
**Annual Report
Natural Water Quality Committee
2006-2007**

December 14, 2007

SUMMARY

In response to the regulatory concerns about areas of Special Biological Significance (ASBS), the State Water Resources Control Board (SWRCB) has empanelled eight experts from different scientific disciplines to help determine a functional definition of “natural water quality.” It is the actions of this Natural Water Quality Committee (NWQC) that are the focus of this report.

The NWQC has a three-year mission to advise SWRCB staff regarding impacts of Scripps’ Institution of Oceanography (SIO) discharges into its adjoining ASBS. While the committee focused on SIO and other relevant data in the SIO vicinity, they also recognized the importance of their work in the context of the greater ASBS, Ocean Plan, and stormwater issues. In response, the NWQC agreed that their recommendations may provide guidance for assessing impacts to water quality in any ASBS in the State. To that end, the NWQC is addressing three primary questions:

- 1) Are water quality objectives and permit limits being met?
- 2) What are impacts of waste discharges to marine species and communities?
- 3) What would ambient marine water quality be like without waste discharges?

The NWQC has met six times between December 2006 and September 2007 addressing the monitoring and conditions specific to the SIO NPDES permit (the first question). Both effluent and receiving waters had been sampled by SIO and some general conclusions have been drawn:

- waste seawater system effluent measurements had identified some constituents of concern (i.e., outside of permit limits), but wet weather runoff generally had more constituents above Ocean Plan standards than the waste seawater system;
- receiving water in the ASBS was elevated above water quality objective limits on at least one occasion for chronic toxicity (kelp) and/or dioxin, but dioxin is ubiquitous and may not be the result of the SIO discharges;
- water quality measurements also revealed some technical shortcomings of EPA approved test methods in the seawater matrix (i.e., total residual chlorine);
- most other constituents were not detected in the effluent, or were present at concentrations that represented no reasonable potential (RP) to cause impacts based on RP analysis using SWRCB developed software.
- bioaccumulation in mussels from receiving waters indicated that organic constituents were rarely found and small changes in tissue concentrations of selected trace metals were observed;
- indicator bacteria levels in SIO discharges and adjoining ASBS receiving waters were routinely low and were rarely outside water quality acceptance limits.

Over the next two years, the NWQC will be helping SWRCB staff develop monitoring programs to address questions 2 and 3. These questions are difficult and must be addressed over greater spatial scales in order to develop a functional definition of natural water quality and to assess the status of ASBS. In order to implement these programs efficiently, the NWQC has recommended integration with regional-scale monitoring programs in southern and central California.

ANNUAL REPORT

The coastal environment of California is an important ecological and economic resource. It is home to diverse and abundant marine life and has some of the richest habitats on earth including forests of the giant kelp, *Macrocystis pyrifera*. The State Water Resources Control Board (SWRCB) has created 34 Areas of Biological Significance (ASBS) in order to preserve and protect these especially valuable biological communities.

California's coasts are also a repository for waste discharges from the State's ever-increasing population. Treated municipal and industrial wastewaters, urban runoff, and power generating station discharges all represent a number of risks to aquatic life from human activities. As a result, the SWRCB, in the California Ocean Plan, has prohibited the discharge of waste to ASBS. All ASBS are State Water Quality Protection Areas that require special protection under state law.

Despite the prohibition against waste discharges to ASBS, a recent survey of ASBS has observed approximately 1,658 outfalls (SCCWRP 2003). As a result, the SWRCB has initiated regulatory actions, establishing special protections through the Ocean Plan's exception process. The intent of these regulatory actions is to achieve natural water quality of the ocean receiving water in the ASBS.

One of the first regulatory actions was taken in San Diego at the ASBS adjacent to the Scripps Institution of Oceanography (SIO). The SIO, who owns and maintains the discharge outfalls to the La Jolla ASBS, was issued an Ocean Plan exception and a National Pollutant Discharge Elimination System (NPDES) Permit. As part of this regulatory action, SWRCB staff was asked to create a panel of experts from different scientific disciplines to help develop a functional definition of "natural water quality." It is the actions of the Natural Water Quality Committee (NWQC) that are the focus of this report.

The NWQC includes eight members (Table 1). The NWQC has the mission to evaluate the SIO monitoring data, and to advise the Regional Board regarding impacts of SIO's discharges to ASBS. While the committee focused on SIO and other relevant La Jolla data, they also recognized the importance of their work in the context of the greater ASBS, Ocean Plan, and stormwater issues. In response, the NWQC agreed that their work may provide guidance for assessing impacts to water quality in any ASBS in the State. To that end, the NWQC is addressing three primary questions:

- 1) Are water quality objectives and permit limits being met?
- 2) What are impacts of waste discharges to marine species and communities?
- 3) What would ambient marine water quality be like without waste discharges?

The NWQC has created a 3-year timeline to achieve milestones that help to answer these three questions. The first question, which is focused almost entirely on SIO permit and site specific issues, were addressed in the first year. The second question, which has both site specific and regional spatial scale issues, will be addressed in the second year. The

increase in spatial scale is necessary because biological impacts at the SIO ASBS can only be interpreted in response to species and communities outside of the SIO ASBS. The third question, which is almost entirely exclusive of the SIO ASBS, will be addressed in the third year. The increase in spatial scale for question three is a reflection of the need to select appropriate regional or statewide reference conditions, which by definition excludes areas with discharges.

The NWQC has met six times between December 2006 and September 2007 addressing the monitoring and conditions specific to the SIO NPDES permit (the first question). Both effluent and receiving waters had been sampled by SIO and some general conclusions have been drawn:

- 1) waste seawater system effluent measurements during dry weather had identified some constituents of concern (outside of permit limits) such as suspended solids, settleable solids, acute toxicity (topsmelt), chronic toxicity (kelp) and dioxins;
- 2) copper in the waste seawater on occasion has been above background ocean concentrations but within the six month median effluent limits;
- 3) during wet weather, when runoff co-mingled with waste seawater, there were higher pollutant concentrations in the waste seawater discharges;
- 4) runoff generally had more constituents with concentrations greater than those specified in Ocean Plan Tables A and B compared with the dry weather waste seawater discharges. These constituents included copper, turbidity, oil and grease, settleable solids, PAHs, indicator bacteria, chronic toxicity (topsmelt and kelp) and dioxins;
- 5) chromium, lead, and zinc in the runoff were elevated above the Ocean Plan Table B six month median levels on more than one occasion during wet weather;
- 6) receiving water in the ASBS was elevated above water quality objectives on at least one occasion for chronic toxicity (kelp) and/or dioxin during wet and dry weather sampling;
- 7) dioxins appear to be ubiquitous in the environment and are likely not a direct result of SIO activities;
- 8) one sampling period coincided with a red tide event (June 2005) that may have had a confounding or synergistic effect with regard to the toxicity tests;
- 9) water quality measurements also revealed some technical shortcomings of EPA approved test methods, such as elevated total residual chlorine measurements in seawater matrix, and acute toxicity interpretations when control variability is extremely small; and
- 10) most other Table B constituents were not detected, or were present in small amounts that represented no reasonable potential (RP) to cause impacts based on RP analysis using SWRCB developed software.

Bioaccumulation in receiving waters had also been conducted using both mussels and sand crabs. SIO results indicated that:

- 1) most organic constituents were present at statistically nonsignificant concentrations relative to a reference site during the study period;
- 2) certain pollutant concentrations were elevated in transplanted mussels near the SIO pier (Cr, Ni, Fe, and Mn) and at the south end of the adjoining La Jolla ASBS

- (As) where the City of San Diego storm outfalls are located relative to other sites within the study area;
- 3) Certain pollutant concentrations were elevated in transplanted mussels near the SIO pier (Cr and Ni) relative to historical statewide Mussel Watch results; and
 - 4) large relative variability in tissue concentrations from sand crabs due to age/reproductive status precluded an assessment of spatial scale gradients and an evaluation of potential effects.

A receiving water study for bacterial contamination was conducted by SIO examining more than 10 sites plus outfall discharges at multiple time intervals during dry weather. The results indicated that bacterial concentrations were routinely low and below water quality standards. In general, the NWQC determined that bacterial monitoring was an inappropriate indicator for assessing potential impacts to aquatic life for this ASBS. Given that SIO and the County Health Department routinely monitors this beach for the protection of human health, the NWQC recommended against future non-routine bacterial monitoring and reinvest their effort into other monitoring elements.

Finally, SIO had developed a fate and transport computer model for their discharges into the nearshore coastal zone of the ASBS. The model had been previously calibrated and validated at the mouth of the Santa Margarita River that discharges into the littoral zone near Oceanside. Based on model runs at La Jolla conducted by SIO, results indicated that dilution of SIO discharges could be very large due to turbulent mixing and advection by wave action and longshore currents. The lowest dilution simulated was 7:1. While the model input parameters (i.e., tide, wave height and direction, etc.) were some of the best available, the NWQC was concerned that little model validation at the La Jolla ASBS had been conducted.

Over the next year, the NWQC will be attempting to further develop a functional definition of natural water quality by answering questions 2 and 3. This will include recommendations for a monitoring program. Since answering questions 2 and 3 will require larger spatial scales, integration of SIO's water quality and biological monitoring with existing regional monitoring programs is being planned (Figure 1). This will increase implementation efficiency and will greatly assist ASBS stakeholder participation. Another goal will be to combine regional programs, thereby enabling SWRCB staff to make statewide assessments of ASBS condition. In order to facilitate the regional implementation, the Statewide Surface Water Ambient Monitoring Program (SWAMP) is providing partial resources and expertise for planning, development, and pilot studies for these regional programs.

Table 1. Members of the Natural Water Quality Committee

<u>Members</u>	<u>Affiliation</u>
Jim Allen	Southern California Coastal Water Research Project
Andrew Dickson	Scripps Institution of Oceanography
Rich Gossett	CRG Marine Laboratories
Dominic Gregorio	State Water Resources Control Board
Burt Jones	University of Southern California
Steve Murray	California State University Fullerton
Bruce Posthumus	San Diego Regional Water Quality Control Board
Kenneth Schiff	Southern California Coastal Water Research Project

Figure 2. Timeline of NWQC and related activities.

