Southeast Florida Action Strategy Team (SEFAST)/
Southeast Florida Coral Reef Initiative (SEFCRI)

Land-Based Sources of Pollution and Water Quality Focus Area

Technical Advisory Committee (TAC)

Summary of First Meeting of the TAC on November 20-21, 2003

The Technical Advisory Committee or TAC for the Southeast Florida Coral Reef
Initiative (SEFCRI) Land-Based Sources of Pollution and Water Quality (LBSP/WQ)
Focus Area held its first meeting on November 20-21, 2003 at the facilities of the
National Coral Reef Institute (NCRI), Nova Southern University Oceanographic Center
in Dania, Florida. The meeting was attended by fifteen scientists invited to serve on the
TAC and eight members of the LBSP/WQ Work Group.

The purpose of the LBSP/WQ TAC is to review/assess existing data and provide advice
and guidance to the SEFAST Core Group and the LBSP/WQ Work Group. Some of the
other major responsibilities and functions of the TAC are as follows: suggest specific
scientific investigations and identify technical information needs necessary for the
LBSP/WQ Focus Area to meet its goals and objectives; assist the LBSP/WQ Work
Group in developing reports on the status of the coral reef ecosystem; assist with the
evaluation of the effectiveness of the monitoring and special studies projects; and alert
the SEFAST Core Group and LBSP/WQ Work Group to emerging environmental
problems and make recommendations for addressing those problems.

The agenda for the first TAC meeting included the following topics:

·   Review of the U.S. Coral Reef Task Force and the local action strategy (LAS)
        process of development.

·   Detailed review and discussion of the draft LBSP/WQ LAS, including issues,
        goals, objectives, and projects/action items. The members of the TAC provided
        comment on the draft document. The draft LBSP/WQ LAS has been revised
        based on comments from the TAC.

·   Presentation on the TAC established for the Water Quality Protection Program
        (WQPP) of the Florida Keys National Marine Sanctuary. Reviewed the purpose,
        major responsibilities, specific functions, operating guidelines and bylaws of the
        WQPP TAC. Also, reviewed the coral community assessment and matrix
        analysis associated with the development of the WQPP for the Florida Keys
        National Martine Sanctuary. The LBSP/WQ TAC will determine whether or not
        it will establish its own bylaws.

·   Representatives from the counties in the geographic area of interest described and

made presentations on the status of the resource and provided other relevant information. These presentations included reviews of ongoing monitoring projects, known problems/issues (e.g., sources of pollution, areas with degraded water quality, etc.), ongoing studies, and existing projects and programs that address land-based sources of pollution.

·   A representative of the NCRI provided information on the newly established Coral Reef Monitoring and Evaluation Project (CREMP) for southeast Florida. This project is an extension of the existing long-term status and trends monitoring project that was established in the Florida Keys National Marine Sanctuary in 1995.

·   An overview of the benthic habitat mapping project for each of the four counties within the SEFAST geographic area was presented to the TAC.

·   Presentation on fish associated with coral habitat and artificial reefs in Southeast Florida.

·   Members of the TAC made brief presentations on various relevant topics associated with the coral reef ecosystem and the LBSP/WQ effort. Some presentations provided information concerning ongoing research projects.

·   A brief overview of the Florida Atlantic Coastal Environmental (FACE) Initiative was presented to the TAC.

·   The TAC worked together to review, revise, and begin to answer some of the priority questions that had been developed by the LBSP/WQ Work Group.

·   The members of the TAC divided into three groups (modeling, monitoring, and pollutant impacts to biological resources). These groups developed topics for possible future projects and special studies/research, as well as for monitoring. Development of these research projects will help answer the priority questions and provide critical information to assist managers with designing and implementing engineering and management actions to reduce pollutant loading to the coral reefs and associated hard bottom communities. Brief summaries of each group recommendations are given below:

Monitoring group:
        The following is a summary of the discussion group's recommendations for monitoring sites and parameters.

•   Gather data within the three county offshore areas (starting with Broward County) on existing monitoring projects (Coral Reef Evaluation and Monitoring Program, County programs, etc.). High resolution seismic profiling of the area is needed if the data does not already exist. This combined data will be utilized determine installation sites for a minimum of three (one per county) nearshore to offshore monitoring transects.

If at all possible, transects will traverse existing monitoring sites so that historical and future data sets can be utilized to enhance our understanding of potential sources of stress.

- Transects would be linear from nearshore to offshore in a layout which may include sites within and between each of the three reef ridges, a site between shore and the first ridge line and if the site allows, a shore based monitoring well). Each of the transect sites would include a monitoring well similar to those installed in the Florida Keys National Marine Sanctuary by the US Geological Survey. Well depth would be determined by seismic survey and well site design would be nested (i.e. 3 wells of various depth/site). Each well site within each transect would also serve as the sampling site for bottom, mid, and surface water analysis. The utilization of a nearshore to offshore transect for monitoring will allow researchers to address sources of nutrients to the covered reef systems, i.e. plumes originating from inlets, groundwater transport and upwelling events. The installation and presence of groundwater monitoring wells within the proposed areas will have both short and long-term benefits.

- The group recommended adopting the Florida Keys National Marine Sanctuary Water Quality Protection Program parameters. These monitoring parameters will be used to evaluate water column and groundwater samples and may be modified by future recommendations of the SEFAST TAC. Monitoring frequency must be maximized. Real time monitoring of select parameters should be employed when available.

- The monitoring program should be adaptable to evolving data sets and emerging technologies. The utilization of remote sensing technology (i.e. satellite imagery) should be incorporated where applicable.

- Water Quality monitoring should include multiple near- to- offshore monitoring transects in coastal waters (both surface layer and through water column), ground water monitoring; monitoring of inlet plumes.

Impact of pollutants group:

1. Survey of benthic communities

- Using existing surveys on benthic communities create database on distribution of reefs and associated benthic communities, identify areas not surveyed yet and survey them.
- It was suggested that first a general area-wide survey should be conducted to identify hot spots (algal blooms, *Cliona* sponges) in relation to any point sources of pollution.
- Survey and other monitoring of benthic communities: Methods suggested were a stratified random design with targeted transects oriented inshore/offshore at point sources of pollution and outside "clean" areas. This should be a highly quantitative biomass-based approach. As the survey is conducted special

attention should be placed on environmental correlates of nearshore pollution gradients and biotic indicators of pollution stress (presence of macroalgae, cyanobacteria, *Cliona* sponges, number of zooxanthellae in corals and octocorals and chlorophyll levels).
- Identification of areas of high groundwater input in hard bottom is considered a priority (δD and $\delta^{18}O$ may provide signals).
- Octocorals could record environmental signals for areas of chronic elevated sediment stress (sedimentation, beach renourishment) based on stable isotope analyses. Known from the past environmental stresses can be documented in larger octocoral colonies.

2. Transplants of target species (field experiments)

- Transplant selected species of stony corals, *Cliona* spp., octocorals into and out of areas affected by point source pollution.
- Octocorals provide rapid new growth that may contain a sewage signal based on stable isotope analyses.
- Coral bands similarly may reflect an environmental signal caused by transplantation.

3. Laboratory experiments to identify mechanisms of pollution effects on coral reef organisms, including but not restricted by scleractinian corals and octocorals.

- It was felt that lack of funding has limited the ability of researchers to address this most fundamental question "How do marine organisms respond to increased exposure to sewage?"

- Sewage contains nutrients, key microbes, DOM, sediments, etc. all of which can influence the health of coral reef organisms, and there can also be interactive effects of these different pollutants.

- Organisms should first be directly exposed to sewage prior to efforts to tease out causative factors and interactive effects of various factors.
- Sublethal effects (reduced growth, reduced reproduction, heat shock proteins, etc.) should be monitored and measured.
- Cyanobacteria and macroalgae should be tested in similar studies.
- Corals, octocorals and *Cliona* should all be good study organisms
- Stable isotope methods should be utilized as signals of environmental impacts.

Modeling (Physical/Chemical Oceanography) Group

- Hydrogeochemical transects necessary for identification of such water sources as ground surface waters, rain water, subsurface ground waters, etc. As tracers can be used different elements and isotopes, fatty acids, some pharmaceuticals, etc. Need for multiple cross-shore transects.

Models of water sources can be built based on these data. It is critical to obtain data on the distribution of the resource through space and time.

- Study of coastal water circulation is necessary for understanding of distribution of waters from different sources (above) and, respectively, pollution sources. Based on this study, can be created data driven models of water circulation and transport rather than from theoretical modeling efforts. Such models will help to understand distribution of pollutants coming with different sources of water.