

**Southeast Florida Coral Reef Initiative (SEFCRI)
 Land Based Sources of Pollution (LBSP)
 Technical Advisory Committee (TAC)
 Meeting #5
 Report of Proceedings
 November 30 – December 1, 2006**

**National Coral Reef Institute
 Nova Southeastern University Oceanographic Center
 8000 North Ocean Drive
 Dania Beach, Florida**

TAC Members	Nov. 30	Dec. 1
Joseph Boyer, Southeast Environmental Research Center- FIU	X	X
Richard Dodge, Nova Southeastern University		
Phil Dustan, College of Charleston, SC	X	X
Dale Griffin, USGS	X	X
Vladmir Kosmynin, FDEP-Beaches and Coastal Systems	X	X
Judy Lang, Independent Scientist	X	X
Brian Lapointe, HBOI	X	X
Erin Lipp, UGA	X	X
Margaret Miller, NOAA-Miami	X	X
Valerie Paul, Smithsonian Marine Station at Fort Pierce		
Esther Peters, Tetra Tech	X	X
Jim Porter, UGA		
John Proni, NOAA - Miami	X	
Mike Risk, McMaster University, Canada		
Gene Shinn, USF	X	X
Alexander Soloviev, Nova Southeastern University	X	X
Peter Swart, University of Miami - RSMAS	X	

Organizational Committee Members present:

Ken Banks, Broward County EPD
 Chantal Collier, FDEP-Coral Reef Conservation Program (CRCP)
 Nancy Craig, Broward County EPD
 Laura Geselbracht, The Nature Conservancy
 Richard Harvey, EPA
 Linda Horne, FDEP – Southeast District
 Fred McManus, EPA
 Marissa Steketee, FDEP-CRCP
 Wendy Wood, Nova Southeastern University

Additional Presenters and Observers:

Peter Swarzenski, USGS
 Bill Fisher, EPA
 Erin Hodel, Nova Southeastern University

Additional Presenters and Observers (cont.):

Rob Ruzicka, FDEP - CRCP

Heather Stafford, FDEP – Coastal and Aquatic Managed Areas (CAMA)

Brian Walker, Nova Southeastern University

Kevin Kohler, Nova Southeastern University

Dave Gilliam, Nova Southeastern University

Greg Jacoski, Nova Southeastern University

Jennifer Kozlowski, NOAA – Silver Spring, MD

Nikki Poulos, FDEP - CRCP

Maureen Trnka, Nova Southeastern University

Eric Shaw, FDEP – Water Resources Management

Christopher Boykin, FDEP – CRCP

Patricia Rose, FDEP – CRCP

Steve Wolfe, FDEP – CAMA

Jeff Beal, FWC

Pat Bradley, EPA

Sam Purkis, Nova Southeastern University

Kevin Helmle, Nova Southeastern University

Allison Moulding, Nova Southeastern University

Nancy Gassman, Broward County - EPD

DAY ONE, Thursday, November 30, 2006**Meeting Summary****Meeting Guidelines**

Marissa Steketee from the Florida Department of Environmental Protection (FDEP) Coral Reef Conservation Program introduced herself as the meeting facilitator and reviewed the logistical information for the meeting. TAC members, Organizational Committee members, and observers introduced themselves around the room (see attendance sign-in sheet)

Marissa Steketee presented the meeting agenda (yellow handout), reviewed the facilitator roles (green handout), guidelines for discussion (blue handout), guidelines for observers, the meeting evaluation form, and the procedures for submitting public comment.

LBSP Project Updates

Binders were provided for TAC members with current LBSP Local Action Strategy (LAS) project information. Marissa Steketee gave an overview of the Local Action Strategy projects. Year 1: Projects 4, 5, and 6 were completed while projects 7 and 12 are ongoing. Year 2 saw the completion of projects 1, 2, 12, and 14; projects 3, 11, and 12 are ongoing. Commencing in July 2006, year 3 projects 4, 5, 12, and 17 have received full funding, while projects 27, 32, and 33 were partially funded, and projects 3 and 19 are being completed through in-house funding. It was also noted that the SEFCRI public review meetings (Project 17) will be held on February 12th and 13th.

Joseph Boyer asked if any new LAS projects will be developed. Chantal Collier (FDEP - CRCP) replied that no future projects will be developed at this time because there are already so many projects on the table to be completed. At the culmination of the existing LAS, it is expected that the outcomes of many SEFCRI projects will provide guidance for the development of a management plan for the southeast Florida reefs, rather than another set of distinct projects.

Presentation: Identification of sources and signals of land-based pollutants in Southeast Florida using stable isotopes as a sewage signal in octocorals and macroalgae/Lyngbya tissue. (LBSP Project 32)

Erin Lipp, UGA, delivered a presentation about host-specific viruses as conservative markers for human sewage on coral reefs. The objective of the project is to identify the links between sewage pollution and coral reef resource contamination. Erin Lipp said enteric viruses are being specifically looked at in this project and that enteric microbes are used as sewage markers. She elaborated saying that fecal indicator bacteria have been traditionally used in water quality research because they are host-specific, obligate parasites (no re-growth), are persistent, and bioaccumulate. Plus, there are more than 120 types known in human feces. There are five hypotheses being tested and the proposed sampling design is a survey of reef/hard bottom stations. Looking at the sample sources (tissue and water), all stations will be sampled twice and then viral targets are to be compared with each other. The research will be done at stations in Broward and Palm Beach Counties and they will all be analyzed for enteric viruses. Data were then presented from a similar study done in the Florida Keys. The study will be done as inlet transects onshore but offshore studies will be performed for tracers. The timeline should be winter-spring to summer 2007 with essays and analyses through spring 2008.

Erin Lipp then asked if members of the TAC and organizational committee had any questions or comments. Items brought up included the depths in the water column that are being sampled and which species of gorgonian is being investigated. Lipp clarified these items by saying that the samples were taken one meter above the coral sample and that they have yet to identify one specific species. A question was then asked about persistence, meaning if the DNA exists in the tissues and if the organisms are viable. Lipp replied that a study performed 4 years ago found that the viruses decay quickly. Enteroviruses (RNA-based) remain infectious in sea water for 4 days and are stable for 6 days and adenoviruses (DNA-based) display prolonged stability in sea water. DNA is much harder than RNA so she is hoping to see persistence in the tissues.

Presentation: “The origin of nitrogen isotope signatures in algae” (related to LBSP Project 32)

Peter Swart, RSMAS, opened by demonstrating how nitrogen isotopes can be used as biological tracers. Changes of nitrogen concentrations are reported relative to atmospheric nitrogen. It is considered the DNA of sewage as nitrogen gives a lot of information on sources and processes. Peter Swart then showed photos of current work

being done in the Keys and the major coral degradation taking place there. Swart also discussed current nitrogen fixation data and analyses from the Keys.

At this point Peter Swart took questions from the TAC and organizational committee. Swart was asked if the atmospheric nitrogen is stable to which he replied that there are some slight variations but for the most part, it is stable and that numerous papers have been published which report the use of stable isotopes as indicators of sewage. It was then noted that most of the dissolved organic matter in another study came from the seagrass and that carbon isotopes are not the DNA of sewage but they can provide valuable info about the system and processes. A system wide approach needs to be utilized and not only nitrogen isotopes but a range of physical factors need to be considered in addition to other chemical measurements.

Presentation: Histopathological assessment of sedimentation and elevated phosphate on the staghorn coral, *Acropora cervicornis*

Erin Hodel, Nova Southeastern University, opened her presentation by explaining that histopathology is the study of cytologic and histologic structure of abnormal or diseased tissue. Fragments were collected from “Dave’s Patch” and acclimated to laboratory conditions for 3 months. The treatments were: control, sand, phosphate, and a sand/phosphate mix. Four replicate tanks per treatment were used with 6 fragments per tank. The epidermis of the coral was examined through histology and it was noted that similar patterns of stress resulted in the coral tissue from any of the treatments but stress showed more severely from the sand than the phosphate. Epidermal measurements were then taken for comparison. The epidermal mucocyte abundance was the only measurement that showed differences between control and treatments. Overall, the sand and phosphate treatment was the most severe and sand was more detrimental than phosphate alone. Histopathological response patterns were similar for sand and phosphate. Gametogenesis was negatively impacted by both sand and phosphate.

Erin Hodel then answered questions regarding the method of her study explaining that the sand was hand sprinkled once a day for 4 weeks with 1 week recovery and the source of seawater was from John U. Lloyd at high tide with 50% Instant Ocean (synthetic sea salt) added.

Presentation: Fishing, diving and other uses (FDOU) update

Rob Ruzicka, from the FDEP Coral Reef Conservation Program, began his presentation with an overview of the FDOU focus area, saying that within the 4-county region, reef related expenditures generate around 2 billion dollars in revenue and employs roughly 60,000 people. FDOU project 10 is evaluating the reef resources of the past and present. Surveys were handed out to gather information from stakeholders (commercial and recreational fishers, surfers, divers, and resource managers). FDOU project 23 is designed to evaluate the applicability of various management tools for coral reefs in southeast Florida.

Presentation: Nutrient standards for protection of coral reef ecosystems

Brian LaPointe, Harbor Branch Oceanographic Institution, opened by explaining that nutrient standards have not caught on as quickly for the marine environment as is has for freshwater. The imbalance determination for nutrient thresholds in the Everglades is achieved by using best available info to determine the “normal” function of the area. The effects of phosphate enrichment in the Everglades have resulted in changes to microbial communities, periphyton, macrophytes, macroinvertebrates, and dissolved oxygen levels. Nutrient effects in the marine environment include changes to microbial communities, scleractinian corals, macroalgae/turfs, invertebrates, fish assemblages, and dissolved oxygen levels. Brian Lapointe discussed past water quality data from the Florida Keys and changes that have occurred over time for DIN, Chlorophyll *a*, and fish assemblages. In southeast Florida, there are similar and different problems with water quality compared to the Florida Keys. In southeast Florida, waters contain outfalls, surface water inlet discharge, and submarine groundwater discharge. Nutrient effects have gained more attention in the Caribbean; Jamaica in particular where many of the same factors affecting southeast Florida apply there as well. The Millennium Ecosystem Assessment of 2005 concluded that excessive nutrient loading into freshwater and marine ecosystems is one of the biggest problems facing these environments. Lapointe noted that Hawaii has already adopted numerical nutrient standards for open coastal waters and that these numbers may be used for a starting point for criteria in southeast Florida. Overall, nutrient enrichment of coastal waters is a major problem that needs attention.

Following the presentation, Peter Swart suggested that a lot of the data might be explained by natural processes. Swart stated that TAC member Mike Risk has presented data from areas not impacted by sewage that showed the same increase. Brian Lapointe responded by saying he has presented his opinion to a group of scientists who came to a consensus of agreement with him about sewage problems in southeast Florida.

Presentation: Florida’s water quality standards development process

Eric Shaw, FDEP Water Resources Management, began by introducing the Clean Water Act which requires all states to develop water quality standards that need to be approved by the EPA. Surface water classifications are classes I-V based on the level of protection but there are no longer class V waters in the state of Florida. Water quality criteria must protect the designated uses of a water body, be approved by the EPA, be based on sound scientific rationale, and protect the most sensitive designated use. They may be aquatic or human health based and expressed in numeric or narrative form. The anti-degradation approach protects existing uses and water quality, but allows water quality lowering provided certain tests are met. Outstanding Florida Waters designation is intended to preserve ambient water quality. Water quality standards relief criteria include exemptions/exceptions, variances, site-specific alternative criteria (SSACs), and mixing zones. All the states are looking at numeric nutrient criteria. A TAC has been set up to provide input into creating criteria for the numerous water body types in the country.

Following the presentation Eric Shaw added that the existing TAC right now will probably not be intact in 4-5 years when those criteria will start being discussed.

Presentation: EPA development of coral reef biocriteria

Bill Fisher, from the Environmental Protection Agency, presented the EPA process for establishing biocriteria monitoring programs. Coral monitoring programs are able to determine if coral reefs are improving or declining below acceptable levels. This allows monitoring results to be linked to regulatory decisions.

The biocriteria are a water quality standard part of the Clean Water Act; thresholds established to protect the biological condition of aquatic life inhabiting waters of a given designated use. Implementing biocriteria requires screening for appropriate metrics, designing an effective monitoring program, assigning designated uses and defining biocriteria, monitoring to assure compliance, and responding to impaired waters. The EPA stony coral rapid bioassessment protocol requires three field measurements of colony size, colony identification, and percent live tissue. The Key West pilot study data were presented to show examples of how the three field measurements were performed. Fisher added that “live cover” was measured on each colony and all the colonies were added together and summed to total a transect and exploratory surveys were completed in St. Croix, USVI to create biocriteria.

Presentation: Transport of pollutants by groundwater – USGS study (LBSP Project 27)

Peter Swarzenski, USGS, gave a review of submarine groundwater throughout history. Groundwater is defined as water in the saturated zone of geologic material. Submarine Groundwater Discharge (SGD) is any flow out across the seabed of the continental shelf. SGD can be on the regional or local scale. It consists of meteoric waters, connate waters, recirculated waters, etc. SGD is variable in time and space but is estimated < 20% of total water. SGD is inherently difficult to measure because it is diffuse with small flux rates and is heterogeneous. Two of the ways to measure discharge are by manual or automatic seepage meters or geochemical tracers such as radon.

Swarzenski continued, presenting time series images of the effect of radon in groundwater on coastal areas during high and low tide.

Public comment period

There were no public comments

General discussion period

Joe Boyer suggested the SEFCRI LBSP TAC approach FDEP about providing input to support the development of numeric nutrient criteria for coral reefs by the Nutrient Standards TAC.

Dale Griffin seconded Joe's idea.

Eric Shaw clarified that the TAC working on developing criteria consists of people who are coming up with a methodology to apply to all water bodies of the nation and they are not specialists in freshwater solely.

John Proni asked if that TAC group is looking into measuring ammonium in fresh and salt water.

Gene Shinn commented that an expert from South Florida - Water Management District (SFWMD) was supposed to come speak to this group about groundwater discharge but this person has been prevented from coming by the SFWMD.

Brian LaPointe replied that the reason no one has come is because of the sensitive issue of the Everglades and adding pressurized water into the groundwater.

Dale Griffin commented that the data Brian LaPointe presented from Hawaii should be considered seriously for Florida.

Phil Dustan asked a question to Bill Fisher about the dimensionality of the system of taking photos from above of each coral head; that video transects give a better idea of community coverage instead of measuring each coral colony individually.

Bill Fisher responded by saying that the idea of taking these photos is a very preliminary look at information which is used to apply to a larger area.

Margaret Miller provided examples of how Bill Fisher's approach to coral communities by using 3D models is usefully moving towards a quantitative approach.

Judy Lang added that with all the discussion about Bill Fisher's methodology the TAC was overlooking what, to her, was the most important part of his presentation; which is that polluters can be prosecuted for violations of the Clean Water Act even if the specific identity of the pollutant wasn't known.

Fred McManus supported Bill by saying that once bioindicators say that degradation has taken place, people can take action to go into the system and better the situation.

Esther Peters commented that Ohio based their water quality standards solely on biological information.

The meeting was adjourned

DAY TWO, December 1, 2006

Marissa Steketee began the meeting by running through meeting rules and gave an overview of the day's schedule.

Presentation: Outstanding Florida Waters

Eric Shaw began his presentation by explaining that the primary purpose of an Outstanding Florida Water (OFW) is to protect ambient water quality as it existed at the time of designation. There are over 300 OFWs listed in the OFW rule and most are within some State or Federally managed area. There are 41 "special waters" OFWs. A "special water" designation is achieved when interested people create an OFW petition. This leads to public workshops and an investigation and report. Finally, an environmental regulation commission holds a public hearing which may lead to an OFW designation. The Environmental Regulation Commission (ERC) is a 7-member citizen committee appointed by the Governor that approves FDEP rules. Two findings must be made by the ERC for a "special water" designation: (1) the water body has either exceptional ecological significance or recreational significance and (2) the environmental, social, and economic benefits of the designation must outweigh the environmental, social, and economic costs. "Exceptional ecological significance" is defined as a water body that is a part of an ecosystem of unusual value (unusual species, productivity, diversity etc.). "Exceptional recreational sig" is an unusual value for recreational activities (fishing, boating, canoeing, water skiing, swimming, scuba, etc.).

An OFW designation states that a new direct discharge cannot lower ambient water quality and cannot significantly degrade ambient water quality in the OFW. Shaw added that "ambient water" is the condition where no significant circumstances are taking place, such as an El Niño. An OFW designation affects new activities that require a FDEP or WMD permit including sewage treatment plants, industrial effluents, and storm water runoff. An OFW does not affect activities with current legal permits, maintenance of existing channels, boating, fishing, etc., docks less than 500 sq. feet, septic tanks, agricultural activities, restoration of seawalls, and activities that do not degrade water quality.

Presentation: Aquatic preserves impact on water quality

Heather Stafford, Florida Department of Environmental Protection, explained that the intent of an aquatic preserve is to maintain natural conditions. The aquatic preserve rule falls under Florida statute 18-20, the Aquatic Preserve Act. The three types of preserves are aesthetic, biological, and scientific and all preserves must fall into one of these categories. Aquatic preserves may be expanded once they have been established, creating a new one. Biscayne Bay falls under statute 18-18 and is unique in the rules and specific language it uses as a designation, i.e. discharge of waste.

Aquatic preserve statutes only apply to state owned land while regulatory rules can be applied everywhere, including private property. Enforcement of aquatic preserve regulations include fines ranging from \$500 - \$5000 / day.

The boundary for an aquatic preserve is determined by the high water line and can include natural water bodies and tributaries. Another way to protect an aquatic preserve is through a land acquisition program, where the state buys land surrounding a preserve to act as a buffer zone. State parks and marine sanctuaries can overlap aquatic preserve boundaries, but federally owned waters are excluded. Rules can be applied to the entire watershed area in some instances. Water management is supposed to follow statute 18 - 20 and while they have become more compliant, aquatic preserve rules are not always followed. A major aspect of statute 18-20 is the public interest assessment criteria, which includes improving water quality and establishing a cost/benefit analysis. Most people feel that the closer one gets to home, the more restrictive these rules should be. People care about their areas more than the county, state, or federal governments.

Public Comment

No public comments submitted

TAC Administrative Business

Marissa Steketee informed the TAC of RSMAS professor Diego Lirman's interest in joining this TAC and becoming a member. All TAC members received a sample biographical form to see what kinds of information they want to receive when considering a potential new member.

Marissa Steketee asked whether the TAC members are interested in allowing new members and whether members want to set a limit for the size of the group.

Chantal Collier added that they looked at the SEFCRI charter as a guideline for developing a process for considering new TAC members; each team is looked at in regards to whether their area of expertise is being represented in the group or not and what projects are being looked at.

Marissa Steketee commented that there are currently 17 active TAC members in this group.

Chantal Collier added that some process needs to be developed in order to deal with the potential addition of new members; a biography of the person interested has been suggested as a way to provide members with information on the interested party to make an informed decision on the person.

Joseph Boyer said that the expertise as well as county affiliation of the potential member should be considered – for example, marine chemistry is not being represented.

Richard Harvey asked if there are any structural limitations under the U.S. Coral Reef Task Force (USCRTF); He thinks that if there is a major omission in the group's expertise, then someone should be added.

Vladmir Kosmyrin said that any non-member can attend meetings and offer their expertise.

Esther Peters asked if Diego knows what the group does and whether he would come to a meeting and observe what goes on so he can be better informed what he is interested in joining.

Chantal Collier added that there is no formal process of what would take place if a TAC member steps down and how they would be replaced.

Margaret Miller said that the TAC needs to establish a process for finding new members and each area of expertise should be represented. The organizing committee, with input from the TAC, needs to find which areas of expertise are needed and then find the people who fill those gaps.

Esther Peters seconds Margaret Miller's motion.

General Discussion

Marissa Steketee brought up the potential for this group to recommend nutrient criteria and how that will be addressed.

Ken Banks said that the literature has been looked at; that the criteria of Hawaii that Brian LaPointe brought up should be further looked at.

Richard Harvey added that he doesn't think the TAC is at the point where they can make knowledgeable suggestions for criteria.

Chantal Collier commented that she discussed the Hawaii standards with Brian Lapointe and he will seek out more information about it to bring back to the TAC. She and Eric Shaw spoke about what the group was trying to get at yesterday, and if this group is going to take the time to make recommendations for water criteria that it would be more beneficial to find out if recommendations would be considered seriously if they are offered.

Phil Dustan asked when is enough of a change to the reefs is enough to trigger the initiation of standards?

Joseph Boyer said that generally the TAC supplies the information and the agency runs with it so the group needs to be proactive and put its stamp on it.

Chantal Collier then said that conversations have been had about adding additional measures into monitoring protocol and the idea of including biocriteria can be addressed.

Phil Dustan commented it is important to determine the level of change on the reefs and when it is considered harmed.

Richard Harvey asked if this group was to write a white paper today on the conditions of the reefs, what would it say? Papers have been written regarding work in the Keys which proved very successful and were taken seriously. If that paper was made, the state would take that information seriously and consider the area. He adds that a petition should be made to the state from the TAC.

Dale Griffin agrees with Richard Harvey.

Marissa Steketee summarized that Richard Harvey is suggesting the writing of a white paper which documents the TAC's knowledge of the reef resources in southeast Florida, the threats to the health of these resources, and the TAC's recommendations for developing water quality and nutrient standards/thresholds and biocriteria for these reef resources.

Dale Griffin added that this group can provide a guide for other areas and groups to do the same thing.

Phil Dustan stated he thought the TAC should push to get a presentation in front of the USCRTF in February to petition the suggestions.

Marissa Steketee asked if there is a second to write a white paper with status of reefs and recommendations of standards.

Phil Dustan seconded the motion.

Esther Peters added that Tetra Tech was asked by the EPA to write a paper on nutrient dynamics and impacts on coastal areas, as well as other aquatic habitats, but the client decided to move more slowly on preparing these white papers and they are still being developed.

Phil Dustan said that much of the information probably can be found in bits and pieces of many reports and just needs to be pulled together.

Marissa Steketee commented that an outline should be made, then the TAC can decide who will spearhead writing each section of the white paper.

Esther Peters offered to review Bill Kruzynski's paper which targeted the Keys and draft an outline targeting southeast Florida for the TAC.

Joseph Boyer thinks that Kevin Carter should come present what is going on in the freshwater criteria TAC group so that the white paper is consistent with what the group is considering as important.

Richard Harvey suggested Bill Kruzynski as a potential editor to the white paper.

Ken Banks commented that since this group has been meeting, they have not produced any documents as a whole and this would be a chance to do that.

Marissa Steketee suggested that these topics will be revisited in Spring 2007 for discussion.

Fred McManus added that Project 32 which is listed as Peter Swart's project isn't actually Project 32 and should be renumbered.

Chantal Collier and Marissa Steketee replied that his project is related to Project 32 and therefore is considered under the umbrella of Project 32, but will be noted as Project 32a.

Judy Lang suggested getting Bill Kruzynski to come and speak to the TAC.

Vladmir Kosmynin suggested reading his paper first.

Richard Harvey commented that Kruzynski is currently writing a book on the Keys.

Margaret Miller concluded that an outline will be made by the next meeting so that sections can be assigned.

Chantal Collier brought up the possibility of discussing dates for the next meeting.

Esther Peters suggested towards the end of May.

Erin Lipp and Phil Dustan added they would not be available the end of May and suggested mid-May instead.

Marissa Steketee passed out meeting evaluations.

The meeting was adjourned

Action Items

No.	Action Item	Responsible Party	Due Date
1	The TAC should approach FDEP about providing input to support the development of numeric nutrient criteria for coral reefs by the Nutrient Standards TAC.	All TAC members	None set
2	The TAC needs to establish a process for finding new members and each area of expertise should be represented. The organizing committee, with input from the TAC, needs to find which areas of expertise are needed and then find the people who fill those gaps.	All TAC and Organizing Committee Members	None set
3	An outline regarding Bill Kruzynski's white paper needs to be written and the TAC will review that and make suggestions.	Esther Peters	Before next meeting