Southeast Florida Coral Reef Initiative (SEFCRI)
Land Based Sources of Pollution (LBSP)
Technical Advisory Committee (TAC)

Meeting #10 Agenda
May 7 - 8, 2009

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

LBSP TAC Members

Name	Affiliation	May 7	May 8
Joseph Boyer	SE Environmental Research Center, Florida International University (FIU)	X	X
Hal Davis	United States Geological Survey (USGS)		
Richard Dodge	Nova Southeastern University (NSU)	X	X
Phil Dustan	College of Charleston	X	X
John Fauth	University of Central Florida (UCF)	X	X
Piero Gardinali	Florida International University (FIU)	X	X
Dale Griffin	United States Geological Survey (USGS)		
Vladmir Kosmynin	Florida Department of Environmental Protection (FDEP)	X	X
Judy Lang	Independent Contractor	X	X
Brian Lapointe	Harbor Branch Oceanographic Institution, Florida Atlantic University (FAU)		
Erin Lipp	University of Georgia	X	X
Margaret Miller	National Oceanographic and Atmospheric (NOAA) Administration, National Marine Fisheries Services (NMFS)		
Valerie Paul	Smithsonian Marine Station at Fort Pierce	X	
Esther Peters	George Mason University	X	X
Gene Shinn	University of South Florida (USF)	X	X
Alexander Soloviev	Nova Southeastern University (NSU)		
Peter Swart	University of Miami, Rosenstiel School of Marine And Atmospheric Science (RSMAS)		X
Judith Gray	NOAA / Atlantic Oceanographic and Meteorological Laboratory (AOML)	X	X

LBSP TAC Organizational Committee Members:

Name	Affiliation	May 7	May 8
Ken Banks	Broward County Environmental Protection and Growth Management Department's Natural Resources Planning and Management Division (NRPMD)	X	X
Nancy Craig	Broward County Environmental Protection and Growth Management Department's Natural Resources Planning and Management Division (NRPMD)	X	X
Laura Geselbracht	The Nature Conservancy (TNC)		
Richard Harvey	Environmental Protection Agency (EPA)	X	
Linda Brien	Florida Department of Environmental Protection (FDEP)		X
Cheryl Miller	Independent Contractor	X	
Wendy Wood	Nova Southeastern University (NSU)	X	X
Chantal Collier	FDEP-CRCP		X
Nicholas Gadbois	FDEP-CRCP	X	X

Additional Presenters and Observers:

Name	Affiliation	May 7	May 8
Jack Stamates	NOAA	X	X
Lew Gramer	University of Miami (UM)	X	
Brian Walker	Nova Southeastern University (NSU)	X	
Drew Wham	College of Charleston	X	X
Katie Olds	College of Charleston	X	X
Jamie Monty	FDEP-CRCP	X	
Ed Tichenor	Palm Beach County Reef Rescue (PBCRR)	X	X
Terry St. Jean	Palm Beach County Reef Rescue (PBCRR)	X	X
Stephanie Clark	Cry of the Water	X	X
Dan Clark	Cry of the Water	X	X
Lou Fisher	Broward County Environmental Protection and Growth Management Department's Natural Resources Planning and Management Division (NRPMD)	X	X
Kate Semon	Smithsonian Marine Station	X	X

Day 1 - Thursday May 7, 2009

MEETING SUMMARY

Meeting Guidelines

Nick Gadbois welcomed the committee, presenters, and observers. The TAC members, TAC OC members, invited speakers and the audience introduced themselves. Nick introduced Judith Grey, who will temporarily fill the vacant seat on the SEFCRI LBSP TAC that John Proni previously held, until NOAA completes its search and appointment to fill the vacancy following John's retirement. The person hired to fill John's vacant position at NOAA AOML will become the new NOAA AOML representative on the TAC. Following the introductions, Nick reviewed the meeting facilitator's role, guidelines for discussion, consensus rules, comment cards and meeting evaluations; then he reviewed the agenda.

Follow up from the November 2008 SEFCRI TAC Meeting

Nick Gadbois reminded the TAC of their discussion at the November 2008 TAC meeting regarding not pursing *LBSP Projects 18(Conduct technical workshops to determine priority areas that need to be surveyed for additional biological and water quality pollutant indicators)* and *LBSP Project 28(Determine the flux of pollutants exiting the offshore wastewater outfall pipes and the net flux to the reef communities)* as part of the current SEFCRI Local Action Strategy because other agencies are already fulfilling the objectives of these projects. Nick had previously circulated a form to the LBSP TAC and LBSP Focus Team to vote on whether the projects should still be pursued, but only 4 responses were returned from both the LBSP TAC and the LBSP Team. Nick asked each TAC member to complete the form in their meeting packets to vote again and return them to him before the end of the meeting. Joe Boyer asked to discuss the projects again before voting. The project discussions are summarized below.

LBSP Project 18: Identify hotspot areas of concern for addition water quality monitoring should be eliminated because other programs, such as the Total Maximum Daily Load (TMDL) and Brownfields, already meet the objectives. Joe Boyer asked about the current status of the state of Florida's efforts to develop water quality criteria. Nick responded that the state is working on developing water quality criteria, but is currently concentrating on freshwater; coastal water quality criteria will not be developed until 2011. Nick mentioned that he had spoken with Ken Weaver, coordinator of the Freshwater Nutrient Criteria TAC for the state of Florida, to discuss using a watershed approach to develop nutrient criteria. Ken responded that the TMDL program will be implemented if downstream sources are impaired. Nick also reported that Chantal Collier met with USEPA while attending the US Coral Reef Task Force meeting in Washington D.C. about developing nutrient criteria for coral reefs in southeast Florida. The USEPA expressed interest in leading this effort with assistance from the SEFCRI TAC. To assist with this process, Nick created a small working group, including Joe Boyer, Nancy Craig, Phil Dustan, Brian Lapointe, and Dale Griffin. However, on a recent call with the USEPA, Nick discovered the USEPA does not have a budget to undertake this project. The USEPA team asked Nick for information that would assist them in developing a proposal for funding through the USEPA. Joe mentioned he would like to participate on the next phone call with the USEPA.

Next, Nick Gadbois discussed *LBSP Project* 28: *Determine the flux of pollutants exiting the offshore wastewater outfall pipes and the net flux to the reef communities*. Nick said he feels that NOAA AOML is accomplishing the objectives of this project through the FACE program. Joe Boyer reminded

everyone that the goal of the project is to collect nutrient data entering the reef environment from the wastewater outfalls. Joe suggested it would be best to summarize the water quality information from samples collected by the wastewater treatment plants before the effluent is pumped out to the outfalls. Joe said the same composition should come out of the outfalls as is being pumped into them.

Nick Gadbois then presented a brief update on the status of other LBSP projects, as summarized below.

LBSP Project 5 – Conduct a Biomarker Study to Identify and Trace Specific Contaminants that Negatively Impact Coral Reefs

The goal of *LBSP Project 5: Conduct a Biomarker Study to Identify and Trace Specific Contaminants that Negatively Impact Coral Reefs* is to determine whether and how land-based sources of pollution affect southeast Florida coral reef ecosystems. The objective of the project is to identify the links between pollution and coral reef resources. A pilot study was completed in 2006 and a more intensive spatial study is now underway. John Fauth, the Principal Investigator for this project, and several others completed field work for this study in the days preceding the TAC meeting.

Nick asked John Fauth if he would give an update about the project. John thanked Ken Banks and his crewmembers for helping with the field work. John said preliminary observations show regeneration of the coral lesions he created for the biomarker study are not healing over a one year time period. However, in the control sites, lesions had healed. John did observe variability in tissue regeneration within each sampling site. John would like to use the data from the Southeast Florida Coral Reef Evaluation and Monitoring Program (SECREMP) study to compare coral health in other areas of the reef tract to his observations of stressed corals with the biomarker study.

Phil Dustan stated he does not believe SECREMP's methodology is an efficient method to detect change over the entire reef tract. Judy Lang agreed with Phil Dustan and explained that since the absolute cover is low to begin with, the diagnostics might not give a good representation of what exactly is occurring on the reef.

Ken Banks said that the enterovirus study, *LBSP Project 33,* is using the same sites as the biomarker study and the results from both studies can be integrated into one report to provide a snap shot of what contaminants may be impacting the corals at these locations.

Richard Harvey stressed that the need to combine the datasets into one document for an overall consensus of what is occurring on the reef tract is important enough to use money from lower priority projects. Nick Gadbois mentioned that it may be possible to reallocate funds to do this from *LBSP Project 24: Educate the public about LBSP impacts on coral reefs*. Nick said he will explore this option.

Phil Dustan, who also assisted John Fauth and team, commented that during the recent trip he came across polychaete worms, *Phylograna* spp., ubiquitously growing on sponges in braided, growing tubes.

Presentation: Preliminary Evidence of Population Structure and a Bottleneck Event in *Porites astreoides*

Drew Wham, a graduate student of Phil Dustan's, gave a presentation about his graduate work on a microbial population study to look at neutral alleles, mutations within the cellular structure of corals that do not affect the overall fitness of the organism, in order to understand population structures of coral reefs in the Caribbean. An ecosystem with many different neutral alleles is reflective of a having a

healthy population. Drew explained how he is using a fingerprint technique to see the neutral alleles in corals between Florida and the Bahamas. His sampling sites consist of locations near and away from ocean inlets and ocean outfalls. A control site was located in the middle of the study area; Drew felt it was not a true control because it was not representative of both the Florida and the Bahamian sampling sites and a substitute control site might be needed. His methodology is based on neutral alleles, variable in size. Preliminary data show the diversity of neutral alleles, necessary for a healthy coral population do not exist in the southeast Florida sites. The Florida variability of neutral alleles is diminished. Greater allele diversity exists in the Bahamas. Drew also determined from his study that corals of Bahamian origin were not found along the Florida Reef Tract. So if the coral population crashes in Florida, recruitment from the Bahamian reefs is unlikely to occur.

Phil Dustan expounded on the subject that Florida should have the same number of alleles and genetic diversity based on latitude similarities. However, this is not the case. A severe bottleneck has caused the genetic differences in the Florida site.

Judy Lang said she was interested in using Drew Wham's work to look at juvenile corals and initial settlers along the entire Florida Reef Tract.

LBSP Project 11 - Develop an Integrated Management System with Florida Fish and Wildlife Research Institute (FWRI)

Through *LBSP Project 11***,** an integrated data management system (IMS) was developed in 2007 in conjunction with the Florida Fish and Wildlife Research Institute (FWRI) to visually present LBSP and related southeast Florida coral reef data from the different local, state, and federal agencies. FWRI is contracted to continue hosting and maintaining the website through December 2010. Nick Gadbois said increased outreach is needed to inform the public about the website and its uses. Nick showed the TAC the different datasets currently available for viewing on the IMS website. Nick stated this project can be used to assess the data for potential impacts to the coastal environment.

Dan Clark said that it might be useful to get the *LBSP Project 11* layers on the Google Ocean program. Ken Banks agreed that it was a good idea to invest resources toward this. Ken also suggested that the public submit pictures and information about locations of high density coral areas to the IMS website. This would also facilitate greater public awareness and caring for scientific information. Nick Gadbois said ArcGIS is capable of displaying pictures and he would look into whether or not this would be possible. Nick wants to add information about the algae blooms to the IMS website and asked the TAC to send him any information they have about past blooms in the SEFCRI region.

LBSP Project 21 – Conduct a Technical Workshop to Evaluate the Outcomes of LBSP Combined Project 3 & 19

The objective of *LBSP Project 21:A technical workshop to evaluate the outcomes of LBSP Combined Project 3 & 19* is to assess the data collected in *LBSP Combined Project 3 & 19: Survey agencies about LBSP programs and best management practices.* The Center for Watershed Protection (CWP) was funded by NOAA to complete *LBSP Project 21.* The CWP conducted a review of the surveys from *LBSP Combined Project 3 & 19* and local and state ordinances, then drafted a document summarizing the findings and providing recommendations to reduce impacts of LBSP in the southeast Florida region. The project team, Ken Banks, Stephanie Clark, and Dan Crean, have reviewed the document and submitted comments. The CWP is currently integrating the comments into their document and will have

a final draft ready for review soon. The second phase of this project will be to hold public workshops with all the agencies that completed surveys to discuss the results of the project. The workshops will be facilitated to extract additional information from the participants about other areas of concern. The information collected during the workshops will be incorporated into a revised edition of the first report. Nick Gadbois discussed a few of the recommendations from the draft report: land conservation, aquatic buffers, better site design, erosion and sediment control, stormwater management. Nick said the next step following the completion of *LBSP Project 21* is to conduct *LBSP Project 23: Implement recommendations from LBSP Project 21*.

LBSP Project 24 – Educate and Inform all Stakeholders Concerning the Value and Importance of the Coral Reef Ecosystem of Southeast Florida, Land Based Sources of Pollution, Pollution Impacts on the Resources and the Strategies Recommended to Address the Problems The goal of *LBSP Project 24* is to educate and change stakeholders' behaviors in an effort to reduce LBSP impacts on coral reefs. The project team consists of Stephanie Clark, Cheryl Miller, and Dan Crean. Cheryl developed a brochure about fertilizer use for distribution to stakeholders at retail chains. Chantal Collier suggested incorporating information about pesticide and herbicide use into the fertilizer brochure because the audiences will be the same. The fertilizer, herbicide and pesticide brochure is currently being drafted. The project team also decided to develop a separate brochure about the southeast Florida watershed addressing areas south of Lake Okeechobee. This brochure is also being drafted. A conceptual diagram of the southeast Florida watershed is currently being created for the watershed brochure. Nick Gadbois showed the draft diagram which displays the flow scheme through the watershed. Aquifers, the confining layer, Lake Okeechobee flow, canals and wetlands, and urban development will all be in the diagram.

LBSP Project 25 – Establish a Long-term Regional Water Quality Monitoring Program (pilot project)
The objective of *LBSP Project 25* is to establish a long-term regional water quality monitoring (WQM) program for the southeast Florida coral reef system. A proposal was submitted to NOAA in September 2008 to initiate a pilot water quality monitoring project at the 17 SECREMP benthic monitoring sites. Nick Gadbois commented that the National Coral Reef Institute (NCRI) will receive funding from NOAA to start the WQM program which will commence in October 2009. Discussions are also being held with the USEPA about possible long term funding for the WQM program. Nick thanked Joe Boyer, Richard Dodge, and Dave Gilliam for their hard work in developing the scope of work for the project. Joe asked if NOAA would continue to fund this. Nick replied that NOAA would rather not and is helping to search for alternate funding sources for the long term.

LBSP Project 27 – Quantify the Flow Rate and Amount of Pollutants being Transported to the Reef Communities by Groundwater
The goal of *LBSP Project 27* is to quantify pollutants from groundwater entering the reef environment. Dale Griffin, the Principle Investigator, has completed the fieldwork and will begin analyzing the data soon.

LBSP Project 30 – Determine Flux of Pollutants from Oceanic Sources to Coastal Waters
Nick Gadbois updated the TAC on the recent developments for *LBSP Project 30: Determine the flux of pollutants from oceanic sources*. Currently, the project's scope of work is not being developed, and Alex Soloviev has data from a previous upwelling study that has not been analyzed. Nick stated that at the

recent LBSP Focus Team meeting the team recommended summarizing the data from Alex's study in a report. Nick asked for volunteers to spearhead the development of a scope of work for this summary project. Joe Boyer volunteered himself with assistance from Alex.

LBSP Project 31 – Determine the Flux of Pollutants from Atmospheric Sources to Coastal Waters
At the previous TAC meeting, Dale Griffin, Piero Gardinali, Gene Shinn and Peter Swart were identified to develop the scope of work for *LBSP Project 31: Determine the flux of pollutants from atmospheric sources*. Dale developed a scope of work suitable for a request for proposal (RFP). Nick Gadbois stated the scope needs to be more detailed to be prepared for when funding opportunities arise. Dale will revise the scope and circulate it to the other team members for review.

LBSP Project 32 – Identify Sources and Signals of Land-based Pollution in Southeast Florida using Stable Isotopes as a Sewage Signal in Octocorals and Macroalgae/*Lyngbya* Tissue
Peter Swart gave a brief presentation of *LBSP Project 32a: Determine fractionation of nitrogen in algae tissue.* Peter showed a slide of the nitrogen fractionation and explained the complexity of the fractionation within the algae. Peter stated that the fractionation accompanying assimilation of nitrate NO_3^- and ammonia NH_4^+ was measured in two species of macro algae (*Gracilaria sp*. and *Agardhiella sp*). The large assimilation factors found in this study can produce significant variations in the stable nitrogen isotopic composition from the uptake of either ammonium or nitrate by algae.
Nick stated that *Project 32* is included in the new NOAA grant awarded for fiscal year 09-10 and that the draft scope of work is in the TAC binder for review. He asked the TAC members to review the SOW and send all comment to him as soon as possible.

LBSP Project 33 – Identify Sources and Signals of land-based Pollutants in Southeast Florida using Human Enteroviruses as an Indicator of Fecal Contamination
Erin Lipp gave an update on *LBSP Project 33* with recent data from the 2007 and 2008 norovirus detection. The project objectives are to determine if reefs are exposed to and/or accumulating human viruses which can be detected by identifying enteric microbes. Evidence of contamination was determined if more than one sample at a site tested positive for a specific virus. Overall, at least 40% of the samples were positive for noroviruses. The trends based on 2 years of data showed a higher evidence of contamination nearshore. Positive results were also found in the surface waters of Broward County's outfall at Hillsboro. Gene Shinn asked if Erin would like another control site based in the Bahamas. Gene offered to take samples since he will be in the Bahamas soon. Ken Banks asked what the survival lengths for the viruses are. Erin said there is no previous model for this, but noroviruses do not survive at length and their hardiness might increase survival times. This project is complete and Erin Lipp is currently drafting the final report.

Presentation: LBSP Projects 8 and 9 – Create Benthic Habitat Maps for Miami-Dade and Martin Counties
Nick Gadbois turned the meeting over to Brian Walker who presented an update of *LBSP Projects 8 & 9: Develop benthic habitat maps of Miami-Dade and Martin Counties* (respectively). The objectives of the project include two phases for each area, with Phase 1 being the visual interpretation of data mapping between reefs, and Phase 2 the acoustic ground discrimination. The Miami-Dade County mapping Phase 1 will be completed by June 30, 2009 and Phase 2 is included in the NOAA Coral Grant Award through FDEP–CRCP for fiscal year 09-10. Phase 1 of the Martin County mapping is in progress and Phase 2 is not yet funded. Broward and Palm Beach Counties are complete. New Broward County

LIDAR was flown August 2008 by the county and is available for use.

For the Miami-Dade County mapping, Brian Walker compiled GIS datasets from many local, state, and federal sources. The main data sets were the LIDAR from Miami-Dade County and aerial photographs commissioned by the National Parks Service (NPS). The aerial photography helped differentiate low relief hard bottom patches from sea grasses and increased accuracy for those habitats. Habitat polygons were created in ArcGIS using a combined technique approach with visual interpretation of the high resolution bathymetry and aerial photography, the same as the Broward County and Palm Beach County mapping efforts.

Brian Walker continued by describing the classification scheme. Shallow aggregate patch reefs, continuous sea grass, and discontinuous sea grass were new additions to the classification scheme. These areas were unique to Miami-Dade County and not found in the Broward County or Palm Beach County maps.

Groundtruthing was focused along 7 cross-shelf transects with samples taken every 100 meters and many targeted areas with specific hard-to-interpret data signatures. There were a total of 607 video drop camera samples which were used to delineate the habitat areas.

Once the map polygons were finalized, an independent accuracy assessment was quantified by sampling 400 random stratified targets with 25 targets in each map category. GPS coordinates from the video were used from the start and end of each video track to plot the sample location and relate it to the map. Accuracy was 93% overall, which is higher than historical mapping accuracy for Broward (89.6%) and Palm Beach (89.2%) Counties. Brian Walker mentioned the highest map confusion was between the deep sand and deep ridge accuracies, which were not very evident in the LIDAR or aerials.

Martin County LIDAR was flown during December 2008 and consisted of 53 flight lines over 4 days covering 350 km^2. Unfortunately, there is a lot of noise in the data due to adverse weather conditions limiting LIDAR penetration. Brian Walker has identified the areas with excessive noise and has asked the subcontractor to fly these areas again. Reflights will occur in summer 2009. Processing of the data is still needed.

Brian Walker suggests mapping every 10 years to make sure any changes to the habitat types can be identified and incorporated into the map. The Broward County maps are based on 2001 data. The recently acquired 2008 LIDAR dataset could be used to update the existing Broward County maps at a fraction of the cost of completing a new bathymetric survey several years from now.

Presentation: LBSP Project 29 – Quantify the flux of pollutants exiting the Port Everglades Inlet and entering the coastal waters

Jack Stamates presented an update on *LBSP Project 29*. The purpose of the project is to quantify flow through the channel with simultaneous estimates of concentrations of anthropogenic waste in the inlet.

During the FACE Boynton Inlet study, nutrients were found to be significantly higher during the ebb tide. Port Everglades is a challenging environment for flow estimation because the flow is vertically stratified. Working in the center of the channel is difficult and dangerous so a solution has been created - a horizontal unit near the surface that is pointed slightly downwards. A determinant physical parameter

of the project is that the channel is wider than its depth. This is significant for the ADCP deployment. Jack Stamates thanked Nancy Craig for her previous assessments of the areas. This data enabled Jack to model the expected acoustic conditions in the inlet.

From calculated sound speed profiles Jack Stamates created an acoustic propagation model which showed that there is significant variation in the acoustic conditions in the inlet. After evaluating the model output from the available data, an 8 degree down angle was chosen to be the best compromise between refraction effects and range. Continuity of the measurements is important and is integral to the project. Battery operation of the system allows for operation during inclement weather and power outages.

The preliminary data showed that around the neap tide, the surface layer of the flood tide often has less motion than the deeper layer. During the spring tide the deeper layer and surface layer are observed to move together with some variation. With the velocity data plotted as a histogram it could be seen that the deeper layer exhibited a somewhat symmetric flood-ebb relationship where the surface layer clearly had less motion during the flood tide. The relationship between the surface and deeper layers probably depends on the wind as well as the tidal changes.

To minimize data corruption from boats, Jack Stamates discussed the algorithmic detection used by his system to detect this outlier. The system can tolerate a significant fraction of the data from a particular measurement to be flagged bad due to boats and still report an accurate value. Small boat data will be used to calibrate the ADCP measurements and to develop flow estimates.

Joe Boyer said that first release of flood waters from Lake Okeechobee was an important event that should be monitored during this study. Joe plans on taking the water quality samples during the release. Judy Lang asked if the width of the channel was symmetrical. Jack Stamates responded that it was not and referred to an image in his presentation. Richard Harvey asked if it would be beneficial to install another SeaKeeper system on the other side of the inlet. Jack replied this would not be needed. Jack plans to upload the real time data to a website that is created already.

Presentation: Coral Disease Investigation

Esther Peters presented a review of recent coral disease observations along Broward and Palm Beach Counties' reefs and previous research in the Florida Keys. She defined disease as any impairment of an organism's vital functions, organs, or systems originating from a biotic or abiotic source. She defined health as the state of an organism when it functions optimally without impairment. The criteria for disease must have at least two of three conditions: recognized etiologic agent (pathogen), identifiable group of signs, and consistent anatomical alterations. The earliest changes begin at the molecular levels. Most diseases do not have a single causal agent. The optimum envelope concept, where parameters are within a normal level, was discussed. When outside of optimum ranges, disease and death can occur.

Cell injury was described as having numerous causes and pathways, morphological changes associated with biochemical changes, and attacks on metabolic processes. A lesion was defined as a wound or injury, a pathologic change in tissue, or as occurring externally or internally with abnormal structure or function of cells that affect the organism's functioning.

Disease diagnoses can be difficult to make because condition must be determined along a continuum

from healthy to reversible/irreversible injury. Biomarkers are vitally important to assist in understanding disease, with two recognized types: of exposure and of effects. Diagnosis requires surveillance and monitoring of early changes, testing of water quality and organisms, notification to alert stakeholders, and quarantine/treatment to prevent spread of disease. Disease investigation relies on study of the ecological factors and the victims, formation of a preliminary diagnosis, and sample collections to perform laboratory tests to confirm the preliminary diagnosis or conduct additional tests. The results of the tests must be evaluated and summarized to make a final diagnosis.

The Coral Disease and Health Consortium was developed in 2001 and 2002 in order to bring together ideas and people to facilitate research on diseases. Recently, funding has been an issue thwarting progress. The consortium meetings reported a need for basic information, colony condition, and potential causal factors.

Rapid tissue loss of Broward County acroporids has been observed. Last summer, permits were obtained to collect mucus samples from *A. palmata* and *A. cervicornis* for Dr. Cheryl Woodley to screen for known coral pathogenic microorganisms. Results are limited to pathogen-specific probes. In Palm Beach County, *Lyngbya* spp. blooms occur down current from the Delray Beach outfall. In November 2008, the site was visited by Palm Beach County Reef Rescue and the samples were sent to FWRI for histopathological examination.

In conclusion, *Acropora* tissue losses are supporting other studies. Microbial communities of healthy and diseased coral tissues are complex. *Lyngbya* spp. on sea fans triggered an immune response; toxins are a potential cause that should be studied. For massive coral tissue loss, there are a lot of unknowns and more diagnostic procedures must be implemented. Overall, there is a need for prompt responses by observers, a central research laboratory, and funding support.

Presentation: SEFCRI Fishing, Diving, and Other Uses Focus Area Update
Jamie Monty presented a brief Fishing, Diving, and Other Uses (FDOU) Focus Area update. The FDOU Team originally created 50 projects around 5 important issues: different conservation ethics, direct extractive impacts, indirect impacts on habitat, artificial reefs, and reliable funding sources. Of the 50, 14 are completed, 25 are ongoing, and 11 are not yet funded.

A long-term strategy for the development of a management plan through SEFCRI FDOU LAS projects predicts outcomes of the projects will form the basis for the management options for the southeast Florida region to be recommended to the appropriate governing authority.

Presentation: A Near-shore Band of Cool Water Associated with a Cyclonic Eddy off the Southeast Florida Shelf: A Florida Area Coastal Environment (FACE) Experiment Aboard NOAA Ship R/V Nancy Foster, February 2008
Lew Gramer, of University of Miami's Cooperative Institute for Marine and Atmospheric Studies, presented the FACE (Florida Area Coastal Environment) program update. The project goal is to protect Florida's coastal waters including water quality and diversity, and funding is currently from NOAA. The project objectives are to, 1) characterize anthropogenic sources of pollution, 2) understand plume dispersal, and 3) characterize natural coastal oceanographic processes that may transport allochthonous, (from other areas) nutrients to the FACE region.

The *R/V Nancy Foster* research cruise conducted February 7-17, 2008, from Miami, Florida had a primary goal to characterize inlet outflow and waste water outfall. An "eddy experiment" was also planned as an opportunistic shipboard project to sample properties of oceanic eddies and associated circulation passing through the cruise study area.

There were two main goals of the eddy experiment: to use high resolution satellite images of Florida waters to catch passage of an eddy, and to investigate dynamics and thermal structure of the eddy interacting with the continental shelf and slope off southeast Florida. The study design included intensive sampling with CTDs and bottle samples along with multiple expendable bathy-thermograph (XBT) deployments. Currents vs. depth were collected with a ship hull-mounted ADCP. Also, thermosalinograph sampling was done onboard the ship.

Implementation of the eddy experiment relied on high resolution (~1km) satellite data from the University of South Florida showing the surface signature of eddies and other circulation features on days before sampling. The mesoscale eddies seen weren't able to be sampled during the cruise due to the unpredictability of their translational motion. However, during the study, an inshore band of cooler water apparently associated with one such mesoscale eddy in the Florida Keys, did reach the FACE study area.

ADCP data showed that a countercurrent with a 1 m per second strong shear developed within a 36-hour period as the cool band passed the study area. CTD data from 16 km offshore also showed an isotherm lifted by 50 m inshore. At 9km offshore, an uplift occurred 40 m in depth, and at 5 km there was a rise of the thermocline. Sea surface temperature and salinity from the thermosalinograph initially showed warmer, fresher water inshore, switching to the reverse pattern (denser water inshore) on the second occupation. All of these changes occurred within 36 hours between successive occupations of the experiment sections, and were attributed to upwelling.

A question was raised during the study as to what forced the cool band along the coast. Hypotheses included: direct air-sea flux at the coast, coastal jet advecting inlet waters, or wind stress from coastal Ekman divergence. However, the winds were not favorable for Ekman divergence so the causal suggestion of wind was eliminated. Satellite imagery was presented appearing to indicate a direct dynamical relationship with the mesoscale eddy, seen interacting with the coastal and offshore topography of the middle Florida Keys at the same time. Future work includes a more complete analysis of the ADCP and hydrographic fields from the experiment, and integration of nutrient and chlorophyll data also collected during the same cruise.

Presentation: Analytical Tools for the Assessment of Airborne Trace Metals in South Florida
Piero Gardinali, Florida International University, gave a presentation about airborne trace metals within the atmosphere along Broward Counties coast. The natural and anthropogenic sources of particulate matter are windblown dusts, pollens, brushfires, and combustion from power plants. African dust is possibly an important source of airborne pollution. Historical research shows between June and August of each year 100 Tg of dust from Africa blows across the Atlantic ocean to the Americas. A recent paper that found African dust on phytoplankton also found a link with copper in dust. Gene Shinn said his past research has found copper in corals.

Filters were used to collect airborne particles at Port Everglades Inlet. A laser ablation system was used to extract the dust off the filters. The dust that was then analyzed for trace metals using inductively coupled plasma mass spectroscopy (ICP/MS). Iron was found within the filter and when plotted against dust, the iron spike is substantially later than the overall toxic metal spike. A correlation was seen with naturally occurring elements, for example, toxic metals with aluminum.

Future research includes a rapid qualitative screen, filter calibrations with one element, quantitative analyses uses digestion, and iron offsets from a dust spike. A good correlation was found between natural and anthropogenic elements but not between each other, which proves different sources for the elements.

Piero also discussed his research of analyzing water samples for microconstituents. For the same site areas, a known reclaimed water spike in the data means the water isn't being cleaned properly for hormones. As an example, preliminary estimates for canals in little Venice show hormone concentration in the waters equivalent to having 25% raw sewage in its canals. Judy Lang asked about the source of the reclaimed water data. Piero Gardinali responded that it was from central Florida. Estrone concentrations give good ecological measurement of water quality degradation and he is currently working on illicit drug detection.

Discussion: Southeast Florida Coral Reefs - Impacts of Land-Based Pollution Document
Judy Lang and John Fauth lead the discussion about developing the SEFCRI LBSP Impacts to Coral Reefs document into both a long, detailed document and a quick guide to coral reefs in south Florida. A long detailed document is being created that will include scientific information related to LBSP impacts to coral reefs. Simultaneously a short 4-page pictorial manual that discusses coral reefs in southeast Florida is being developed. Judy has taken over the responsibility of compiling the edits for the short document. She began by thanking everyone who put time and effort into drafting the paper. Nick Gadbois mentioned that there might be funding from the FDEP CRCP for a professional layout and printing of the shorter 4-page document. Judy has drafted the current layout and text and asked everyone to read through the document to edit, make suggestions about the layout and send them to her as soon as possible. She also said to rank the action items in order of importance. John said the statement "The Gold Coast reefs have been named one of the top 10 reefs worldwide for fishing" must be cited which was taken from scubadiving.com's Top 100 Readers' Choice survey.

The meeting was turned over to John Fauth to discuss the larger, more detailed document.

John Fauth suggested rewriting the technical information in layman's terms for the targeted audience. Richard Harvey said the language should be written to reflect that the resources need to be protected now. John agreed and stated that there is not enough "hard hitting" language that reflects the impacts that pollution is currently having on coral reefs. John also requested feedback about the length of the document, 33 pages not including the action items, and asked if this should be shortened. There was a general consensus that the document should be shorter with more "hard hitting" language.

Other brainstorming ideas about the 4-page document included:

- Richard Harvey suggested comparing the condition of the resources globally vs. regionally vs. locally.
- Vladmir Kosmynin wanted to change the wording to 'small patches of reefs along the 330 mile

stretch of the coral reef'.

- Richard Dodge wanted to avoid leading off with negative statements, and start with discussing the great resource that we have and include the threats and global warming on page 2.
- Ken Banks mentioned referencing the State of the Reef Report for the technical information, to shorten the front page, and make the entire document more action oriented.
- Phil Dustan wanted a long term goal to be to reverse the loss and enhance the economy.
- Judy Lang discussed a smaller font for the technical information to make it appear shorter.
- Richard Dodge mentioned the ICRS Call to Action, listing and basing the action items off its example.
- Phil created an acronym (S.E.F.C.R.I.) to use to list the action items.

Public Comment
Dan Clark and Stephanie Clark each gave verbal public comment.

General Discussion
Nick Gadbois informed the TAC that he has become the point of contact for lionfish sighting reports in the southeast Florida region. Nick stated that there have been 5 reported cases of lionfish in the SEFCRI area since October 2008 - 4 reports in Palm Beach County and one in Miami-Dade County. REEF in the Florida Keys wants to capture all the lionfish that have been reported for gut analysis. Nick said there are liability issues with having the public capture the specimens due to the toxins lionfish carry. REEF will be training people this summer on techniques to properly capture the fish. Gene Shinn asked if anyone was catching them for the aquarium trade yet. Nick responded that he did not know. Phil Dustan suggested putting a bounty on the fish. Judy Lang mentioned 3 restaurants in Nassau, Bahamas that now serve lionfish regularly.

The meeting was adjourned at 4:55 pm.

Day 2 - Friday, May 8, 2009

Facilitation Guidelines/Agenda Review/Overview of Day 1 Discussions
Nick Gadbois reviewed the previously discussed facilitator roles, guidelines for discussion, consensus rules, and meeting evaluations. He asked everyone to fill out the meeting evaluations and leave them on their desks. He also asked everyone to fill out the action item rankings from Day 1. He quickly gave an overview of the previous day's events and announced the Day 2 agenda before turning the meeting over to Chantal Collier.

Presentation: NOAA Coral Reef Conservation Program Roadmap for the Future
Chantal Collier introduced the presentation she gave acknowledging that it was created by Kacky Andrews, NOAA Coral Program Manager.

The NOAA Coral Reef Conservation Program (NOAA-CRCP) mission is to support effective management and sound science to preserve, sustain and restore valuable coral reef ecosystems for future generations. Chantal gave a brief history of the NOAA Coral Reef Conservation Project (CRCP), mandated by the Coral Reef Conservation Act (CRCA) of 2000. The reauthorization of the act is currently pending in Congress. The House has introduced it as H.R. 860, and a companion bill is

pending in the Senate. The House bill will add provisions, expanded appropriations for NOAA, increased capacity for the Department of the Interior, and allow enforcement of vessel grounding and impacts. She mentioned the challenges associated with addressing injuries to coral without funding. With the expanded act, additional support will help allocate funding needed for response to localized events in many jurisdictions. The NOAA-CRCP operates as a matrix program across 4 NOAA offices – National Ocean Service, National Marine Fisheries Service, Oceanic and Atmospheric Research, and National Environmental Satellite, Data, and Information Service. She commented on the external review of the program in 2007. Its purpose was to obtain independent assessment of effectiveness and recommendations for improvement.

The Roadmap for the Future includes 7 guiding principles:

1. The CRCP will address coral reef management needs based on sound science.
2. The CRCP will take an ecosystem-level approach to coral reef conservation, including human aspects.
3. The CRCP will implement its objectives through strong partnerships.
4. Leveraging of non-CRCP resources will be instrumental in achieving program objectives.
5. Measurable objectives will be included and tracked for all CRCP-funded activities.
6. Decision-making processes, including those involving spend plans, will be clear and transparent.
7. Program funding will reflect CRCP priorities.

The primary objective of the Roadmap is to address coral reef management needs. Three threats: climate change, land based sources of pollution, and fishing impacts were identified by NOAA as their national priorities. Three working groups were created last fall by representatives of the states and territories, local managers, academics, NGO partners, and federal partners to develop the goals and objectives for each national threat area. The groups have been meeting since November 2008. NOAA-CRCP's target to complete development of the goals and objectives for these three national priority threat areas is May 31, 2009.

In addition to the three national priority threat areas, NOAA will conduct priority setting and capacity assessments of coral reef managers needs for each jurisdiction. This has already begun for Florida and Hawaii, and will be based on existing strategic planning documents and future direction as defined by the managers on the ground in each jurisdiction. Once the groups have been identified, each jurisdiction will establish their own timeline. Priorities may need to change in response to the changing environment; therefore, the priorities can be revisited and altered over time. Once the priorities have been identified, capacity assessments will be conducted to determine what is possible based on staff, data, information, and equipment, and other available resources.

Another step in implementing the NOAA-CRCP Roadmap is regional mapping and monitoring workshop to identify jurisdictional and regional needs and priorities. The Pacific regional workshop was completed in November 2008, and the Atlantic/Caribbean workshop will be held in May 2009. The results of the Pacific workshop are online and an associated report compiling the results from both workshops will be available later this year.

Esther Peters asked if NOAA will incorporate making observations to assess the management style. Chantal said yes, that the jurisdiction managers will have to identify performance measures and strive to meet those objectives.

John Fauth asked about adaptive management strategies and having the research and management coming together. Chantal mentioned a recent working group meeting she attended where strategies to integrate coral reef scientific and management communities were discussed.

Presentation: NOAA Coral Reef Conservation Program LBSP Goals & Objectives
Ken Banks presented information about the NOAA-CRCP LBSP Working Group's Goals & Objectives.

The LBSP Threat Area includes four project goals:

1. To reduce pollutant loading from watersheds to coral reefs. The different jurisdictions will establish their own criteria for pollutant reduction.
2. To preserve, protect, and restore coastal/watershed systems in priority coral reefs areas that maintain the functional landscape using a ridge to reef management approach to enhance coral reef ecosystem resilience and promote recovery.
3. To promote natural recovery of reef systems by restoring reef and marine ecosystems that have been adversely impacted.
4. To build management capacity at the local level through local, state, regional and federal coordination.

Piero Gardinali stated he had concerns about assigning priority to different reef systems. Ken Banks mentioned this was discussed in-depth among the working group members and that the general consensus was that the U.S. islands have many different reef systems that may not be connected to one another, thus they feel a need to prioritize how they approach managing them. Peter Swart stated that atmospheric pollution may be the most significant source of contaminants to certain areas and asked if this was discussed. Ken stated that each jurisdiction will be able to focus on the different sources of pollution that are affecting their respective reef systems. Stephanie Clark asked about the jurisdiction of Florida and if the Florida Keys National Marine Sanctuary (FKNMS) is included in the Florida jurisdiction. Chantal Collier said that the FKNMS is included in the Florida jurisdiction. Esther Peters talked about how the problems are more with watersheds and this requires city, state, and other managers to make laws and ordinances that will help to reduce LBSP.

Presentation: Investigating potential nutrient sources fueling *Lyngbya* blooms across south Florida
Kate Semon, Smithsonian Marine Station, presented research on potential sources of nutrients that may be triggering *Lyngb*ya spp. blooms. She first described *Lyngbya* spp. as a filamentous cyanobacteria. The species are too difficult to differentiate, so they are using a microscope to define distinguishing morphological characteristics. Her research shows that *Lyngbya* spp. blooms are complex and synergistic and might have a preference for nutrients like iron and phosphorus. Kate said *Lyngbya* may begin in the sandy areas, detach and float along reefs. She's documenting when, where, and what form it's in. She also found that allelopathic events inhibit coral settlement and recruit survival, lower coral holobiont resilience, directly kill coral, deter grazers, and smother seagrasses.

She is currently using stable isotopes to suggest potential sources for nutrients. Monthly collections have occurred during the bloom season. Carbon results suggest high productivity. Biomarker sites have been used and June 2008 data is completed while July 2008 is still being analyzed.

In summary, some δN signatures suggest nonpoint source influences, possibly from inlets, while all

carbon signatures show high productivity using a mix of dissolved aqueous concentrating mechanisms, possibly HCO_3 uptake. Future research will continue to survey and use nutrient bioindicators.

Esther Peters mentioned groundwater influx through the sand might be a potential source of nutrients. Ken Banks mentioned specific Broward County areas in the sediment where *Lyngbya* spp. grows from the sediment and they detach and move.

Translocation experiments were suggested by Ken Banks in order to look at substrate effects. Vladmir Kosmynin felt that the decrease in coral recruitment wasn't true and that corals didn't suffer from it, while other marine species do. Gene Shinn asked about the water that comes out of the sediment; is it freshwater or saltwater? John Fauth said he has found pore water as low as 9 ppt at the biomarker sites. He suggested a regression style approach by looking at the distance from the sources because that will be independent of the mixing.

Discussion: TAC Administrative Business
It was decided that the next TAC meeting will be November 12 and 13, 2009.

Public Comment
Stephanie Clark and Dan Clark each gave verbal public comment.

General Discussion
Chantal Collier informed the TAC the Florida Coral Reef Protection Act legislature passed in both the Florida House and Senate. The intent of this legislation is to build on the state's existing authority to create a civil penalty schedule and pursue damage compensation for grounding incidents. The bill was modified as it passed through the Florida Senate. One major change was that the provisions of the bill will be limited to 5 counties, Monroe, Dade, Broward, Palm Beach and Martin Counties, instead of statewide. This bill will not supersede any federal authority in the Florida Keys National Marine Sanctuary.

A tiered system for penalties includes $150, $300, and $1,000 fines for the 3 damage categories of: 1 m^2, 1-10 m^2, and greater than 10 m^2. The fines may be doubled or tripled for aggravating circumstances or coral reef injuries in state parks and aquatic preserves. If damage is less than one square meter, a warning letter may be issued in lieu of a penalty for "first time" offenders and serve as educational information. FDEP will move forward with a comprehensive outreach program to increase public awareness of reef injuries associated with vessel groundings and anchoring and the implications of the new law. The bill also provides a legal definition for coral reefs.
The bill, still pending signature by the Governor, would go into effect on July 1st. This bill responds to several of the 19 recommendations from a 2006 workshops improve response to, and restoration of, coral reef injuries in southeast Florida.

Gene Shinn asked if the legal conditions included live rock currently without growing coral. Chantal Collier said the bill applies to all hard bottom areas, coral reefs and worm reefs.

Dan Clark asked if enforcement language for recreational users was included in the bill. Chantal Collier said FWC's definition of 'take' was limited to harvesting, but didn't include anchoring. She said companion legislation by FWC may be needed to allow FWC enforcement of the law. FWC law enforcement currently doesn't have the authority to enforce the area.

Discussion: Recap of Southeast Florida Coral Reefs: Impacts of Land-Based Pollution
Nick Gadbois turned the meeting over to Judy Lang to recap the Impacts of LBSP paper and the changes that where discussed during the previous day's brainstorming session. Judy passed out a handout that used the acronym SEFCRI to outline the "actions section of the 4-page document.

She thanked Phil Dustan for the suggestion of using the acronym "SEFCRI" as a guideline for action items. The handout Judy passed around had her suggestions for action items using the SEFCRI acronym. She said it looked better than bulleted items. She said the action items need to be ranked within each letter. Judy asked everyone to prioritize the action items.

Discussion ideas included:

- Phil Dustan mentioned 'Stop' instead of 'Support' and 'Enforce' instead of 'Eliminate' as words in the original acronym - "SEFCRI" = Stop Engage Forecast Care Restore Ingenuity.
- Chantal Collier preferred starting with "Support" which is more positive than "Stop".
- Judy Lang asked if everyone was in agreement with the acronym and everyone was.
- Peter Swart wanted research mentioned in the actions.
- Phil Dustan suggested a t-shirt idea with more generalized information and mentioned using some of the language from the ICRS Call to Action paper.
- Judy Lang wanted to make sure to keep the text minimal in order to keep the large picture on the front cover.
- Esther Peters wanted to keep the "SEFCRI" action items on one page.

Judy Lang turned the meeting over to John Fauth. John said the last half of the document, recommendations/action items, still needs to be developed. He wanted everyone to suggest specific topics to help develop this section for review.

John Fauth asked for the write-ups to be e-mailed to him by June 15, 2009. Nancy Craig asked for follow up e-mails and reminders. Judy recommended all members not wait until June 15th to complete their sections.

Nick Gadbois asked everyone to fill out the comment cards and project rating sheets in their folders.
He adjourned the meeting at 12:05 pm.

No.	Action Item	Responsible Party	Due Date
1	The TAC members will write their respective sections of the LBSP Impact Paper	TAC	June 15, 2009
2	Revise the scope of work for LBSP Project 31: Determine the flux of pollutants from atmospheric sources	Dale Griffin	No Date Set
3	Develop the scope of work for LBSP Project 30: Determine the flux of pollutants entering the reef environment from oceanic sources, to summarize the data collect by Alex Soloviev	Joe Boyer/Alex Soloviev	No Date Set
4	Determine if funds can be reallocated from Project 24 to compile data from the completed LBSP Projects into one report	Nick Gadbois	No Date Set