Annual Report
Natural Water Quality Committee
2007-2008

April 13, 2009

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?

In its first year, the NWQC centered its efforts on the first question by evaluating results from the SIO monitoring of ASBS discharges.

This report describes the NWQC's activities during its second year. The NWQC met four times between September 2007 and November 2008 and made progress in four main areas including: 1) creating a definition of natural water quality; 2) making presentations to both the SWRCB and the San Diego RWQCB; 3) reviewing the SWRCB's large-scale ASBS monitoring program; and 4) writing a white paper on monitoring recommendations for the SWRCB's Proposition 84 ASBS Task Force. The NWQC provided both a philosophical and pragmatic definition of natural water quality so that SWRCB staff can use the definition to attain environmentally protective benchmarks. Public presentations of the natural water quality definition and conclusions about SIOs discharge monitoring were well-received by both the SWRCB and San Diego RWQCB. The NWQC reviewed the SWRCB's monitoring plans for large-scale monitoring of ASBS water chemistry, subtidal rocky reef biology, and intertidal rocky reef biology. The reviews were encouraging and recommendations were adopted by the first of these monitoring programs, which initiated in southern California during fall 2008. Finally, the monitoring recommendations provided to the Proposition 84 ASBS Task Force have led to the formation of a joint subcommittee that will focus on providing monitoring guidance to stakeholders and the SWRCB.

BACKGROUND

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, which 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.

SUMMARY OF THE FIRST YEAR PROGRESS

The NWQC convened six meetings in the first year and focused mainly on the first question associated with the monitoring and conditions specific to the SIO NPDES permit. The NWQC reached some general conclusions that are detailed in the first year report. For example, the NWQC concluded that runoff discharges from SIO generally had higher concentrations of many constituents than SIO's waste seawater system. While a small number of constituents (i.e., copper, suspended solids, settleable solids) were outside of permit limits, a large number of constituents were well below permit limits with no reasonable potential to violate permit limits. In addition, most organic constituents did not bioaccumulate in mussels transplanted near the SIO pier, but elevated levels of some trace metals were observed. Finally, bacterial concentrations were routinely low and met water quality standards in receiving waters of the ASBS.

SECOND YEAR PROGRESS

The NWQC met four times between September 2007 and November 2008. The NWQC focused their effort in five main areas including: 1) creating a definition of natural water quality; 2) making presentations to both the SWRCB and the San Diego RWQCB; 3) reviewing the SWRCB's large-scale ASBS monitoring program; 4) reviewing a pilot study of ASBS natural water quality; and 5) writing a white paper on monitoring recommendations for the SWRCB's Proposition 84 ASBS Task Force.

Definition of Natural Water Quality

After six months of effort, the NWQC created a written definition of Natural Water Quality (see Attachment A). Natural ocean water quality is that water quality (based on selected physical chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of:

a) man-made constituents (*e.g.,* DDT),
b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial) and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question, and
c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man.

However, recognizing that natural water quality is extremely variable based on non-anthropogenic factors and that finding areas of the ocean (California or elsewhere) that have no human influence, the NWQC provided a practical definition for the SWRCB. *Natural water quality* for an ASBS must satisfy the following criteria:

a) it should be possible to define *reference* areas that currently approximate *natural water quality*
b) any detectable human influence on the water quality must not hinder the ability of marine life to respond to natural cycles and processes

Presentation to the SWRCB and RWQCB

On April 1, 2008 Ken Schiff gave a presentation to the SWRCB on the activities of the NWQC (See Attachment B). The presentation focused on the NWQC's three questions, constituency, definition of natural water quality, and conclusions of results from the SIO monitoring. The presentation was well-received by the Board and used for considering the SWRCB's adoption of draft special protections. On November 12, 2008 Ken Schiff gave the same presentation to the San Diego RWQCB as staff reviewed SIO's NPDES permit monitoring requirements. Once again, the presentation was well-received and, ultimately, the RWQCB altered SIO's NPDES permit monitoring requirements.

Reviewing the SWRCB Regional Scale ASBS Monitoring Program

The SWRCB is developing a statewide monitoring program for ASBS in collaboration with regulated ASBS dischargers. The statewide program is being developed as an integration of three regional programs including northern California (San Francisco to Oregon), central California (Point Conception to San Francisco, focused largely around Monterey Bay), and the southern California Bight (Point Conception to San Diego, including the Channel Islands). The southern California regional program was the first to design, prepare, and implement monitoring. The NWQC assisted by reviewing the monitoring workplan and providing expert commentary on its strengths, weaknesses, and recommendations for improvement. The reviews were encouraging and recommendations were adopted prior to the initiation of field efforts in Fall 2008.

Natural Water Quality Pilot Study

In response to the regional scale ASBS monitoring programs, the SWRCB funded a pilot study to assess the feasibility of identifying and sampling reference sites. Reference sites comprising discharges from undeveloped watersheds were sampled following storm events at eight sites statewide. Two sites each were located in northern, central and southern California and two sites from the Channel Islands. Concentrations were uniformly low regardless of location.

White Paper on ASBS Grant Monitoring

The voters of California have approved Bond measures for Proposition 84 that provides funding to assist responsible parties to comply with the discharges prohibition into ASBS. The SWRCB is planning on distributing approximately $32,000,000 from Proposition 84 specifically to remove waste from discharges that drain directly to ASBS. Approximately $1,000,000 from Proposition 84 may be set aside to provide for coordinated effectiveness monitoring for the suite of projects recommended for funding. As a result, the NWQC was encouraged by State Water Board staff to address monitoring issues related to Proposition 84 grant funded projects. The NWQC addressed this issue in three steps: 1) determine the success (or failure) of monitoring programs associated with other grant programs; 2) assess what factors would be important for grant funded monitoring for ASBS; and 3) provide recommendations to the Proposition 84 Task Force, the body that evaluates Proposition 84 Grant proposals, including monitoring.

Ultimately, the NWQC made three recommendations to the Proposition 84 Task Force to enhance the grant program monitoring components (Attachment C). These recommendations included: 1) a cohesive, question-driven monitoring program; 2) a unified monitoring design that ensures comparability in sampling, data analysis, and information management; and 3) a person or group responsible for coordinating, collating, assessing and reporting on the Proposition 84 monitoring effort.

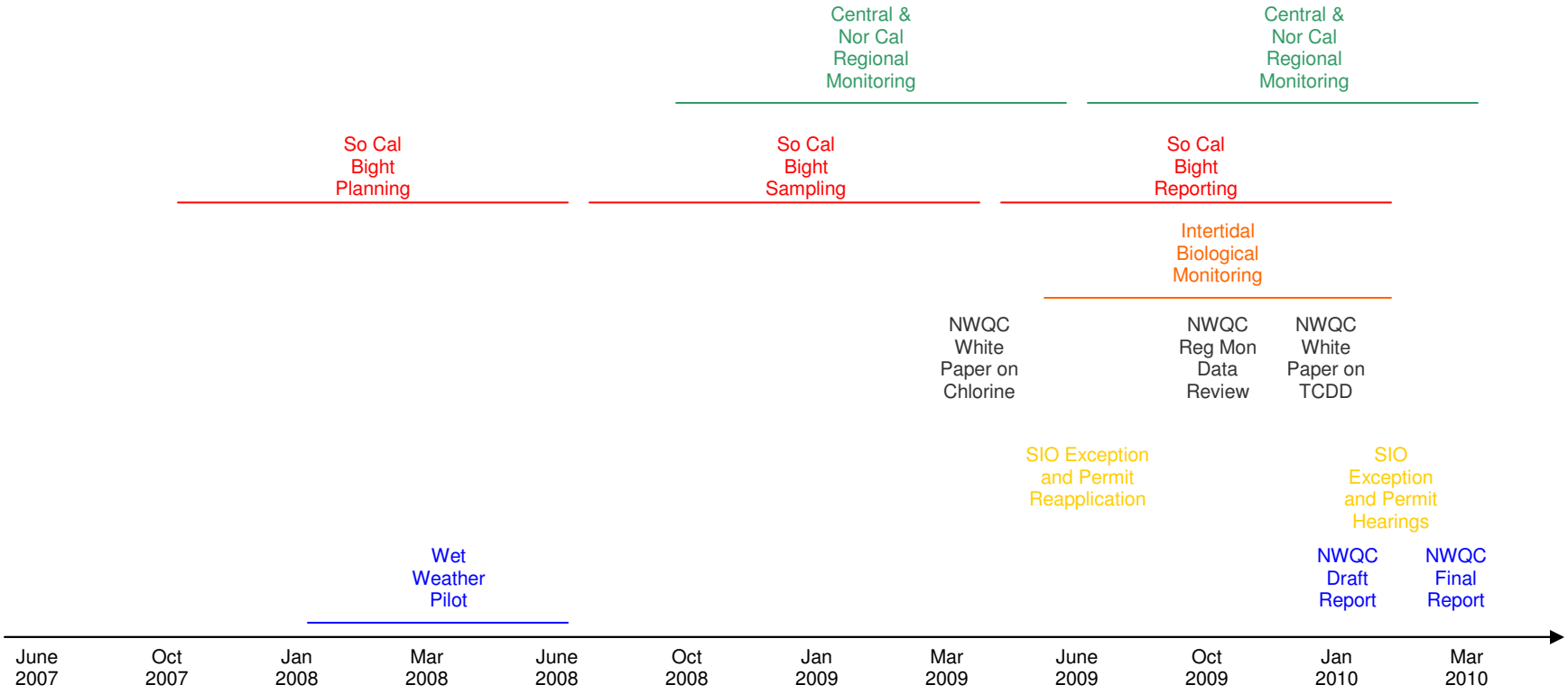
PLANNED ACTIVITIES FOR YEAR THREE

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 (Figure 1). This will include reviewing information gathered during the large-scale regional monitoring surveys of ASBS in southern California. The NWQC will review and recommend actions for the SWRCB as the regional monitoring programs in central and northern California emerge. The NWQC will provide recommendations to the SWRCB chlorine and TCDD testing from ASBS discharges. Finally, the NWQC will evaluate intertidal biological sampling from ASBS statewide.

Table 1. Members of the Natural Water Quality Committee

Members	Affiliation
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.



ATTACHMENT A

What do we mean by natural ocean water quality for an ASBS?

Natural ocean water quality: That water quality (based on selected physical chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of:

d) man-made constituents (*e.g.,* DDT),
e) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial) and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question, and
f) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man.

Natural ocean water would be expected to vary noticeably both from place to place, and from time to time. For example, there are significant variations in the composition of minor constituents of seawater (*e.g.,* nutrients, oxygen, trace metals) with depth in the ocean, as well as with distance from land and even between ocean basins. Furthermore, significant ocean properties such as salinity, temperature, and pH vary appreciably with location, season, and year to year due to natural oceanographic processes.

Even within California's coastal ocean, spatial differences exist as a result of regional differences in solar radiation, precipitation, and naturally occurring fresh water. Coastal seawater will differ measurably in trace element composition as a consequence of local watershed geology. Various places on the California shelf have naturally occurring hydrocarbon and groundwater seepage. In near-shore seawater, temporal and seasonal differences in suspended sediments result from variations in wave action. Naturally occurring marine life itself also alters water quality by various processes. For example, seawater near a sea lion haul-out may be high in fecal bacteria levels.

In addition, there are naturally occurring large-scale ocean cycles that dramatically influence the physical, chemical and biological components that support marine life along the California coast. For example, El Niño and La Niña oceanographic events can significantly alter the surface water temperature along the California coast thus extending or diminishing the range and abundance of cold versus warm water species. Rainfall during such El Niño events can also exert large influences on coastal water quality due to significant flood events that deliver (natural) sediments from undeveloped watersheds. Turbidity events associated with California river systems during large flood events have been observed from space.

However, the reality is that vast areas of the ocean are no longer pristine. Truly natural water quality probably does not now exist in California's coastal ocean, and may be rare throughout the world. For example, plastic debris can be found in remote areas of the ocean thousands of miles from continents, and persistent organic pollutants may be found

in marine life inhabiting equally remote regions. Even if anthropogenic land-based waste discharges were to be completely eliminated from a section of coastline, there is no guarantee that natural water quality would be reestablished there. Aerial deposition, pollutants carried by oceanic currents from distant sources, and vessel discharges may influence water quality conditions.

It is the goal of this definition to acknowledge that any definition of *natural water quality* for an ASBS must satisfy the following criteria:

- it should be possible to define *reference* areas that currently approximate *natural water quality*
- any detectable human influence on the water quality must not hinder the ability of marine life to respond to natural cycles and processes

Such criteria will ensure that the beneficial uses identified by the Ocean Plan are protected for future generations.

ATTACHMENT B

Presentation to the SWRCB on Natural Water Quality Committee, April 1, 2008.

ATTACHMENT C

Natural Water Quality Committee
Initial Recommendations for Monitoring ASBS Implementation Projects

The Natural Water Quality Committee (NWQC) was formed at the direction of the State Water Resources Control Board (SWRCB, resolution 2004-052, Section 3.a.). The charge of the NWQC was to define natural water quality based on a review of monitoring data and to advise the Water Boards regarding the attainment of natural water quality relative to waste discharges in Areas of Special Biological Significance (ASBS). Some of these recommendations have focused on monitoring as one approach to assessing the attainment of natural water quality.

The voters of California have approved Bond measures for Proposition 84 that provides funding to assist responsible parties to comply with the discharge prohibition into ASBS. The SWRCB is planning on distributing approximately $32,000,000 from Proposition 84 specifically to remove waste from discharges to ASBS. Approximately $1,000,000 from Proposition 84 may be set aside to provide for coordinated effectiveness monitoring for the suite of projects recommended for funding. As a result, the NWQC was encouraged by State Water Board staff to address monitoring issues related to Proposition 84 funded projects. The NWQC addressed this issue in three steps: 1) determine the success (or failure) of monitoring programs associated with other grant programs; 2) assess what factors would be important for grant funded monitoring for ASBS; and 3) provide recommendations to the Proposition 84 Task Force, the body that evaluates Proposition 84 Grant proposals, including monitoring.

After discussions with RWQCB and SWRCB staff, task force members from other grant programs (i.e., Proposition 50), and the grantees themselves, the NWQC came to three conclusions regarding the successes and failures of previous grant programs. Frequently in the past, grant programs were incapable of assessing the success/failure of their program for either removal of pollutants or improvements to receiving waters. Inadequate guidance was provided to the grantees on the specific goals of the monitoring programs employed, especially to those grantees that lacked capabilities and experience with monitoring. Specifically, grantees rarely had a vision of the State's monitoring objectives such as cumulative pollutant removal. Even for those grantees with experience and capability, the timeline of the grant programs (typically two to three years) were inconsistent with adequately quantifying the goal of measuring pollutant reductions.

The NWQC discussed several important elements to enhance the Proposition 84 grant program monitoring components. These elements included: 1) a cohesive, question-driven monitoring program; 2) a unified monitoring design that ensures comparability in sampling, data analysis, and information management; and 3) a person or group responsible for coordinating, collating, assessing and reporting on the Proposition 84

monitoring effort. A clear statement of objectives needs to be composed so as to provide a vision for the Proposition 84 monitoring program. Monitoring experts universally agree that this is best achieved through the use of a well-formed and unambiguous monitoring question, much akin to a hypothesis for testing. This question should be crafted with care and agreed to by the Proposition 84 Task Force or other governing body.

A centralized monitoring design should be created with sufficient scientific rigor that the monitoring question can be answered with a specified level of confidence. It is impossible to describe what this design may look like until the monitoring question is created, but there are certain elements that must be included. The first element should be some level of standardized sampling. Standardized sampling approaches ensure representativeness and reduce bias in data collection. For example, flow weighted composite sampling during wet weather runoff can produce very different results than grab sampling, even during the same storm event at the same site. Comparing data from different sampling approaches is inappropriate and could lead to faulty conclusions. Similarly, standardized quality assurance should be achieved through the laboratory analysis portion of a large-scale monitoring program. Comparability is paramount and several large-scale monitoring programs use performance-based quality assurance guidelines to ensure comparability for laboratory analysis. Finally, a centralized data management system is necessary for collating the reams of information generated by multiple monitoring programs. Grantees will focus on the monitoring data associated with the management actions specific to their project and these individual data sets will be, for the most part, relatively small and easy to manage. Combining data sets from numerous individual grant projects *post hoc*, however, would be daunting to impossible and could cost hundreds of thousands of dollars unless a well-conceived information management system is implemented before data collection. Thankfully, several systems exist within the state that could be used as a vehicle for data management.

Finally, a person or group must be tasked from the beginning with the responsibility for coordinating the Proposition 84 ASBS monitoring program. Deriving monitoring questions, ensuring comparability, and quality assurance/training cannot be done as a sideline to one's daily activities. It is a full-time job. The larger the program, the more likely it will require additional personnel to accomplish all of the integration necessary to address the monitoring question. It will be this entity that shall be responsible for communicating with grantees on monitoring and eventually for writing a summary report of the program's success at reducing pollutant loads and/or concentrations.

The NWQC had four recommendations to the ASBS Task Force on a structure for the statewide grant monitoring program to achieve the three goals of monitoring question(s), comparability, and organization. The first recommendation stated the singular monitoring question of utmost importance, "How much pollutant (i.e., in kg) was removed as a result of the grant-funded BMP?" Several additional questions are feasible and perhaps warranted, but this single question must be answered. The second recommendation addressed who should coordinate the Proposition 84 monitoring. The NWQC felt that the SWRCB should coordinate this monitoring, perhaps through one of

their statewide programs such as the Surface Water Ambient Monitoring Program (SWAMP). Third, the NWQC felt that at least 10% of each grant should be allocated to monitoring activities. Each grantee can conduct this coordinated monitoring themselves or, if they prefer, return 10% of the grant back to the SWRCB to arrange for the coordinator to conduct this monitoring. Regardless of who implements the monitoring, the SWRCB must use the $1 million set aside from Proposition 84 to conduct the coordination, quality assurance, and data management to ensure comparability. Finally, the NWQC recommended that grantees be allowed a 1-year, no-cost extension to conduct post-construction monitoring. The extra time will provide invaluable monitoring information, particularly in the drier parts of the state where rainfall is limited to a short window of time during the year.