

# ***Southern California Coastal Ocean Observing System (SCCOOS)***

## **Strategic Advisory Committee Meeting**

February 24, 2009

The Ocean Institute, Dana Point, CA

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### **Water Quality Efforts and Harmful Algal Blooms (HABs) NOTES**

The SCCOOS team has focused to date on developing on-line access to water quality (WQ) and harmful algal bloom (HAB) relevant ocean data including water quality sampling results, surface currents, surfzone currents, rainfall predictions, satellite remote sensing images, and meteorological observations as well as responding to requests for specialized plume trajectories for discrete events. As these observations become accessible, an outreach/training effort will be developed as needed to make users aware of the data availability and accessibility. These topics were reviewed by the WQ and HAB focus group.

This focus group discussed multiple avenues by which SCCOOS could address Water Quality and HABs issues in the Southern California Bight. A number of major focus areas were discussed including two areas not previously addressed by SCCOOS:

- 1) In discussions with Chris Crompton, the issue was raised about SCCOOS possibly moving further inland to meet the primary needs of stormwater agencies (among others). Offshore oceanographic information was recognized as helpful, but stormwater agencies have more immediate management issues in the bays and harbors that could be better supported through SCCOOS developing a comprehensive network of enhanced gauging stations on all major tributaries. Such a move by SCCOOS would require extensive discussion since this would be a significant departure from current SCCOOS observing activities which focus on the coastal ocean. Another possible SCCOOS contribution could be working with such groups as the Southern California Stormwater Monitoring Coalition and Clean Beaches Task Force in developing online databases to disseminate watershed data that are currently being collected.
- 2) It became clear during the discussions that SCCOOS needs to add biological and chemical sensors to its arsenal. Some of these are currently available and new sensors are being developed. Examples include river or pier-based sensors for chemistry (such as optical PAH sensors) and biology (such as microbial indicators measured through continuous flow qPCR); these would enhance the value of SCCOOS information immensely. Clearly physical oceanographic data are an important foundation, but water quality managers focus on biological and chemical endpoints and new sensor technologies could provide valuable data for informing their management decisions.

In addition to discussion of these new focus areas, other discussions of the group focused on three important user groups of SCCOOS data currently being collected: Stormwater National Pollutant Discharge Elimination System (NPDES) permit holders, Ocean Outfall dischargers, and State Regulators. There was some discussion on National Estuarine Research Reserve (NERR) user needs as well as HAB monitoring efforts. A recommendation was made that

SCCOOS should partner with local agencies to determine where best the observing system can provide products and sensor technologies in the most effective/complementary manner. It's important to note that many of the same basic water quality parameters such as ocean temperature, salinity, oxygen, pH, turbidity, nutrients, etc. can be used for multiple end users increasing the applicability and impact of measurements. The overall areas where participants felt SCCOOS would be most effective were:

- Trajectory based plume mapping (hindcast, nowcast, and forecast)
  - Near real-time trajectories at known areas of interest such as discharge locations, river outlets, and estuaries
  - On demand trajectories for event based monitoring such as sewage leaks, HAB locations, and spill response
- Documenting outfall discharge characteristics
  - Glider technology for longer time scales
  - Autonomous underwater vehicle (AUV) technology for shorter time scales
  - Modeling for forecasts
  - Integrate outfall acquired data (e.g., flows) as a model input source for virtual moorings
- Integrated demonstration for areas of impact
  - Tijuana River (already in place)
  - Santa Ana River
- Sensor technology
  - Near real-time sensors that provide end-to-end solution including: data acquisition, distribution, archiving, and retrieval. Work with agencies to introduce sensors and network; the agency will then pick up maintenance.
  - Example: MESONET - <http://www.mesonet.org>
- HABs support
  - Continuation of pier monitoring for near real-time measurements
  - Glider and AUV technology for mapping blooms

**Stormwater National Pollutant Discharge Elimination System (NPDES) permit holders:**

Permit holders know a lot about watershed impact, but have not focused on open ocean impact. This is an area where SCCOOS participants could work with permit holders. Particular beach segments need focused studies because there are contaminants from the watershed, but little information on fate, transport and effects of those contaminants. There are few real-time, continuous sensors monitoring river flows, only periodic bottle sampling (sometimes automated). Permit holders could be interested in sensor technologies that take continuous measurements of rain fall, water level, temperature, pH, dissolved oxygen, and nutrients. Look at integrating current data streams as well such as network of rain gauges and stream gauges.

**Ocean Outfall dischargers:** Discharges need to monitor their plume and model the ocean area of impact. There is a need for the following: on demand trajectories, glider/AUV mapping technologies, full water column monitoring, and modeling for hindcasts in order to “match” with other data such as sediment chemistry, benthos, and fish and forecasts for predicting potential impacts based on changing treatment/disposal scenarios.

**National Estuarine Research Reserve (NERR):** Estuaries have a monitoring need to determine nutrient loading, oxygen stress, ocean flushing, and circulation. Depleted oxygen when the mouth closes has severe impact on estuarine habitats. When this occurs, a significant amount of money is spent on opening the mouth. Monitoring requirements include temperature, salinity, turbidity, dissolved oxygen, pH, and nutrients.

**HAB Research:** SCCOOS is working on an integrated HABs web portal that could be shared by West Coast Regional Associations. There is a need for buoys that will pick up blooms in near real-time (HAB and bacteria). Monterey Bay Aquarium Research Institute (MBARI) has a sensor in development, although very expensive and high maintenance.

**State Water Resources Control Board:** Agreed with the need to better understand the fate and transport of both surface and subsurface plumes. The state needs to know where the plumes are and where they are going—an issue often asked of them by the public. Also need information for siting and monitoring of coastal desalination plants.

**Possible future efforts that had been put forth:**

1. Embed nearfield effluent plume models within the ROMS models and predict height of rise, and far-field (>200m) dispersion of the plumes. This topic was discussed during a meeting on numerical modeling efforts within SCCOOS held at USC on 23 January 2009.
  - a. Clients: Environmental Protection Agency (EPA), Regional Water Quality Control Boards, and dischargers.
2. Run plume tracking models for river discharges and other surface plumes. Currently this model is run for the Tijuana River discharge.
3. Conduct co-operative field surveys of discharge plumes with local agencies using various observational approaches including gliders, AUVs, thermistor-moorings, high frequency radars, and drifters. This work will provide observations of plume dispersion for calibrating and validating ROMS and other models such as discussed point 1 above.
4. Conduct Bight 08 experiment to examine nutrient budget in San Pedro Bay as affected by natural and anthropogenic inputs (project approved, funding pending) and phytoplankton bloom development (HABs).
5. Establish climatological background for regional water quality data sets.
  - a. A collaborative effort with the working group focusing on Climate Impacts on Marine Ecosystems Clients include dischargers, EPA, SWRCB, RWQCBs, among others.
  - b. Developing a climatology for the SCB would help (1) better establish discharge compliance with Code of Practice (COP) criteria (e.g. natural light, pH, and dissolved oxygen) and/or (2) update existing or develop new COP receiving water compliance criteria.
  - c. It would also help determine future restoration efforts by evaluating whether or not they might work.
  - d. This product should prove useful in understanding coastal issues related to climate change; there already a tentative effort to look at historical Publicly Owned Treatment Works (POTW) water quality data for evidence of such change.