

**Southeast Florida Coral Reef Initiative (SEFCRI)  
Land Based Sources of Pollution (LBSP)  
Technical Advisory Committee (TAC)  
Meeting #8  
Report of Proceedings  
May 1-2, 2008**

**National Coral Reef Institute (NCRI)  
Nova Southeastern University Oceanographic Center  
8000 North Ocean Drive  
Dania Beach, Florida, 33004**

**LBSP TAC Committee:**

<b>Name</b>	<b>Affiliation</b>	<b>May 1</b>	<b>May 2</b>
Boyer, Joseph	Southeast Environmental Research Center, Florida International University	<b>X</b>	<b>X</b>
Davis, Hal	United States Geological Survey		
Dodge, Richard	Nova Southeastern University, NCRI	<b>X</b>	<b>X</b>
Dustan, Phil	College of Charleston	<b>X</b>	<b>X</b>
Fauth, John	University of Central Florida	<b>X</b>	<b>X</b>
Gardinali, Piero	Florida International University	<b>X</b>	<b>X</b>
Griffin, Dale	United States Geological Survey	<b>X</b>	<b>X</b>
Kosmynin, Vladimir	Florida Department of Environmental Protection	<b>X</b>	<b>X</b>
Lang, Judy	Independent Scientist	<b>X</b>	<b>X</b>
Lapointe, Brian	Harbor Branch Oceanographic Institution, Florida Atlantic University (FAU)	<b>X</b>	<b>X</b>
Lipp, Erin	University of Georgia	<b>X</b>	<b>X</b>
Miller, Margaret	National Oceanic and Atmospheric Administration (NOAA) South Atlantic Fisheries Science Center	<b>X</b>	<b>X</b>
Paul, Valerie	Smithsonian Marine Station at Fort Pierce	<b>X</b>	<b>X</b>
Peters, Esther	Tetra Tech	<b>X</b>	<b>X</b>
Proni, John	NOAA – Atlantic Oceanographic & Meteorological Laboratory	<b>X</b>	
Shinn, Gene	University of South Florida	<b>X</b>	<b>X</b>
Soloviev, Alexander	Nova Southeastern University	<b>X</b>	<b>X</b>
Swart, Peter	University of Miami, RSMAS	<b>X</b>	<b>X</b>

**LBSP TAC Organizational Committee:**

<b>Name</b>	<b>Affiliation</b>	<b>May 1</b>	<b>May 2</b>
Banks, Ken	Broward County Environmental Protection and Growth Management Department (EPGMD)	<b>X</b>	<b>X</b>
Brien, Linda	Florida Department of Environmental Protection (FDEP) – Southeast District	<b>X</b>	<b>X</b>
Collier, Chantal	FDEP – Coral Reef Conservation Program (CRCP)	<b>X</b>	<b>X</b>
Craig, Nancy	Broward County EPGMD	<b>X</b>	<b>X</b>
Gadbois, Nicholas	FDEP - CRCP	<b>X</b>	<b>X</b>

Geselbracht, Laura	The Nature Conservancy	X	
Harvey, Richard	U.S, Environmental Protection Agency (USEPA)	X	X
Miller, Cheryl	Independent Scientist	X	
Wood, Wendy	Nova Southeastern University, NCRI	X	X

**Presenters and Observers:**

Name	Affiliation	May 1	May 2
Beal, Jeff	Fish and Wildlife Commission (FWC)	X	
Clark, Dan	Cry of the Water	X	X
Clark, Stephanie	Cry of the Water	X	X
Drayer, Courtney	University of Miami - Rosenstiel School of Marine and Atmospheric Science (RSMAS)	X	
Edge, Sara	Harbor Branch Oceanographic Institution, FAU	X	
Evans, Sam	University of Miami - RSMAS	X	
Frydenborg, Russ	Florida Department of Environmental Protection	X	X
Gibboney, Meredith	FDEP – CRCP	X	X
Jacoski, Greg	Nova Southeastern University, NCRI	X	X
Marinkov, Ivan		X	
Moulding, Alison	Nova Southeastern University, NCRI	X	X
St. Gelais, Adam	Nova Southeastern University, NCRI	X	
Tichenor, Ed	Palm Beach County Reef Rescue	X	
Turgeon, Scott	US Department of Agriculture – Natural Resources Conservation Service (NRCS)	X	
Voss, Joshua	Harbor Branch Oceanographic Institution, FAU	X	
Walzcak, Joanna	FDEP – CRCP		X
Wolfe, Steven	FDEP	X	X

**Day 1, May 1, 2008**

**Meeting Summary**

**Meeting Guidelines**

Chantal Collier welcomed the group, including two of the three new TAC members; Piero Gardinali and John Fauth. The third new member, Hal Davis, was not in attendance. Richard Harvey informed the group that Fred McManus could no longer participate in the TAC because his responsibilities had been reassigned. Everybody in attendance then introduced themselves. Following the introductions, the meeting was turned over to the facilitator, Nick Gadbois.

Nick Gadbois reviewed the facilitator role, guidelines for discussion, and the meeting agenda. He then turned the meeting back over to Chantal Collier who presented a review of the SEFCRI history, mission and organizational structure.

**Presentation: SEFCRI History and Organizational Review**

SEFCRI, derived from the work of the Southeast Florida Action Strategy Team (SEFAST), identifies key threats to the coral reefs of Southeast Florida and priority actions needed to reduce those threats. SEFCRI is a locally developed and driven road map for collaborative and cooperative action among federal, state, local, and non-governmental organization partners. SEFCRI was developed with guidance from the U.S. Coral Reef Task Force (USCRTF) and in tandem with Local Action Strategies (LAS) in Hawaii, Guam, American Samoa, CNMI, USVI, and Puerto Rico. The goals and objectives of the group are linked to the USCRTF National Action Plan. The SEFCRI vision is to develop an effective strategy to preserve and protect southeast Florida's reefs and associated reef resources, emphasizing balance between resource use and protection, in cooperation with all interested parties.

SEFCRI is in its fourth year after initially gathering in May 2003 to develop a Local Action Strategy (LAS) targeting southeast Florida. This LAS was completed in December 2004. SEFCRI is composed of four focus areas, including Land Based Sources of Pollution (LBSP), Fishing Diving and Other Uses (FDOU), Awareness and Appreciation (AA), and Maritime Industry Coastal Construction Impact (MICCI). Combined, these focus areas of concern contain 140 Local Action Strategy projects.

The SEFAST Team, renamed the SEFCRI Team in 2005, conducts its work under the organization structure and duties outlined in the SEFCRI Team Charter. Chantal reviewed the roles and responsibilities of Team members, the Program Manager and Technical Advisory Committee members participating in SEFCRI.

Principal funding for SEFCRI projects comes from the Florida Department of Environmental Protection and the NOAA Coral Reef Conservation Program. Additional funding has been provided by the U.S. Environmental Protection Agency, U.S. Geological Survey, and Florida's State Wildlife Grants. The website for the Florida Department of Environmental Protection Coral Reef Conservation Program is [www.dep.state.fl.us/coastal/programs/coral/](http://www.dep.state.fl.us/coastal/programs/coral/). Chantal Collier turned the meeting back over to Nick Gadbois.

### **LBSP Project Updates**

Nick Gadbois presented an update of LBSP projects. *LBSP Projects 3/19* included compiling a list of agencies, programs, and best management practices related to LBSP. Surveys were sent out to local, state and federal agencies with programs related to land based sources of pollution to acquire detailed information about the programs in place. Roughly one-third of those were returned. Follow-up interviews were conducted with the agencies who returned the surveys to try to extract more details about the projects the agencies identified. A database was created and populated with the information derived from the surveys and interviews. This project was completed February 2008. The follow-up project to this is *LBSP Project 21* which will assess the information in the database for gaps in BMPs and conduct a technical workshop with each agencies who returned a survey, land based sources of pollution related contractors and the general public to present the findings and identify additional gaps in BMPs and other hot spot areas of

concern. LBSP Project 21 will be coordinated with SEFCRI, the Center for Watershed Protection and NOAA. The scope of work is being finalized for this project.

*LBSP Project 8* will create benthic habitat classification maps for Miami-Dade County's coastal waters. This project is ongoing and Brian Walker (NCRI) is compiling aerial photos, benthic data and other data sets to create polygons in ArcGIS of different habitat types as part of phase 1 of this project. The areas in the polygons will be groundtruthed using a camera and SCUBA. Funding is needed to complete phase 2: acoustic groundtruthing.

*LBSP Project 9* will create benthic habitat classification maps Martin County's coastal waters. Nova Southeastern University was awarded a grant through the Florida's Wildlife Legacy Initiative State Wildlife Grants for phase one of this project to collect LiDAR bathymetry of the entire Martin County coastal waters. The scope of work for this project is complete. Two potential contractors have been indentified to collect the LiDAR. The scope of works submitted by these contractors is currently being reviewed.

The goal of *LBSP Project 24* is to educate and change stakeholders' behavior to help reduce the effects of LBSP on coral reefs. Cheryl Miller (independent scientist) is developing a draft brochure of southeast Florida watershed information and LBSP issues of southeast Florida. Distribution options are currently being explored but may include home improvement stores, nurseries and partnering with other agencies with existing environmental education programs.

The intergrated data management system developed for *LBSP Project 11* in conjunction with Florida Fish and Wildlife Research is currently up and running (<http://ocean.floridamarine.org/sefcric/splash.html>). Information on mooring ball locations, anchorages, and groundings has all been updated. FWRI currently hosts and maintains this project and will do so through 2009.

*LBSP Project 27*, conducted by Dale Griffin (USGS), will determine the flux of pollutants in the groundwater in Broward County. The Quality Control/Quality Assurance documents for this project are currently being developed.

**Presentation: LBSP Project 32(a) – Identifying sources and signals of LBSP using stable N isotopes**

Peter Swart, University of Miami – RSMAS, presented an update of *LBSP Project 32(a)* which identifies sources and signals of LBSP using stable N isotopes. The funds for this project have been expended and the tasks detailed in the scope of work have been completed. The final report is currently in development. This project was completed in two experiments. The first experiment grew different species of algae in varying concentrations of nitrate and ammonia. This resulted in no change of the isotopic composition and the growth rates were the same in each of the nutrient concentrations. The second experiment investigated whether the algae *Aghardiella* preferentially took up ammonia or nitrate. To determine this two methods were used. The first method added ammonia and a small amount of N<sub>15</sub> labeled nitrate to the algal samples. The second

method combined nitrate and a small amount of ammonia with the growing algal samples. The algae were then analyzed and it was determined through the assimilation factor, that the algae is primarily utilizing the ammonia, but is also uptaking the nitrate.

A similar experiment was performed using the algae *Grassilaria*. Results from this study demonstrated that this *Grassilaria* utilizes both ammonia and nitrate at the same rate. These tests indicate that there is no real dependence on the concentration of ammonia or nitrate on the assimilation factor. This means that on the reef, during different points of the year, the isotopic composition of ammonia and nitrate will get heavier with a lower nutrient concentration.

Brian Lapointe added that the levels of nitrate used for the experiments are much higher than those seen on coral reefs. He suggested using concentrations equal to what is being seen along the reef system.

Ken Banks asked if only the tips of the algae were tested or if the entire sample was looked at. Peter Swart said that he was only interested in new growth (tips) because the old growth would be the same as the pre-experiment.

#### **Presentation: LBSP Project 5 – Biomarker study**

John Fauth, University of Central Florida, presented an update of *LBSP Project 5*. The purpose of this study is to determine how pollutants and other stressors first affect corals on the molecular and cellular level, then the entire organism, and finally the entire community. The first part of this study sampled the coral *Porites* at eight different sites, both near shore and off shore, in proximity to oceanic inlets and wastewater outfalls, and a control site. A biopsy was taken at each sample site. The wounds are monitored every few months to determine regeneration rates. It has been determined that the sites further away from the wastewater outfalls and oceanic inlets, the biopsy heals quicker than those in close proximity to an outfall. The lesions on the corals at the deeper water sites also took longer to heal. It was found that the protein ubiquitin and cytochromes were heavily associated with regeneration. These sites will continue to be monitored.

A lab experiment was also done which exposed *Porites* to increasing concentrations of water from Port Everglades. The coral showed no response to the changed water.

The TIE-TRE study is using brine shrimp and sea urchin embryos as specimens for the hatchability and standard lethality tests. The brine shrimp have shown no difference in hatchability and lethality when exposed to the pore water from the interstitial layer and the reef surface water. The sea urchin embryos did show noticeable change in that they did not make the change to the four celled embryos. The next step in this process will be to determine how coral growth compares to the results shown in the shrimp and sea urchins study.

The TIE-TRE sampling should be completed shortly. The biomarker samples have been collected and samples from the Bahamas and USVI, more pristine locations, will be used for comparison with the south Florida locations. The coral colonies from the first study

will undergo contaminant analysis and histology in June or July 2008. This will give a more complete picture of what may be affecting the coral colonies.

Margaret Miller asked if the second part of the study will be performed with coral larvae. John Fauth replied that it would be using the same coral species *Porites astroides*.

Esther Peters noted that if sampling was done at low tide, then the concentration will change.

**Presentation: LBSP Project 29 – Determine the flux of pollutants exiting the ocean inlets and net flux to the reef community**

John Proni, NOAA, presented an update on *LBSP Project 29* involving the reconnoiter effort being done in Port Everglades. A small vessel outfitted with a riverboat calibration mechanism crossed the inlet channel 45 times. The riverboat approach has worked well in obtaining the vertical profiles. Results from the collected data showed the shipping channel has a 10:1 ratio of width to depth. While Port Everglades has a slower flow than Boynton Inlet, more water is transported through the channel. It was the purpose of this study to determine the total volumetric flux of water flowing through the port. The study also showed during the ebb tide, while the flow rate remains unchanged, the direction of flow is sheared at ~9 m depth. The transition from ebb to flood tide shows the bottom layer increases in depth while the top layer is diminished. Members of Broward County Environmental Protection Department will be conducting phase 2 of the project: water quality testing.

When making these flow measurements in the channels using side sound beams, one is only seeing a fraction of the total geometric area. This problem is resolved by constructing an index calibration where the boat crosses the channel numerous times and that data is run in a correlation function against the data from the side looking flow. If these data sets align properly, that indicates a high correlation between the two. As this project progresses, Dr. Proni will supplement the horizontal profile with a vertical profile. His plan is to develop a correlation function for the upper layer and a separate one for the lower layer. It is his contention that as the flow changes from high speed to low speed, the fraction of total flow in the upper layer significantly diminishes. He will also use the vertical data and correlate it with the side looking data while completing frequent riverboat crossings. The second reconnoiter has to spend a 24-hour period. Once the second system is in place, then major rain or wind events can be captured.

Members of Broward County Environmental Protection Department will be conducting phase 2 of the project: water quality testing.

**Presentation: LBSP Project 33 – Identify sources and signals of LBSP in SE Florida using human enteroviruses as an indicator of fecal contamination**

Erin Lipp, University of Georgia, presented an update of *LBSP Project 33*. Enteric microbes are being studied because they are a standard measure of water quality and health issues. One of the problems with fecal indicator bacteria is that there is no indication of their source. Viruses are used because they are host specific. This study looks at viruses specifically associated with human waste. The two main objectives of this study are to determine if microbial constituents of human sewage are reaching the coral reefs and if they are, are they bioaccumulating in sessile organisms. Samples were first collected in August 2007 from eight reef sites. Surface mucus layer and sponge tissue samples were obtained from substrate water. Results showed enteroviruses have limited persistence in seawater and coral mucus while adenoviruses demonstrate prolonged stability.

To date, no enteroviruses have been found from the eight coral samples sites. Indicator levels were high but remained below action limits set by the USEPA. No virus samples were taken from the oceanic wastewater outfalls. The sponge tissue assays are currently in progress.

The goal for the inlet study is to follow the flux of water from outgoing tides to identify areas of accumulation of the enteroviruses and fecal indicator bacteria. Enterococci are found at the highest concentrations on the surface at the mouth of the inlet and levels decreased further offshore and at depth. This pattern was the same for *Clostridium perfringens*. Fecal coliform bacteria are not seen at depth. Results indicate that the port inlet is a source of fecal indicator bacteria and human enteric viruses to the nearshore environment. The offshore outfalls may also contribute to the levels fecal indicator bacteria. Work on this project is ongoing and will include viral extraction efficacy assays on sponges as well as adenovirus detection.

#### **Presentation: LBSP Project 26 – Volunteer water quality monitoring program**

Nick Gadbois, FDEP-CRCP, presented a proposed volunteer water quality monitoring program. This will begin as a small scale, pilot program limited to one county in the SEFCRI region. The scope of work for *LBSP Project 25*, a long-term monitoring program, was developed by the TAC and Water Quality Monitoring Team and included a three tier approach. Tier 1 looks at temperature, salinity and chlorophyll A at the surface and depth of the 13 SECREMP sites plus eight additional locations. Tier 2 is aimed at turbidity, nitrates, phosphorus, carbons, dissolved oxygen, and enterococci at the same sites as Tier 1. Tier 3 is aimed at herbicides. Neither *LBSP Project 25* nor *Project 26* has been implemented due to funding constraint. However, it is believed that *LBSP Project 26* will be less expensive compared to *LBSP Project 25* because of the use of volunteers.

Nick Gadbois proposed conducting the volunteer WQM program in one of 2 ways: sampling coastal waters only or coastal water sites plus additional inshore sites. All volunteers will be trained in FDEP collection procedures to provide quality assurance. An outside lab will be used to analyze water samples. Sampling will be done at the surface, mid-level, and reef level across all reef tracts in that county and would include the SECREMP monitoring sites in that particular county.

Margaret Miller asked about the cost savings versus simply having Broward EPD do the testing. She said there could be a lot of variances that can ruin the project. Joe Boyer agreed that quality assurance might be compromised.

Brian Lapointe asked who would be in charge of the data management. Nick Gadbois responded that the outside lab would be responsible for reporting the data and FDEP-CRCP would be in charge of establishing a database to house the information.

Phil Dustan added that there should be some insurance to protect the equipment.

Several TAC Members voiced their concern about maintaining quality assurance. Margaret Miller suggested focusing on one aspect of water quality to simplify the process.

Valerie Paul suggested identifying the purpose and audience for the project. If the purpose is to collect data that can be used for management decisions, volunteers may not be the best option. However, if you want to educate the public about water quality concerns, a volunteer WQM program would be a great option.

Chantal Collier said there currently is no funding allocated for this project. The FDEP-CRCP is simply trying to gauge whether this project should be pursued for funding during the next grant cycle. She added that a principal objective behind establishing a volunteer water quality monitoring project is to engage the public. However, since it is important to volunteers to know that they are contributing their time in a meaningful way, if the data cannot be used for management decisions, it may not make sense to pursue this project. There are other ways to engage the community which can be pursued with fewer obstacles to success.

### **Presentation: Ocean outfall legislation update**

Linda Brien, FDEP, presented an update on the legislation that was passed to eliminate the ocean wastewater outfalls. Senate Bill 1302 prohibits all new wastewater discharge through the ocean outfalls and flows are limited to their currently permitted discharge capacity. All plans for the expansion and addition of wastewater outfalls have been stopped. Existing outfalls will be permitted for maintenance. The bill includes wastewater treatment and management requirements, minimum reuse requirements, outfall/wet weather discharge allowances, plan and report submittals, and opportunity for water reuse to support outfall elimination. By 2018 nutrient level will have to be decreased to meet at least advanced wastewater treatment or reducing the total nutrient load by 80–90 %. By 2025 the use of outfalls will be eliminated. The bill requires that 60% of the outfall flow must be used for reuse. After 2025, outfalls can be used for wet weather flows when reclaimed water cannot be used and must meet AWT standards. Loans through the revolving State funds will give priority to projects targeting reuse. Water Management Districts must give funding priority to projects that target reuse to assist in the elimination of the oceanic outfalls. The bill will establish a funding mechanism and a dedicated

account within the Ecosystem Management and Restoration Trust Fund. These funds will assist in the implementation of infrastructure projects.

Wastewater facilities will have to submit proposals and plans to FDEP about how they will be decreasing flows from the outfalls, options for creating alternative disposal methods and plans for reuse by 2009.

Gene Shinn asked how many new disposal wells will be built and Linda Brien said that is unknown.

**Presentation: Detecting coral responses to environmental stress through gene expression profiling**

Sara Edge, FIU/Harbor Branch, gave a presentation on using microarray technology to determine gene expression profiles in corals as a detection method of coral responses to various stressors. All cells in an organism have the same genetic code but different genes are expressed based on different stimuli. Gene expression profiling can determine which genes are expressed by specific stimuli. By exposing a tissue sample to a pollutant, one can determine which pollutant is affecting a reef based on the genetic expression. Using microarray technology, RNA is extracted from sample tissue and reversed transcribed. The isolated genes are then compared to sequences in available genetic databases using bioinformatics tools to develop the coral array.

The current array includes 150 genes that are known to response to stressors. Lab tests were performed that examined stressor specific gene expression patterns including those from increased temperature, UV, and salinity. In situ work was done in Bermuda that studied gene expression patterns at varying distances from point sources of pollution. Responses were seen to heavy metals and pesticides. A temporal field study was done in the Florida Keys to see the differences in gene expression over time within a population. Results from this study showed no response expression to heavy metals or pesticides.

Work done in southeast Florida concentrated on *Montastraea cavernosa*. Five separate colonies at five different sites were sampled 5 times during 2005 and 2006. Tissues samples from each colony were taken and each colony was photographed and marked with a tag. RNA was extracted from the tissue samples, reverse transcribed and labeled, then characterized by gene function; normal cellular function genes, multi-functional genes, stress response genes, and symbiotic specific genes. Results showed the most stressed periods occurred during June and October of 2005. The stressor did not appear to be thermal nor UV related since June and October were not the warmest months and the genetic patterns were not indicative of these stressors. However, stressed periods did correspond to heavy participation events which significantly lowered salinities and resulted in particulate matter accumulating on corals possible due to storm activity. In addition, a strong correlation between the expression of host stress genes and zooxanthellae genes was observed during the study. Research is ongoing to investigate this correlation further.

### **Southeast Florida Coral Reefs: Impacts of Land-Based Pollution Policy Paper**

Esther Peters, Tetra Tech, presented an update on the TAC Non-White Paper. It was decided at previous TAC meetings the TAC should write a paper that would help others understand the stressors that are impacting the SE Florida Reefs. It was decided that the TAC paper should be a short document with bullet points, images, and minimal text such as Brian LaPointe's Bucco Reef Trust document. It should be designed to educate Florida politicians on the state and county levels. Esther Peters had written an outline and several TAC and TAC Organizational Committee (OC) members contributed information, maps, and photos. Judy Lang, Esther Peters, Valerie Paul and Margaret Miller compiled and edited the information received from the contributing authors. Esther Peters then distributed copies of the rough draft to the TAC members and asked them to review and comment on the document.

Nick Gadbois dismissed the TAC OC and observers while the TAC member reviewed the document.

The TAC organized a committee lead by John Fauth to compile the second draft of the paper. Committee members include John Fauth (Chair), Phil Dustan, Gene Shinn, Erin Lipp, and Piero Gardinali.

Gene Shinn said that it's important not to scare the public with this and cause an overreaction.

Brian Lapointe suggested the website [www.harness.com](http://www.harness.com) for information on harmful algal blooms that should be included.

Esther Peters said that another rough draft of the paper will be sent to TAC members before work begins on the recommendation and solution section.

Esther Peters turns the meeting over to Nick Gadbois

#### **Public Comment**

No public comments submitted.

Nick Gadbois adjourned the meeting for the day.

### **Day II, Friday May 2**

Nick Gadbois welcomed the TAC, TAC OC, presenters and observers to the meeting. He reviewed the facilitator roles, meeting guidelines, and the agenda. The Public Service Announcement that was created through the Awareness and Appreciation Focus Area was shown. Each TAC member requested a copy and the script of the PSA. Portions of the script may be incorporated into the document being created by the TAC.

#### **Presentation: Studies of ecology and toxicity of *Lyngbya* of Florida Reefs**

Valerie Paul, Smithsonian Marine Station, presented her study examining *Lyngbya* blooms in Florida waters. *Lyngbya* species are found in most tropical and sub-tropical environments. Blooms are usually associated with increased nutrient levels and can produce toxic compounds that impact human health. *Lyngbya* blooms are currently reported worldwide and associated with the warming of water bodies. Many diverse *Lyngbya* species are found in Florida, producing a wide range of secondary metabolites (cyanotoxins). Aside from the texture, most species can only be identified microscopically. The different groups of *Lyngbya* might need to be reclassified taxonomically based on molecular methods.

This study has looked at both top-down and bottom-up control methods. However, because of the compounds that *Lyngbya* produces most herbivores will not eat it. That only leaves the small amount of specialized herbivores for bloom control. Valerie Paul is beginning to identify the diverse compounds being produced by the blooms. This work is generally supported by the ECOHAB Program. The Mote “Protect Our Reefs” license plate program is also contributing funds for the project. The technique involves short term bioassays with individual tufts of *Lyngbya* that are incubated in situ in polycarbonate jars and given various treatments of nutrients. Nitrogen and phosphorus had little effect on algal growth where as iron has been shown to encourage growth which is consistent with studies done in Australia. This suggests that *Lyngbya* blooms are replete with the nutrients naturally available and limited by micronutrients. Some stable isotope analyses have been done using C<sub>13</sub> and N<sub>15</sub>. These tests show that although many species of *Lyngbya* can fix atmospheric nitrogen some *Lyngbya* species rely on nitrogen and carbon from anthropogenic sources.

Valerie Paul has developed feeding assays where extracts and compounds are incorporated into artificial diets of *Lyngbya* species. This has demonstrated that these compounds have a deterrent effect on grazing. Enzyme inhibitors have been found in many *Lyngbya* species which deter many generalized grazers. *Styocheilus striatus* is one of the only specialized *Lyngbya* grazers. Cyanobacteria have also been found to impede coral settlement and recruitment. This study is ongoing and there are plans to continue testing around Florida.

Gene Shinn asked when *Lyngbya* became a problem in Florida. Ken Banks replied that it was first seen in 1990 but became a problem in 2003.

**Presentation: USEPA Stony Coral rapid bioassessment protocol for southeast Florida Reefs**

Russ Frydenborg, FDEP, presented the rapid bioassessment protocol established by the U.S. Environmental Protection Agency (USEPA). The Center for Biological Diversity has petitioned FDEP to place coastal waters on Total Maximum Daily Load list due to potential increase in pH due to global climate change. By 2050, pH in the open ocean is expected to increase by 0.2 standard units, which will lead to a 20-25% decrease in the calcification rate of corals. The Department of Environmental Assessment and

Restoration (DEAR) came up with a plan to review the rapid bioassessment technology used by the USEPA to determine if it can be included as an official methodology for evaluating disturbances within the Clean Water Act. The current State water quality standards will be open for review in a few months and coral response to pH can be included in this revision.

The short term goal is to team with the USEPA and conduct initial sampling to develop statewide standard operating procedures for eventual inclusion in the Quality Assurance rule. The long term goal is to develop a multi-metric index coral community health based on response to human stressors. An objective measure of human disturbance must be developed for the ranking matrix. Once a predictable environmental indicator response is determined, a multi-metric index can then be formulated. The final step is to use the EPA's biological condition gradient (BCG) to calibrate the index. The BCG process is used to determine appropriate thresholds to categorize sites as "exceptional", "healthy", or "impaired".

The bioassessment protocol involves a 1 m wide belt transect, where corals are identified to species, enumerated and measured for width and height. An estimate of the percent live tissue coverage is also made. There are many metrics that can be calculated from these measurements, providing the tool to relate to the endpoints.

Chantal Collier asked how this effort potentially ties into the development of numeric nutrient criteria for coastal waters in Florida, including coral reefs. Russ Frydenborg responded that it is not a direct involvement, but when there is a calibrated index that can be used as a response variable to nutrient enrichment it can assist with nutrient criteria development. Chantal Collier then asked how these indices would fit in with the current SEFCRI processes. Russ Frydenborg stated that it is difficult to predict how the bioassessment criteria will develop, but having standardized, and legally defensible methods for community assessment would be a step in the right direction.

Phil Dustan asked how this process would compare to already established metrics such as Reef Check. Judy Lang responded that Reef Check surveys do not qualify as metrics.

Margaret Miller added that the challenge will be that coral reefs are an artifact of what was originally there due to disease and bleaching. She continued that a fundamental difference between coral reefs and other habitats is that the human gradients are weaker signals than the strong bleaching events. Judy Lang suggested that coral may not always be what one looks at in the coral ecosystem to determine water quality. Something such as *Lynghya* can be studied more easily.

John Fauth asked how the metrics that are assessed are determined. Russ Frydenborg responded that it is best to select non-redundant metrics that measure a variety of important ecological attributes and include those that give the best response to the human disturbance gradient.

Vladimir Kosmynin said that no matter how the indices are built, the assessment and survey are the real problems. Ken Banks added that another problem is coming up with the disturbance gradient as it is too non-linear over time.

Phil Dustan stated that it is difficult to try to construct criteria based on 2% of coral reefs that were originally there. He feels that there is no reason to go through the motions to prove it is degraded when all one has to do is stick their head underwater. Russ Frydenborg responded that the criteria would establish legal proof that could be used to serve as the basis for regulatory decisions.

### **TAC Administrative Business**

Richard Harvey said that the EPA strategic plan has been circulated and The National Tribal Council has expressed interest in participating in a SEFCRI group. Chantal Collier said that it would be a definite opportunity, but their interests should be established first to ensure their interests are met by inviting their participation on the appropriate focus team. She added that any group is always welcome to attend SEFCRI meetings even if they are not members of a focus team or the TAC. Richard Harvey stated they do have lawyers and lobbyists and could make some contributions but he is unsure of their level of expertise. Chantal Collier responded that they do not need to be experts they just need to understand the ecosystem. They could also be classified as a user group. Chantal Collier asked Richard Harvey to have the National Tribal Council contact her.

Nick Gadbois proposed November 6 and 7 or 13 and 14 as potential dates for the next TAC meeting. A firm meeting date will be scheduled at a later time.

### **Public Comment**

Dan and Stephanie Clark, *Cry of the Water*, spoke during the Public Comment period. Comments were not presented for inclusion in the minutes.

### **General Discussion**

Nick Gadbois said that the draft environmental impact study (DEIS) for the Port Everglades expansion project has not been issued yet. Chantal Collier said that the DEIS is anticipated in June and the public will have about an opportunity to provide comment on the DEIS. As part of the expansion project, the Port wants to remove eight acres of mangroves to expand the turning notch for the larger ships. The proposed mitigation plan is to plant more acreage of mangroves at another location. Ken Banks added that the EIS will have a huge impact on the reefs and everybody should try to make a comment during the public comment period.

Nick Gadbois announced the results of the unfunded LBSP project prioritization ballot completed by the TAC and TAC OC - the TAC is still interested in pursuing all of the current unfunded LBSP projects and long term monitoring (*LBSP Project 25*) was deemed the highest priority project to pursue in Fiscal Year 6.

Phil Dustan said that the atmospheric project (*LBSP Project 31*) should have higher priority.

Dale Griffin asked if *LBSP Project 25* could be worked into the port expansion project. Ken Banks said that no mitigation details have been worked into the port plan yet. Richard Harvey added that if the TAC is looking for long term monitoring, then long term funding is needed so the group will not have to reapply every year. Chantal Collier said that a small amount of funding could be requested from NOAA with state matching funds but this may not be the best solution for funding a regional water quality monitoring project. The amount of funds available would be insufficient to establish an adequate number of sites across the region, and would not ensure long-term sustainability of the monitoring project..

Chantal Collier suggested that *LBSP Projects 28 through 32* should be the target projects instead of the long-term and volunteer monitoring due to the cost associated with monitoring. Dale Griffin noted that these projects were prioritized prior to the new ocean outfall legislation. Chantal Collier suggested that the TAC revisit *LBSP Projects 28 -32*. Nick Gadbois said that he would resend the project ballot with just these projects listed

### **Southeast Florida Coral Reefs: Impacts of Land-Based Pollution Policy Paper Recap**

Esther Peters said that the TAC members had reviewed the draft paper and agreed to further develop the paper. A new committee was established to lead the development of the second draft. John Fauth will chair committee. The other committee members, Phil Dustan, Gene Shinn, Erin Lipp, and Piero Gardinali, will assist in compiling and reviewing the second draft. TAC members who have comments can give them to John Fauth. An electric copy of the draft will be sent to the TAC.

Esther Peters said that NOAA will not allow John Proni to participate in writing the paper. Vlad Kosmynin said that the TAC Organizational Committee should also be included in writing the paper. Chantal Collier said this was discussed at the last meeting and it was decided that the paper would be stronger if it came from scientists only and not scientists and managers. She also noted that if she is to take this to legislators, then she should not be an author. Richard Harvey added that if agency people were included, then they will most likely have to get the document approved by their agency. It was also noted that Bill Kruzynski's paper was written from the aspect of a knowledgeable scientist and not as an agency member.

Nick Gadbois adjourned the meeting at 12:43.

### **Meeting Adjourned**

### **Action Items**

<b>No.</b>	<b>Action Item</b>	<b>Responsible Party</b>	<b>Date</b>
1	Distribute DVDs of SEFCRI PSA to the TAC	Nick Gadbois	None
2	Distribute project priority ballots highlighting <i>LBSP Projects 28 and 32</i>	Nick Gadbois	None
3	Distribute electronic copy of the LBSP Impact Paper	John Fauth	None
4	Set the next TAC meeting date	Nick Gadbois	None