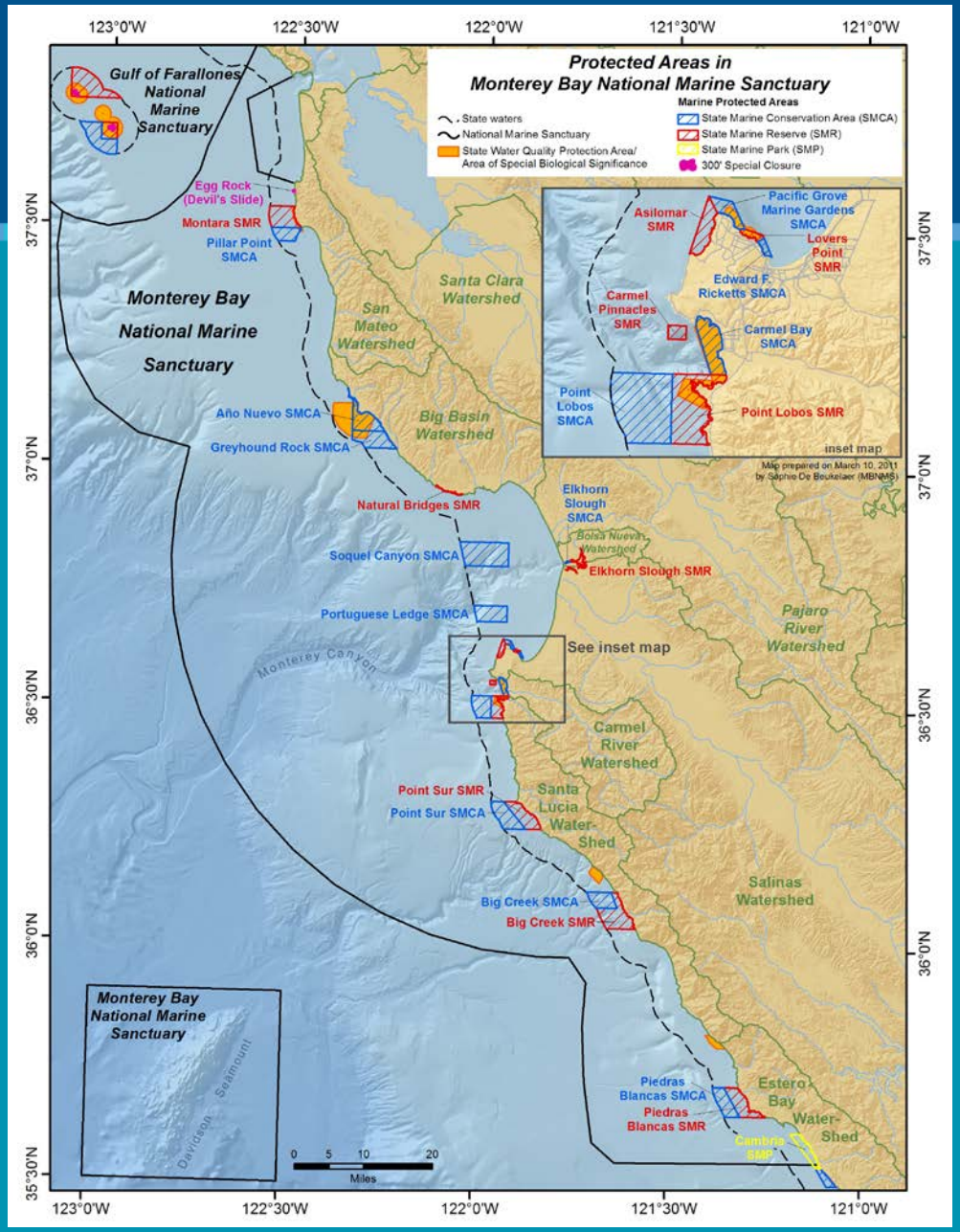
Yes

- 11 waterbodies never exceeded a WQO
  - Big Sur at A. Molera, Big Cr., Dani Cr., Plaskett Cr. and Prewitt Cr.
- Of 130 waterbodies monitored, 85 were never listed as an Area of Concern.
- San Simeon Cr listed as Area of Concern 2007, 2008, 2009, 2013.

Areas of Concern



Areas of Special Biological Significance

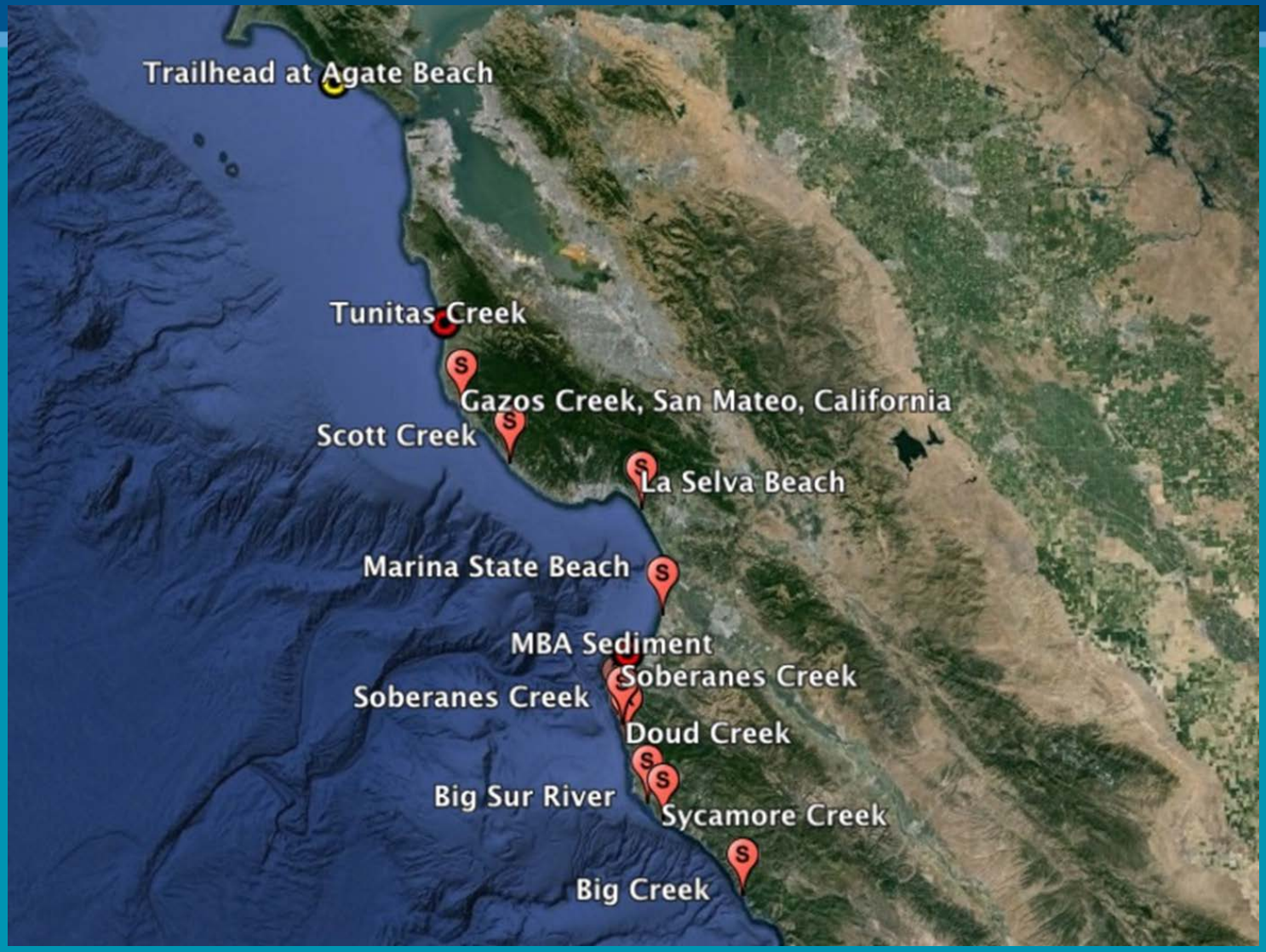


Interim Report Summary

ASBS Reference Sites

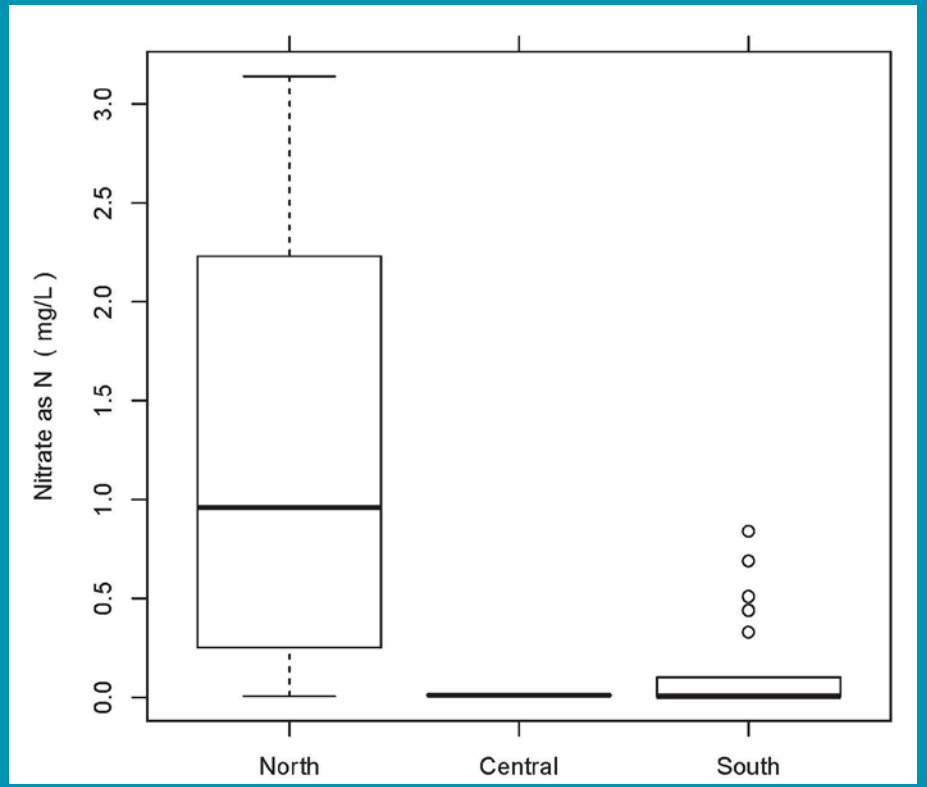
- 28 sites on CA coast; divided north, central and south coasts
  - open beach with breaking waves
  - must have drainage from a watershed that produces flowing surface waters during storm events;
  - reference watershed should be similar in size to the watersheds that discharge to ASBS;
  - watershed must be comprised of primarily (>90%) open space;
  - cannot be on the State's 2006 list of impaired waterbodies (e.g., § 303d list).
- Minimum of 6 rain events, pre and post storm
- CC added 2 background sites within Monterey Bay

ASBS Reference Sites



Reference Site Results

- All 28 reference sites appeared to have little to no human influence.
- On average, little difference between pre and post storm samples.
- No site had detected and quantifiable concentrations of synthetic pesticides.
- No reference site exhibited toxicity to any of the three test species: mussel, purple sea urchin, giant kelp.



ASBS Monitoring Design

- 1 storm per year at all outfalls ≥ 18”
- 3 storms per year at outfalls ≥ 36” (11=1 per discharger)
  - Pre-storm receiving water
  - Storm receiving water
- Reference site receiving water
- Annual bioaccumulation (CCLEAN sites plus Pt Reyes)

ASBS Year 1 Results (2013-2014)

- Trace Metals
  - Highest concentrations in north (pre and post storms)
  - Greatest increase in storm samples
    - Copper, mercury, lead and zinc
- Broad detection of PAHs in storm samples but not pre-storm
- No pesticides detected in any mussel samples
- Bioaccumulation
  - Pharmaceuticals detected from vet and livestock sources (5 of 7 sites)
  - Caffeine detected at 3 No MB sites
  - PCBs higher at Pt Reyes than any other site

ASBS Year 1 Results (2013-2014)

- Toxicity
  - 6 failures in discharge samples (urchin)
  - 4 failures in receiving water (urchin)
  - 1 failure in receiving water (mussel embryo)
  - 1 failure in receiving water (kelp germination)
  - 3 failures at reference sites (kelp germination)
  - 1 failure at reference site (kelp growth)
- Nutrients
  - No difference for NO_3 and PO_4 in pre and post storm samples
  - Urea (2 – 10 fold) and Ammonia (2-3 fold) were much higher in storm samples

Questions?

Bridget.Hoover@noaa.gov

(831) 647-4217