

**Southeast Florida Coral Reef Initiative (SEFCRI)  
Land Based Sources of Pollution (LBSP)  
Technical Advisory Committee (TAC)  
Meeting Three  
Wednesday the 16th and Thursday the 17th of November, 2005  
National Coral Reef Institute  
Nova Southeastern University Oceanographic Center  
8000 North Ocean Drive, Dania Beach, Florida 33004**

**TAC Members Present:**

Boyer, Joseph, Southeast Environmental Research Center, Florida International University  
Dodge, Richard, NCRI/NSU  
Dustan, Phil, College of Charleston  
Kosmynin, Vladimir, FDEP  
Lapointe, Brian, Harbor Branch Oceanographic Institute  
Lipp, Erin, University of Georgia  
Miller, Margaret, NOAA  
Paul, Valerie, Smithsonian Marine Station at Fort Pierce  
Peters, Esther, Tetra Tech  
Proni, John, NOAA, Miami  
Risk, Mike, McMaster University, Canada  
Shinn, Gene, USGS  
Soloviev, Alexander, Nova Southeastern University  
Swart, Peter, RSMAS, University of Miami

**Meeting Attendees:**

Banks, Ken, BC EPD  
Bareford, Karen, FDEP Coral Reef Conservation Program  
Behringer, Dianne, Broward County/Sea Grant  
Bergh, Chris, The Nature Conservancy  
Boykin, Christopher, FDEP Coral Reef Conservation Program  
Carter, Adrienne, NCRI/NSU  
Carter, Kevin, BC EPD  
Clark, Dan, Cry of the Water  
Clark, Stephanie, Cry of the Water  
Collier, Chantal, FDEP Coral Reef Conservation Program  
Craig, Nancy, BC EPD  
DeBiasse, Melissa, NCRI/NSU (Recorder)  
Fauth, John, University of Central Florida  
Fisher, Lou, BC EPD  
Foster, Greg, NCRI/NSU  
Fretwell, Carol, NCRI

Geselbracht, Laura, The Nature Conservancy  
Gilliam, David, NCRI/NSU  
Harvey, Richard, EPA  
Helmle, Kevin, NCRI/NSU  
Home, Linda, FDEP  
Kasik, Christina, FDEP Southeast District Office  
Kramer, Phil, The Nature Conservancy  
Pam Krauss, PAM Inc.  
Logan, Kelly, NCRI/NSU  
McManus, Fred, EPA  
Monty, Jamie, FDEP Southeast District Office - CAMA  
Moulding, Alison, NCRI/NSU  
Naugle, Cory, FDEP Coral Reef Conservation Program  
Trnka, Maureen, NCRI/NSU  
Walker, Brian, NCRI/NSU  
Wilson-Davis, Lisa, City of Boca Raton

**Abbreviations:**

BC EPD: Broward County Environmental Protection Department  
EPA: U.S. Environmental Protection Agency  
FDEP: Florida Department of Environmental Protection  
FOC: Florida Oceans Council  
FRRP: Florida Reef Resilience Program  
FWRI: Florida Wildlife Research Institute  
LAS: Local Action Strategy(ies)  
LBSP: Land Based Sources of Pollution  
NCRI: National Coral Reef Institute  
NOAA: National Ocean and Atmospheric Administration  
NSU: Nova Southeastern University  
NSU OC: Nova Southeastern University Oceanographic Center  
RSMAS: Rosenstiel School of Marine and Atmospheric Science, University of Miami  
SECREMP: Southeast Coral Reef Evaluation and Monitoring Project  
SEFCRI: Southeast Florida Coral Reef Initiative  
SEFLOE: Southeast Florida Outfall Experiment  
TAC: Technical Advisory Committee  
USCRTF: United States Coral Reef Task Force  
USGS: United States Geological Survey  
WQMP: water quality monitoring program

**Southeast Florida Coral Reef Initiative (SEFCRI)**  
**Land Based Sources of Pollution (LBSP)**  
**Technical Advisory Committee (TAC)**  
**Meeting 3: Minutes**  
**Recorded by Melissa DeBiase**  
**Wednesday the 16th and Thursday the 17th of November, 2005**  
**National Coral Reef Institute**  
**Nova Southeastern University Oceanographic Center**  
**8000 North Ocean Drive, Dania Beach, Florida 33004**

**Wednesday November 16, 2005**

1. 9:10 AM Chantal Collier called the meeting to order and introduced herself as co-host along with Richard Dodge and Carol Fretwell, both of the National Coral Reef Institute (NCRI). She thanked Vladimir Kosmynin, Ken Banks, and Richard Dodge for helping to prepare the Agenda for the meeting. She then gave a brief overview of the Agenda as follows:
2. **Wednesday November 16, 2005**
  - i. TAC member and attendee introductions.
  - ii. Discussion of the possible adoption of guidelines for the facilitation of the meeting.
  - iii. Updates on the current status of the Southeast Florida Coral Reef Initiative (SEFCRI) and plans for the future.
  - iv. Detailed updates on the individual projects of the Land Based Sources of Pollution focus team given by the project leads.
  - v. A presentation given by John Proni on a tracer study conducted in Hollywood, Florida.
  - vi. A presentation on the Florida Reef Resilience Program.
  - vii. Discussion on funding strategies and how to come up with sustainable and large- scale funding for projects that are more research oriented and for a long term water quality monitoring project.
  - viii. Review of projects currently on the table that were identified by the TAC at the last meeting and discussion of any projects that need fine tuning.
  - ix. A public comment session at 3:50 pm.
  - x. Meeting adjournment at 4:30 pm.
3. **Thursday, November 17, 2005**
  - i. Break out sessions to discuss potential projects in more detail.
  - ii. Discussion of a water quality monitoring program for the four county region (Martin, Palm Beach, Broward, and Marni-Dade), its minimum parameters, and funding opportunities.
  - iii. Time for news or updates from TAC members about personal projects etc.
  - iv. Meeting adjournment at 4:30 pm.
4. TAC members and attendees introduced themselves.

5. 9:15 AM Chantal Collier introduced the Land Based Sources of Pollution (LBSP) Project Coordinator Cory Naugle.
6. Cory Naugle introduced herself to the TAC. She reviewed the contents of the packets given to the members. The packets included:
  - a. Member comment cards that will be included in the minutes.
  - b. Meeting evaluation forms.
  - c. A copy of the proposal for Project 11.
  - d. Rough scopes for projects drafted at the last TAC meeting.
  - e. A copy of the Minutes from the last meeting.
7. Cory Naugle proposed that the TAC meetings be run in a more structured fashion. She stated that her main goal as facilitator is to be neutral and make sure everyone is participating in the process. She briefly explained the Consensus-Based Process and asked the TAC if they would like to adopt consensus-based rules. She asked the TAC to remember to stay focused on the Agenda during the next two days. Phil Dustan said he was concerned that too much structure creates bureaucracy, and structure may start to overwhelm the content and free discussion of the meeting. The relaxed atmosphere of the last meetings produced a lot of interesting projects. He said the setup of the tables made him feel isolated from the rest of the TAC members. Cory Naugle said that the room would be set up with the tables in groups on Thursday. She said she felt the consensus-based rules would eliminate bureaucracy and keep the TAC members on track and focused on the Agenda. One reason facilitators have come into the meetings is because SEFCRI is a collaborative federally funded program and members should have ample opportunity to participate. Structure provides a means by which to evaluate and assess the collaborative process. Phil Dustan said that one of the great strengths of the meetings is their informal nature and great collaborations have come about because of the informality. He said that the TAC has been following the guidelines without having to make a formal decision to do so. Richard Dodge said that he felt the guidelines would be a positive influence on the meetings. Vladimir Kosmynin said that he tried to organize the meeting in a way so that everyone can express his or her opinion and it would be possible to find common ground. He said structure was needed in the planning of the Agenda but did not believe the ideas would be compromised. Mike Risk said he sees the need for structure and felt the guidelines were really just common sense. He said he would like to propose a compromise because he felt that he was being patronized. He suggested codifying the way the TAC members have been acting since the beginning of the meetings. Esther Peters said they did need a facilitator to keep the meeting from becoming too chaotic. Cory Naugle said that aside from preventing chaos and disorder, since we are including more projects there will likely be opportunities for discussions about priorities. There are also more people involved with TAC projects and she did not want anyone to feel that they do not have ample opportunity to participate in the process. She felt that if guidelines were not put in place, some participants may find it difficult to express ideas and participate, which would not be fair to the process. Cory Naugle said there was a copy of the guidelines for discussion for both TAC members and for observers in their packets and that it was important for the observers to be included in this collaborative process.
8. Phil Dustan said he felt there should be more flexibility in the length of time given for each public speaker because three minutes is not enough time and people get very upset when they are cut off before they can make their point. He said the best part of the U.S. Coral Reef Task

Force (USCRTF) meetings in Washington was the public comment session. Cory Naugle said that the guidelines for public comment were taken from the USCRTF. She suggested that if all the public speakers had taken a turn and there was still time available, people could speak a second time. Carol Fretwell suggested counting the number of public speakers ahead of time and determining how much time each speaker could use based on the total time allotted for the public comment session. Cory Naugle said she received no response from the posting on the website requesting reservations for public comment but that comment cards filled out by the observers will be included in the Minutes. Phil Dustan felt that the public comments can add a tremendous amount of insight to the discussion. Richard Dodge said sometimes public comment brings a lot to the table and sometimes it does not. He said he thinks three to five minutes per speaker is adequate. Cory Naugle said that the TAC needed to make a rule about the length of public comment because she does not want to be unfair to anyone. Margaret Miller suggested having a three minute public comment period for each speaker and then having a discussion of the topics the speaker brought up if the TAC feels more discussion is warranted. Cory Naugle asked if the TAC would like to adopt by consensus adding a member discussion period after the public comment session. She said she would send the consensus rules to the TAC members by email. Cory Naugle then asked the TAC to decide how many members will make up the quorum in case there are meetings where some members cannot attend. Esther Peters asked if a member could be included by conference call or email when he or she cannot physically attend the meeting. Phil Dustan said that in most cases a quorum is 50% plus one. He said he thinks a group should develop some by-laws for the TAC after the meeting so as not to waste time talking about it now.

9. Cory said she would like to bring up the idea of forming a steering committee for the TAC. Phil Dustan suggested there be a Consensus Rules By-Laws Committee. Richard Dodge, Phil Dustan, and Cory Naugle agreed to be part of this committee. Cory Naugle said that in prior TAC meetings, some LBSP Focus Team members had been able to participate. In order for people not on the TAC, but integral to the TAC, to sit at the table at meetings and participate in discussions, a sort of steering committee would need to be formed so as to form a precedent for participation in TAC discussions. Valerie Paul suggested making these people part of the TAC. Cory Naugle explained that the group would not have to be scientists but they would help plan the meetings and coordinate with all those involved. It would not be appropriate to make them official members of the TAC because they may not have the expertise required to be a TAC member. Peter Swart asked for clarification on the organization of how SEFCRI is divided into smaller task groups. Cory Naugle explained that the LBSP group is the only group that has a TAC. Peter Swart then asked why there is a TAC for some groups and not for others. Vladimir Kosmynin explained that other non-scientific groups such as for Public Relations do not need TACs. Chantal Collier gave a short description about the organization of SEFCRI. There are four focus areas in SEFCRI: Land Based Sources of Pollution; Awareness and Appreciation; Fishing, Diving, and Other Uses; and Maritime Industry and Coastal Construction Impacts. Each of the four focus areas has a team that has been involved in developing projects. Each team also has a local agency navigator, a state agency navigator, a federal agency navigator, and a non-agency navigator. Initially the SEFCRI membership was very agency dominated and led by only local and federal navigators, so they went to great lengths to try to find ways to open up the process and involve other people who are representing other entities. In the process of doing that they

thought it was important to expand the role of the navigators to represent other groups as well so they added a non-agency navigator to each focus area and they also added a state navigator so all levels of government were represented. There are now four navigators for each team. For the LBSP Focus Team, Ken Banks is the local agency navigator, Laura Geselbracht of the Nature Conservancy is the non-agency navigator, Richard Harvey and Fred McManus, both of EPA, share the role of federal navigator, and Linda Horne of the Florida Department of Environmental Protection (FDEP) is the state agency navigator. They help to develop all the details at the project level, helping to coordinate project teams, etc. Because of the technical level of the projects the LBSP group is working on, the LBSP Team determined the need for the TAC from the start of the SEFCRI planning process. As interest and desired participation in SEFCRI has grown over time, in February 2005, the SEFCRI Team developed a charter for the entire SEFCRI Team and the need for other teams to have a TAC was identified therein. Margaret Miller asked if the steering committee needs to be different from the navigators who are already in place and if it would involve adding outside people beyond the navigators already in place.

10. Chantal Collier said they would be a subset of the steering committee, but it would be expanded to people like herself, Cory Naugle, and Carol Fretwell since they had been doing most of the planning and coordinating for the meetings. Cory Naugle proposed Richard Dodge, Vladimir Kosmynin, Ken Banks, Nancy Craig, Laura Geselbracht, Richard Harvey, Fred McManus, Carol Fretwell, Linda Home and Cheryl Miller as people who might be members of this steering committee. Valerie Paul asked why this proposed steering committee is so large. Chantal Collier said it is because they will serve different functions. She said the logistics have mostly been taken care of by herself, Cory Naugle, and Carol Fretwell and that Vladimir Kosmynin played a large part in coordinating past meetings. The agenda planning has been more of a group effort by Fred McManus, Ken Banks, Vladimir Kosmynin, Richard Dodge, Cory Naugle and herself. She thought it was important to also include the navigators so they could keep their groups informed. Peter Swart said he felt like there was a steering committee in place already and that the TAC members were not involved in the steering committee. He has never seen any requests for items to be considered for the agenda and then the agenda magically appears. Cory Naugle said she sent out two drafts of the agenda and no one responded with input. Peter Swart said he felt he and others are not having any input in the agenda and that there is already steering committee acting independently of the TAC. Chantal Collier said that one of the objectives of the day is to set up a little more structure and make it so the LBSP TAC is run a little more like the other SEFCRI groups. Peter Swart said that he had no problem with setting up a steering committee but he requested that the TAC be more engaged in the planning of the agenda and that the TAC members' expertise be utilized. He said that one of the reasons why four members recently retired may be because they felt they were not being asked for their input. Cory Naugle said three of the members who had resigned had yet to participate in any of the previous meetings. She would like to see more involvement from the TAC and the only response she got about the agenda for this meeting was from the navigators. Valerie Paul said that a draft of the agenda was sent out but that is not the same as asking for input. Chantal Collier agreed with Cory Naugle and said that she had sent an email trying to confirm the dates for the meeting and in that email she also asked for input on items that may be included in the Agenda. She said that it was a rather long email and maybe the request was lost in the rest of the email but she received no responses. Cory Naugle said she would make a point of sending an email with a

deadline for topics to be included the agenda. Vladimir Kosmynin said he would take responsibility for the agenda of the first meeting. He organized the meeting the best he could. He wrote the agenda and had hoped for input from other people. He said if any of the TAC members wanted to change the Agenda or add to it that is fine. It was the first agenda for the first meeting and now the TAC can decide how they want to change it if they want to do so. Cory Naugle asked if the TAC would like to pass a consensus to adopt the steering committee. Peter Swart said he thinks people are having a problem with the concept that the steering committee is something above the TAC and I think what you are describing an organizing committee that works with the TAC. Vladimir Kosmynin suggested the TAC members discuss what would be covered in the next meeting at the current meeting and that will help set up the agenda. Cory Naugle asked if anyone had any other points of contention before the consensus ruling. Esther Peters said that the TAC has had a sort of organizing meeting [team] all along but it just did not have a name and the people were not specifically identified but she thought it would help if they were identified. Richard Dodge said he thought an alternative would be to put the navigators on the TAC and have a steering committee of the TAC instead of with the TAC. Cory Naugle said her problem with that idea is that some of the TAC members are not involved directly in the research as are some of the navigators. Another point she made is that steering committee members who are not on the TAC do not have a vote. Vladimir Kosmynin suggested changing the name from steering committee to organizational committee. Cory Naugle took a vote and the motion to form an organizational committee was passed by all voting members. She thanked the TAC members for dealing with the new structuring issues. Valerie Paul asked for a list of the current TAC members. Cory Naugle introduced Chantal Collier to give an update on the SEFCRI projects.

11. 10:00 AM Chantal Collier said there are four focus areas that have been identified as the major threat areas that the SEFCRI will be addressing. They were all selected through a process that included four public meetings over the course of two years until SEFCRI could come up with the final product which is the local action strategy (LAS) document that was printed earlier this year after the culmination of the last public meeting in the fall of 2004. The Local Action Strategy outlines 140 projects across all four focus areas. Several of these have been started with the first year of implementation funding which runs from October 2004 to March 2006. Twenty-one projects were implemented in the first year. Approximately six are completely done, several are getting very close to being done, and others are still ongoing. The projects are only in the first year even though it is longer than a 12-month period because the funding cycle is actually 18 months. Chantal Collier said she would like to let the TAC know that SEFCRI applied for an extension on this award from NOAA because some of the projects will take a little longer to complete. She said she would not get into a lot of detail as to why some projects were taking longer but it is partly due to contractual issues, learning the ins and outs of how to get this work done, and things like hurricanes that put some of the timetables for the projects behind. Everything is still on track and moving forward and will be completed eventually. SEFCRI is requesting an extension of one year on the NOAA grant for year one project implementation. For year two, twenty-one additional projects got underway in July 2005 and that is also an 18 month funding cycle that will carry through to December of 2006. There is a tremendous overlap between years one and two which has been a great challenge for the staff that was onboard when she started the effort. They have since expanded and are moving along quite

well now that they have additional staff. Initially the local action strategies were supposed to be a three-year plan. This is something that a lot of the jurisdictions, not just Florida, within the Coral Reef Task Force are struggling with because, like Florida, they have very ambitious local action strategies and the reality is that everyone wants to make sure they complete all of these projects and 'do so in a comprehensive way rather than just checking numbers off the list to get it all done in three years. As discussions have moved on with funding coming from NOAA and looking at what they can realistically accomplish with both the financial and human capacity that they have in place, they have expanded the Florida local action strategies to be more of a five to six year process to realistically accomplish all of SEFCRI's goals and objectives and not leave anything out due to lack of time. The next funding cycle is a three-year (36-month) grant proposal that was just submitted last week and the projects that were identified for that were selected through team meetings that were held throughout the summer for all four of the focus groups. There was a lot of debating as to which projects should be included and which should not be included with the available funding they anticipate and she is happy to say they did not leave any of them out. They will see what comes back with NOAA's pre-proposal review comments in January. They are a little heavy on the amount of funding they asked for than what is actually available, but there may be some flexibility in that. They know there is additional funding available in year three that was set forth in the President's budget last year. They are hopeful they will be able to get all the projects completed and there is an opportunity this time around that was not available last year for a potential matching funds waiver from NOAA. If the funds are there, they hope to get all the projects in, but if they need to take some out they will consult again with the teams to see which projects would have to be removed. It is an ambitious goal and year three will begin while they are still in year two and still finishing up year one. They have a lot on their plate. She pointed that out because it is something that is important to stay aware of as they go through the process. Even before year one began they had inherited some new projects in her office that were ongoing and need a lot of attention. They are doing a lot of work to get caught up and get these projects as firmly on track as they can. Unfortunately they are constrained by the budget cycles that NOAA gave to them. If they are able to include 83 projects in the next grant and they are all approved, they will accomplish another 59% of the LAS, leaving about only 11% unaddressed and most of those will be discussed here. Chantal Collier mentioned some of the projects that are completed or close to being completed. They completed their third year of the Southeast Florida Coral Reef Evaluation and Monitoring Project with Nova Southeastern University and the FWC which is a benthic habitat monitoring program. The results of the first two years are available on the website and the report from the third year will be available sometime next spring. The mapping of Broward County was also completed and the mapping of Palm Beach County has been initiated and the TAC will hear more about that from Brian Walker later in the day. Because it took a little longer to finish the mapping for Broward County, they are a little behind on the time tables for Palm Beach County and that was one of the reasons for asking for the extension on the first year's grant. After that is done there will still be a hole in the mapping for Martin County and parts of Miami-Dade County that will need to be addressed. They also have increased their technical capacity to support the implementation of all the LAS projects. In addition to hiring Cory Naugle, they hired two additional staff persons this summer, one who helped out with the meeting registration this morning, Karen Bareford, who is the coordinator for the Fishing, Diving, and Other Uses project



team. They also hired Christopher Boykin who is the Awareness and Appreciation project coordinator. They conducted an education and outreach needs assessment and developed targeted outreach tools. SEFCRI conducted a pilot coral biomarker study to identify links between LBSP and reefs. SEFCRI also initiated development of rapid response and restoration guidelines for coral reef injuries in southeast Florida. Some of the outstanding needs that potentially need the big dollars, a reason they are still outstanding needs, include water quality monitoring and research projects addressing LBSP. They are still looking for partnership opportunities and funding opportunities for these areas. It is important to determine what the parameters should be for a water quality monitoring program for the entire southeast region. This is a project that definitely needs to be funded and at this point the best strategy is to identify what they want the monitoring program to include so they can go after the available funding. There are a few new opportunities Chantal Collier said she would tell the TAC about that they may be able to target. Chantal Collier put in a request for additional funding from the state for mapping of Martin and Miami-Dade counties and to kick off the mapping of Martin County which will start next spring. There were two well-developed proposals for the groundwater research component to be reviewed in the afternoon and hopefully some of the other proposals would also be moved along by the end of the meeting. Chantal Collier said she would like to acknowledge the people who have been involved in the process from the beginning. Lastly she mentioned the website ([www.dep.state.fl.us/coastal/proe.rams/coral](http://www.dep.state.fl.us/coastal/proe.rams/coral)). Upcoming meetings, the Minutes from past meetings, project reports for example the monitoring reports for years one and two, are posted on the website: She encouraged the TAC members to check the website regularly. They are also developing a less technical, more fun and friendly website for the general public. She said there are a few resolutions that came out of the recent Coral Reef Task Force meeting that she would like to share, possibly over lunch. Chantal Collier said they would next get into the details of some of the specific LBSP projects that have been implemented and she invited John Fauth from University of Central Florida to give an update on the coral biomarker pilot project.

12. 10:15 AM John Fauth introduced himself and recognized the other people involved in the biomarker study: Phil Dustan and Eric Ponte of the College of Charleston, Ken Banks of the Broward County DEP, Bernardo Vargas-Angel of NCRI, and Craig Downs of the Haereticus Environmental Laboratory. The discussion for the project began at the Caribbean-Atlantic Region Workshop on Coral Reefs and Land Based Sources of Pollution in San Juan, Puerto Rico in May 2004. The pilot project was designed to use molecular biomarkers, which are the sort of enzyme assays that medical doctors routinely test in our blood and work on any living organism, to link land-based sources of pollution with degradation of coral reef health. The scientists compared the responses of corals at impacted sites and biomonitoring control sites already established by Broward County. The presentation showed data on cellular diagnostics, lesion regeneration, and community structure and ecosystem shifts such as percent cover. They also archived some environmental samples of water and sediment. They also conducted lab experiments at the NSU Oceanographic Center on *Porites astreoides*. The basic concept was to take molecular and cellular functions that are expressed in the biomarkers and link them to toxicant (chemicals, drugs, pesticides, etc.) and environmental stressors (heat, salinity, etc.) that impact corals at the molecular and cellular levels first. This causes cellular damage and alternations in cellular function that then impacts tissue and organ function which then impacts

whole-animal physiology and function which can then create population- and community-level consequences. The timeline of this process is very important. Because the toxicants and stressors are affecting the cells first, that is the tip-off that disease is coming. Depending on the particular stressor, it may take months for the effects to be seen at the organismal or community level. The hope is that by doing targeted experiments and learning more about the molecular and cellular functions, problems will be forecasted before they arrive. It may also be possible to tell if you are making progress with restoration efforts at the molecular level even when it may take years or decades to see if there is progress being made at the community level. The sampling design was a 2 x 2 x 2 factorial. It compared two LBSP, sewage outfalls and shipping channels or inlets located nearby or distant from the sampling sites. The Hillsborough Inlet site was near an inlet or shipping channel and near a sewage outfall. The Port Everglades site was near an inlet or shipping channel and distant from a sewage outfall. The Hollywood site was near a sewage outfall but distant from a shipping channel or inlet, and the Broward County DEP biomonitoring control site was distant from an inlet or shipping channel and from a sewage outfall. Nearshore sampling sites were 6-m deep and offshore waters were 17-m deep. The initial site recognizance was done in July of 2004. After several interruptions by hurricanes, five Porites were sampled at each of the eight stations, in the Florida Keys and in the Marquesas in January of 2005. Phil Dustan sampled Porites in the Bahamas. In August 2005, those sampling sites were revisited. Percent cover and bottom composition were calculated by point-count data from digital video images. Most sites were dominated by open bottom or by *Lyngbya*, which are negatively correlated with each other. The open bottom tended to be covered with sponges. Coral percent cover was less than 4% at all sites, which is very low. Clustering the sites by bottom composition showed all the inshore sites with the exception of the Hillsborough Inlet site grouped together. The Hillsborough Inlet site grouped with the deep water sites. In terms of the ecosystem response, there was no detectable effect from the sewage outfalls, shipping channels or inlets, or depth. The estimated mortality of the coral colonies looked at what percent of the colony was composed of dead tissue. Mortality was broken up into new and old mortality. Old mortality was defined as a site with algal growth. The biomonitoring sites had very little mortality at all. The mortality levels at the Hollywood sewage outfall were significantly different from the control site. The other sites had less new mortality and intermediate levels of old mortality. There was a strong signal coming from the Hollywood sewage outfall. There was no difference between inshore and offshore sites in this analysis. The results were statistically significant in a three-way ANOVA.

13. Phil Dustan interjected and said that this was community that had lost a tremendous amount of coral because the percent coral cover is now only 1 to 4%. So we were looking at mortality on top of 50 years of death. The study also focused on just one species of coral and on individual coral colonies. Mike Risk said we do not know what coral levels were like 50 years ago and that he was uncomfortable with underwater observers identifying new and old mortality. John Fauth said the new mortality is very obvious. Phil Dustan said these are colonies that were alive. Peter Swart asked if there was any evidence that the sewage outfall had changed over any time period or has it been the same for a long time period. John Fauth said they do not have that kind of information so they are just looking at what they can see in this one snapshot of time. They had limited inferences from it but they can try comparisons from one to the next and he said he would show some other data from the lab experiments that will lead the TAC members to

suspect it has been that way for a while. Margaret Miller clarified that the new mortality was instantaneous estimated when the initial samples were taken, and it was not over the eight-month time period for the revisit. It was an instantaneous estimate of bright white skeleton. Mike Risk said that monitoring by definition can never identify cause and effect. John Fauth agreed and said the study went beyond this level. Looking at total mortality, interactions could be seen. The depth and whether an outfall or inlet/shipping channel was present or not influenced the amount of mortality. A similar pattern with the biomonitoring control site could be seen where corals were almost completely covered in live tissue. Inshore corals near a sewage outfall or shipping channel had about 3 to 5% mortality where offshore corals had about 30% mortality. Richard Doge asked if this was an estimate of mortality over the eight months between sampling and revisiting. John Fauth said this was an instantaneous estimator. Peter Swart asked a question about the inshore versus offshore sampling sites. He asked if the source of the sewage was offshore. John Fauth confirmed the statement and said the offshore site is closer to the sewage outfall than the inshore site. Peter Swart said the shipping channel is also offshore because the water is being trained offshore. He asked how close the inshore sampling sites were to the channels and how far south were they from the channel. Ken Banks said Port Everglades sampling site was just north of the channel on the outside reef and on the inner reef the sampling site is just south of the channel. Richard Dodge asked if the case could be made that the offshore sites were actually farther away from the pollution source because the boiling up and the mixing brings the pollution inshore and maybe the offshore sites are actually further from the source than the inshore sites. John Fauth said that could be true, but he thought the biomarker data would argue against that theory. There are different ways to interpret the data and there are different caveats to worry about. The regeneration data was not an instantaneous snapshot. The regeneration rate of the lesions was shown in mm<sup>2</sup> of tissue regenerated per day. Only three sites, all of which were inshore sites, had regeneration rates that were statistically significantly different than zero. At the offshore Hollywood sewage outfall site, the lesions had actually gotten larger. At the inshore sites the lesions of some of the colonies were completely gone, others were closing up and new tissue was coming in. The corals at the offshore sites were not able to repair what was pretty minimal damage. The data shown was the average regeneration rate for five colonies. In summary, the percent mortality was significantly lower at the biomonitoring control sites than at sites near sewage outfall. Percent mortality was lower at inshore compared to offshore sites. Regeneration rates were positive only at the inshore and offshore biomonitoring sites, the inshore Hollywood sewage outfall, and the inshore Hillsborough Inlet. Joseph Boyer asked if the study had looked at the negative effects as well. He said he did not see any synergistic effects at all. John Fauth said that was what the factorial design allowed them to do. The combined effect of the two sources of pollution was not as bad as the sum of their parts. The other possibility is that the sites were different. Craig Downs did most of the cellular diagnostic work. The first kits he used were the kinds of kits that medical doctors use to test human patients. He tweaked the kits to work for corals and then created more sophisticated assays. It was possible to probe different parts of the cell and see what the responses were. The first protein examined was Heat Shock Protein 60 (Hsp 60) which is a molecular chaperone. HSP 60 takes proteins that are being denatured and folds them back together so they can maintain their function. Ubiquitin marks degraded proteins that need to be destroyed and recycled. It is an indicator of protein turnover. Margaret

Miller asked if the corals sampled from Biscayne Bay and the Bahamas were from inshore or offshore sites. Phil Dustan said those corals were sampled from shallow inshore patch reefs. John Fauth continued and said the Bahamian corals had very low levels for every biomarker they tested for. The take home message was that southeast Florida corals are stressed compared to corals in the Bahamas. He said he wished they had been able to get some more data but they had limited funding for the project and Craig Downs did some of the protein work for free. There were significantly elevated levels of Hsp 60 at offshore sites relative to the inshore sites. Ubiquitin levels varied between inshore and offshore sites. It was higher at the inshore Hollywood sewage outfall and at the Biscayne National Park/Florida Keys inshore site. When small heat shock protein levels were compared between sites, results were non-significant among the offshore sites, although all sites showed elevated levels except the Bahamas sites. Small heat shock proteins only get up regulated in response to stress. Craig Downs used the analogy that small heat shock proteins are like the National Guard. They are expensive to maintain and are only brought in when all the other systems are being overwhelmed. Glucose Regulator Protein 75 (Grp 75) regulates glucose levels and was used as an indicator of nutritional stress. Levels of Grp 75 were elevated at the Hollywood outfall site, especially offshore. Joseph Boyer asked if this meant the corals were not feeding. John Fauth said that it could mean the corals are not feeding but he and others observed in the field that some corals were being covered in sediments. Margaret Miller asked if nutritional stress was related to heterotrophism or autotrophism. She said it seemed difficult to interpret the results. John Fauth agreed and said all of the assays he showed reflected only the cnidarian part of the symbiosis. Margaret Miller asked if a limitation in light would create the same response as would nutritional stress. John Fauth said one might then look at the zooxanthellae response separately to see if they are responding to a light stress. He said they have a lot of tools and there is a question of how many can you mobilize and this is their first pass. They only have ten biomarkers and they are trying to understand the broad picture of what is going on so we can narrow it down. Phil Dustan said they had a very restricted budget. John Fauth said the data generated more questions than it solved. When there is a disruption of the symbiosis like in a bleaching event, the zooxanthellae produce radical oxygens which are broken down by Copper or Zinc Superoxide Dismutase (Cu/Zn SOD) into a less toxic peroxidase. There were no significant differences among the sites for levels of Cu/Zn SOD and all Florida sites showed higher levels compared to the Bahamian corals. Ferrochelatase (FC) is an enzyme that indicates changes in metabolic state. Elevated levels of FC were present in all Florida sites relative to the Bahamas. At the Port Everglades and Hillsborough Inlet sites, the levels were higher offshore than inshore. Cytochrome P450-2 (Cyp 2) detoxifies carcinogens, drugs, and pollutants. Cytochrome 450-6 (Cyp 6) detoxifies pesticides. Corals in the offshore sites had high levels of Cyp 2. There was no clear signal between sites for Cyp 6. Glutathione-S-transferase (GST) detoxifies electrophilic xenobiotics and Multi-Drug Resistance Protein (MDR) pumps xenobiotics from the cell. GST and MDR levels were elevated in offshore sites.

14. Valerie Paul said the GST and MDR levels at the Florida control site were elevated as well. John Fauth agreed and said there really is no traditional control site in Florida. Ken Banks said the control site is the lesser of all evils and is halfway between both inlets. Peter Swart asked about the effects of temperature and other parameters that might prevent corals from growing in Broward County. John Fauth said he had data from Hobo monitors but that he has not yet

analyzed it but it would be possible to look at the hypothesis that temperature is causing some of the variation. Some of the markers are temperature independent. Vladimir Kosmynin said he did not think corals were not growing because of climatic changes. Phil Dustan said there was a clear signal between the mainland USA and the Bahamas a couple of hundred miles offshore so that rules out dust as being the overriding issue. He thought they demonstrated a very clear land-based signal. Peter Swart said he would guess that ten or twenty years ago one would see similar growth and calcification rates between the Florida Keys and the Bahamas. John Fauth said *Montastrea* is much more sensitive than *Porites*. *Porites* is a very tough, weedy species. It is usually harder to find a signal in *Porites* than in *Montastrea* so when there is a signal coming from *Porites*, a little alarm bell goes off. [Someone?] said one of the differences he found in this area from the Bahamas to the Keys was phosphorus availability. The N to P ratio from Martin to Miami-Dade Counties goes from 20 to 1 to 70 to 1 in Florida Bay. The Keys and the Bahamas have much lower phosphorus availability. Phil Dustan said another thing he, John Fauth, and Craig Downs were discussing was how much of these chemicals can the corals make and they wondered if they were seeing the maximum amount of stress enzymes that the corals can produce because they do not know how high the levels can go. They do know that the levels in the Bahamas are much lower. Phil Dustan said it is clear that if one went out and looked at the coral community, there has been a lot of coral mortality. Since their study looked at the survivors, that brings a new dimension to the project. John Fauth said in the Florida Keys they found high levels of these biomarkers in shallow waters and lower levels in deep water. On the southeast coast of Florida they chose their sampling sites in order to take advantage of the proximity to shipping channels or sewage outfalls but in the Keys the sites selection was more random and regeneration rates at these patch reefs changed during the year. Peter Swart said the most resilient corals in the Florida Keys are those found on patch reefs. John Fauth agreed and said one of the linkages they made was the percentage of mortality with the amount of the glucose regulating protein produced. The higher the amount of the protein the corals made, the higher the mortality level. The higher the levels of Csp 2 and 6 produced by the corals, the lower the regeneration rate. The regeneration rate was higher when Ubiquitin levels were high. For the lab experiments, Bernardo Angel-Vargas set up conditions that allowed two variables to be examined at the same time. Coral colonies from inshore and offshore sites near the biomonitoring station were collected. After a two-month acclimation period in artificial seawater, half were treated for 96 hours with artificial seawater as the control and half were treated with water collected from Port Everglades at high tide. Levels of salinity and nitrates were adjusted to keep the control and the experimental group the same. The results of the lab experiment showed there was no difference in the levels of Hsp 60, GRP 75, and sHsp between the artificial and Port Everglades water. The shallow water corals produced lower levels of the biomarkers than did the deep-water corals. The same pattern was seen for Cyp 6, GST, and MDR. After two months in acclimation, the deep-water corals were still showing higher levels of the biomarkers than the shallow-water corals. The difference seen between the shallow and deep-water corals has probably been consistent over time. Another possibility that caught John Fauth and the other researchers by surprise was that the water from the port may not be the culprit. When the port water was brought into the lab it was run through a 50-micron filter. It could be that something larger than 50 microns was affecting the corals. Another possibility was the contaminants were at low levels in the water and they must be accumulated, either by

bioaccumulation or by accumulation in the sediment. If the latter is true, then the contaminants were not in the port water itself. Peter Swart asked if they did any kind of water quality measurements. John Fauth said they did not have funding to do any water quality testing. He said the main goal of the study was to get a broad picture of what was going on. He would like to see the TAC coordinate their efforts in order to develop a more detailed picture. Brian Lapointe asked if John Fauth had tissue samples available for analysis because that doing some tissue analysis would be a great addition to the study. Phil Dustan said this study was a quick pilot study. They expected to see a big result with the lab experiment and the Port Everglades water. John Fauth said that there were coral tissue samples that will be analyzed. He also said that it did not rain during the lab experiment and it may not be what was in the port water but what was flushed into the port that is a factor. Joseph Boyer said they were also missing food chain effects. A lot of the time you will not have a handle on what they are eating. Phil Dustan said that the corals may be so stressed they do not feed at all. Fred McManus asked John Fauth if any Bahamian corals were used in the lab experiments. Phil Dustan said CITES kept them from bringing corals from the Bahamas to the U.S. He said it was a challenge even to bring the frozen samples back into the States. Mike Risk said someone at last year's meeting said there was no need to reinvent the wheel, all that was needed were techniques that were already on the shelf. Geochemical methods cost ten dollars each and have been available off the shelf for years. Mike Risk said there has been a dominance of biological approaches in this field. John Fauth said he agreed that he was not a marine biologist and that he came from a totally different background. His background is in Evolutionary Ecology and his study organism was amphibians. What he saw repeated in different groups such as marine turtles or coral reefs is that they were closed communities and there was not always a lot of input from other avenues. He said it would be very beneficial to bring in people who work in different fields and to get their input on the problem. Peter Swart said what needed to be done to prove the point was to measure the nitrite, ammonia, etc. in the coral tissue samples and if the water samples were available, those could be measured too and then a connection could be made. He said not enough of that kind of testing was being done. He said if the connection were made from the nitrates and ammonia in the water all the way down to the tissue, then he would be a believer. John Fauth said that was one of the big challenges. At the meeting in Puerto Rico there was great information on watershed runoff and coral communities but no linkages between them. People at the meeting were not trying to find correlations. It did not prove causation but there was a consistent pattern and those gaps need to be bridged. Mike Risk said that the resource was trickling away, and John Fauth was talking about developing new tools. Mike Risk said he would like to see the group use the tools already available to work on the really important problems. John Fauth said the situation was like a problem-solving exercise. The problem needed to be identified and then all the available tools needed to be thrown at the question. Phil Dustan said the beauty of this tool was that only a very small amount of tissue was needed. Ken Banks asked why this technology was so expensive if it was being used routinely in the medical field. Phil Dustan said making the antibodies was very expensive. The proteins in humans are different from the coral proteins so adjustments needed to be made. Craig Downs was designing coral-specific primers from scratch. John Fauth said that was another reason why sequencing coral genomes was so important. Valerie Paul said she thought the comparison with other sites would be very important, like with the Bahamas data, but that one should be very cautious of that particular

data because the corals came from a much shallower site and it was already demonstrated that the shallow site were different from the deep. Phil Dustan said the site was within six meters of depth (of the Florida sites?). One collection site was two to three meters deep and the other was five meters deep. To be thorough, one would want to do a complete sweep. He said one of his interesting experiences was that in the Bahamas shallow water corals were happier than deep water corals. Brian Lapointe asked if the site was Rainbow Gardens. Phil Dustan said one site was Rainbow Gardens and another site was south of Little Exuma. John Fauth said they would like to do a coral transplant. It would be possible to see the effect of the environment. Margaret Miller said she wanted to emphasize the point that there is a lot of potential in terms of the biomarkers being diagnostic, but she did not feel they are quite there yet. John Fauth said some markers were diagnostic. Margaret Miller asked if there were dose-response results. John Fauth said if one wanted to look at rising temperature, there were markers that predicted bleaching eight months in advance. Phil Dustan said the TAC could become like the scientist who study global warming and study it to death before thinking it could possibly be real but he thought the TAC needed to be cautious in that respect. Margaret Miller asked if biomarkers would be able to distinguish the difference between, for example, 30 degrees or 31 degrees Celsius, or between pesticides, or heterotrophic versus heterotrophic nutrition. Phil Dustan interjected that they were just trying to answer with a yes or a no. Margaret Miller said there was obviously some evidence of some very\_ suspicious patterns but the step between the pattern and something that she had trouble calling diagnosis is a step that has yet to be made. She said experimental work is needed to make that link. John Fauth said that was the message that needed to travel up the hierarchy. There was a lot of funding for mapping and monitoring. Margaret Miller said the TAC should be able to say with a strong voice that those experimental verifications and the ground truthing of the markers needed to be the next step. Cory Naugle called for a break from 11:20-11:30 AM.

15. 11:30 AM John Proni began his presentation on the use of Sulphur Hexafluoride (SF6) as a long-distance tracer. The objective of the study was to evaluate the use of SF6 as a tracer of discharges into the coastal ocean. The two discharges of interest were wastewater effluent outfall plumes and coastal inlet plumes. The advantages of using SF6 as a tracer included its extremely low detection limit (less than 40 fM and 1 fM =10-15 mole/l), low natural background levels, stability in water, and its inert and non-toxic nature. Its limitations included poor water solubility, no in-situ detection (gas extraction from water samples is required), and escape into the atmosphere at the air-sea interface. John Proni said the results of this study were in press in the journal Environmental Science and Technology under the title "Farfield Tracing of a Point Source Discharge Plume in the Coastal Ocean Using Sulfur Hexafluoride." The authors on the paper were Rik Wanninkhof, Kevin F. Sullivan, W. Paul Dammann, John R. Proni, Frederick Bloetscher, Alexander V. Soloviev, and Thomas P. Carsey. In this experimental pilot study, SF6 was injected into the piping system of the Hollywood outfall and was tracked to 70 miles from the outfall. Multiple tracks were taken from the location of the outfall northward. South of the inlet, a standard tracking was undertaken. The samples of SF6 were more or less ??? as one would expect a plume to be distributed under a northerly flowing current. (Interestingly, when the northerly flowing water, marked with the SF6, which must be distinguished from the water leaving the sewage treatment facilities?) At the inlet, there appeared to be an expansion of the east-west distribution in the detection of the samples. The results of a vertical cast 13 km north

of the point of injection showed mixing of SF6 in the water column down to 12 m depth. At 66 km north of the outfall, mixing was detected at 20 m in depth. There were a series of transects that ran from a ??? location to the shore. These data followed what might be called a half normal distribution, suggesting the water was pretty well mixed. The reason why it was half normal was because the ship went in as close to shore as it could but then had to reverse. All the data was collected on shore-going transects in order to ensure no contamination of the sensory system from prior insertions into water carrying SF6 as the ship turned around. John Proni speculated that what they saw was a characteristic distribution from an inlet and once the outfall plume mixed with the inlet water, subsequent dispersal characteristics were more like those of an inlet than the point-source outfall plume. John Proni said he would emphasize that point again at the end of his presentation when he showed some of his earlier inlet data recorded some 30 to 35 years ago. In another graph, John Proni showed evidence that although there was some southerly flow after the SF6 injection, most moved northward. The initial east-west transport of the material over the first six kilometers was really not large. These data were all in agreement with a prior experience from exercises such as the sea core?? program where the?? were monitored for some time. The dilution with range in terms of kilometers was ?? over all. One of the problems with SF6 was that it had such a low detection level that if too much is put into the piping system, the dynamic is exceeded. It was also a problem when SF6 was lost to the air or some was trapped in the piping system. Past experiments conducted in a small range using dyes indicated over a range of about one kilometer, 120 total dilutions could be expected. Over the first kilometer, the dye and the SF6 agreed in dilution values. An intrinsic tracer, such as salinity, which is typically good out to one kilometer, and the dye data also agreed with intrinsic tracer data. Data gathered in 1988 gave an indication of what might be expected with the SF6 pilot study. The data from 1988 gave an instantaneous view of a typical buoyant plume from a sewage outfall. The rising plume affected the oceans surface and depending on the buoyancy of the plume, boils may have formed. When the material stayed near the waters surface, a sequence of boles was formed. The boles were a snapshot of a statistical system. During plume modeling, the statistical mean of the boles is taken. In terms of the chemistry, the spatial distribution of the surfaces over which the boles occurred must be taken into account. There could be differences in pH or salinity etc in the boles. The point here was that for the tracking that occurred for an outfall, the triangle was expected to be largely confined to the upper part of the water's surface. At the time of the SEFLOE data, there was no method for long-distance tracking or for looking at the interaction of plumes. We learned from studies in Puerto Rico, if there was a sewage outfall adjacent to a plume, the area had a gradient of reduction of coral presence associated with it closest to the exit point of the river. If there was a sewage effluent plume present in the case of a riverine discharge, that discharge can act as a cap?? for the effluent source. Data from the Port of Miami taken in 1974 showed areas of strong acoustical reflectors. It also showed large quantities of material coming out of the port on the up tide which appeared to descend rapidly throughout the water column. There was an accretion of material at the bottom of the mixed layer. John Proni said when there are density steps in the water column profile, materials from such things as inlets or outfalls can detrain. Detrainment was investigated as a mechanism for transporting material from coastal areas to the ocean. When the detrainment surfaces were tracked, the surface sloped from west to east. That slope matched the geostrophic balance slope of the Gulf Stream. To summarize, John Proni



said SF6 has useful qualities and it was going to be combined with other tracers for long-term in-depth measurements. He said he is interested in injecting SF6 into coastal waters and possibly groundwater and septic systems to look at long-range transport.

16. Joseph Boyer said John Proni saw traces that moved 66 km in two days and asked how this related to the hydrodynamic model. He asked if John Proni had looked at a model simulation over the same time period. Joseph Boyer said tracer studies are very expensive to do whereas model simulations are pretty cheap. He also said the tracer study was only good for a one-time event. John Proni said he had not looked at model simulations. Gene Shin said tracer experiments provide actual data and they can be done often since the system is always pumping water. Joseph Boyer said multiple models exist on the west coast and asked if any models exist for the east coast. Peter Swart said he knew of models that were being developed. Valerie Paul asked about the methodology of the study. She said the data showed a very distinct track of the plume moving north but asked if there was any detection to the east or south of the outfall. John Proni said the plume would not be detected to the south because the current was due north. Phil Dustan asked if the detrainment was material that was flocculating coming out of the outfall or if it was particulate. Gene Shinn said he spent an hour next to the outfall in a submarine. He said the material was going straight up and looked like tea. He saw no particles and nothing on the bottom around it. Phil Dustan asked if there was a separation with some material moving out and other material moving north, with the material moving out being a different physical substance. Phil Dustan said at a location where a river was interacting with oceanic waters, a lot of flocculation occurs. In the study, John Proni dealt with basically a freshwater system pumping into a saltwater system so there was generation of some sort of material. Phil Dustan asked if John Proni had any information on that. John Proni said he did not factor that?? He said there were some regions where there was a very serious issue with an outfall in which the detrainment was very something??? One of these areas was Massachusetts Bay.
17. 12:00 PM Cory Naugle introduced Kelly Logan and Maureen Trnka and said they would give an update on Projects 1 and 2. Maureen Trnka introduced herself and Kelly Logan as the graduate student interns for the LBSP Local Action Strategy Projects 1 and 2. The Project Manager for Projects 1 and 2 was Dr. Nancy Craig of the Broward County Environmental Protection Department (BCEPD). The steering committee included Ken Banks, BCEPD; Dr. Nancy Gassman, BCEPD; Dr. Richard Dodge, Nova Southeastern University Oceanographic Center (NSUOC); Chantal Collier, Florida Department of Environmental Protection; and Kevin Carter, BCEPD. The consultant was Pam Krauss. Projects 1 and 2 were products of the LBSP Focus Group. The two projects were combined. The materials provided in the folder given out to the TAC members included a copy of the PowerPoint presentation, a literature citations list, the project status report, the consultant draft report. A literature-cited list with full annotations was available to those interested. The goals of the project were to quantify and characterize point and non-point sources pollution from the literature, develop a list of probable sources of pollution specific to southeast Florida, review, \_collect, and assemble the existing literature, identify information gaps, assemble listings of applicable Federal, State, and Local water quality standards, and to review relevant coral reef pollution literature. The project was broken down into five tasks to be completed by June 2006. Task one was a pollutant literature search. Task two was an investigation into sources of pollution in southeast Florida. Task three was a review of the

Federal, State, and Local water quality standards. Tasks four and five involved the completion of progress reports and the final report. Task one was the pollutant literature search. The compiled list of pollutants included nutrients, metals, pharmaceuticals/organics, herbicides/pesticides, salinity, carbon dioxide, temperature, turbidity/sedimentation, disease/pathogens/bacteria/viruses. A literature search was conducted on a global scale. The citations to date were listed in the packet of materials under the heading Task One Literature Search. Task two addressed the sources of pollution specific to southeast Florida. These sources included outfalls, inlets, submarine groundwater discharge, coastal ocean processes, seasonal upwelling, Everglades restoration, and carbon dioxide rise. Task three focused on water quality standards. The focus was to determine whether regulations on land-based water quality standards or reef management and conservation efforts either currently address or could be used as a basis to promulgate regulations for reef water quality standards. The current Federal laws that address coral reef conservation, management, or species protection included the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act); the National Marine Sanctuaries Act; the Coral Reef Conservation Act; the Oil Pollution Act; the Endangered Species Act; the Federal Water Pollution Control Act; and the Safe Drinking Water Act. State water quality laws addressed regulating the source of the discharge or setting standards for receiving waters. Local water quality programs varied from having no water quality standards at all, other than incorporating the already imposed state regulations into local code, to creating no discharge zones, to the inclusion of water-quality standards specific to marine areas. In general, the existing land-based water quality criteria under Federal, State, and Local laws and regulations were found to be broad in approach to marine waters, recreational fishing, shellfish, and wildlife propagation with no specific reference to coral reefs. Also, quantitative water quality criteria that specifically addressed waters where coral reefs occur had not yet been developed. The reporting requirements for the combined Projects 1 and 2 included quarterly progress reports and a draft of the final report combining work from tasks 1-3. Once completed, the draft will be reviewed by an issue team and the TAC members and comments will be included in the Final Report. At the time of the meeting, the Task One pollutant literature search was 100% complete. The Task Two sources of pollution list was in beginning stages, the Task Three water quality standards was 100% complete, and the Tasks four and five progress and final reports were on track to be completed by June 2006. The final product will be a synthesis and summary of effects and consequences of pollutants on coral reefs, existing water quality standards and their relevance to coral reef communities, and potential pollutants that can impact upon them, and data and information gaps based on the literature review. A searchable database may also be developed as part of the project.

18. Phil Dustan asked how Maureen Trnka and Kelly Logan performed the literature search. Maureen Trnka said the primary search was done electronically. Once those articles were obtained, the secondary search was going into the references of those articles using the Nova Southeastern University main campus and Oceanographic Center libraries and interlibrary loan. Phil Dustan asked which search engine was used. Maureen Trnka said they used all the search engines available through the NSU website. Phil Dustan said he noticed there were no articles sited older than 1974. Maureen Trnka said there was a cut-off date for the literature search because of all the work that existed and that date was 1975 unless an earlier paper was applicable. Joseph Boyer asked if the consultant to the project Pam Krauss would be at the

meeting. Maureen Trnka said she would be at the meeting that afternoon (Wednesday, 16th November). Joseph Boyer asked where to find the appendices for the literature search. Maureen Trnka said the appendices were in a binder and it was available for anyone who wanted to look through it. Joseph Boyer said there were some water-quality standards that were not present in the literature search materials. Brian Lapointe suggested Peter Bell's work on nutrient thresholds on the Great Barrier Reef should be added. Kelly Logan said that Maureen Trnka's and her contact information was in the folder handed out to all the TAC members and they should feel free to suggest any literature that was relevant to Projects 1 and 2. Peter Swart asked if he could send references for papers prior to 1975. Maureen Trnka said if those papers were applicable, then yes, absolutely. Mike Risk said he thought Maureen Trnka and Kelly Logan did a great job. He said that the literature search was very important and will save him a lot of work. Maureen Trnka said she was hoping the annotated literature search would be able to be published online. Phil Dustan wondered if this project was a good vector to try to bring back some of the older, but still important and relevant papers such as the Jamaican mass bleaching event paper. He suggested posting the annotated literature search on the coral list and ask for additions from the people who subscribe to that list.

19. Cory Naugle said she and Fred McManus would be the next presenters after the break for lunch. She said he would give a brief description of Project 3.
20. Fred McManus said Project 3 of the LBSP LAS concerned programs involved with designing and implementing actions to reduce land-based sources of pollution affecting coral reef ecosystems of southeast Florida. These were actions to reduce water pollution directly by implementing the best management practices, prohibiting or restricting certain activities, modifying existing regulations, and focusing on enforcement. The first objective was to compile a comprehensive list of agencies and other entities and all their ongoing plans or programs that addressed land-based sources of pollution. Fred McManus prepared a letter with the help of the focus team that described SEFCRI and Project 3 and talked about compiling a comprehensive list of projects and programs in place that described what was presently being done to control land-based sources of pollution. The letter went out to various individuals and agencies in Southeast Florida. Fred McManus apologized for not being as effective as he should have been in getting all that information. He said Cozy would be able to do a better job than he did. Cozy Naugle said she did not think she could do a better job but she did not have the letters EPA after her name. She said she hoped she could wrap up the project and have a final report prepared soon. Cozy Naugle said it was time to break for lunch and asked the TAC to be back by 12:45 PM.
21. 12:50 PM Cozy Naugle called the meeting back to order and introduced Greg Foster as the next presenter. Greg Foster said the waters of Broward and Palm Beach County were not conducive to imagery-based habitat mapping due the ever changing and always present influence of the water column which confused and impaired the visual information. Alternative methods to image-based habitat mapping included sun-shaded bathymetry, acoustic ground discrimination (QTC and Echoplus), in situ assessments, video camera ground-trothing, and diver knowledge. NCRI took a two-pronged approach to benthic habitat mapping. In phase one, the surface features were visually interpreted from sun- shaded bathymetry and aerial photography. This allows for the coarse determination of general reef features. Phase two added the acoustic ground discrimination information on top of the phase one data which allowed mapping of between-reef habitat. The red laser of a LID.AR flyover was used to track the bathymetric

surface features and the green laser was used as a reference point from sea surface level. The resultant X, Y, Z data, where X and Y were the geographical latitude and longitude and Z was the elevation, were then arranged in a three-column matrix database and imported into the computer program ArcGIS9. The X Y points were plotted three dimensionally and the Z variable was then added to the image to produce the final TIN surface. To aide the visual interpretation of surface features, the TIN image was hill-shaded in Arc to produce shadows which made it easier to see the features such as former borrow pit areas and coral reef hard bottom habitat. The hill- shaded TIN image was then stitched to a photo-mosaic of infrared images produced by aerial flyovers and this allowed the referencing of offshore features to coastal features. Using the same LID.AR database, more information could be added to the map as a depth contour which further increased the ability to identify features. By combining the results of aerial photography and high-resolution bathymetry, it was possible to produce a phase one benthic habitat map. The final product was used to create a detailed, large scale map of the nearshore benthic communities. There was a large segment in North Palm Beach County where no estimates have been made. North Palm Beach County appeared to have a large portion of hardbottom offshore that was not reefal in nature but contained reef communities. Before the preliminary map of North Palm Beach County can be assembled, acoustic ground discrimination data and ground truthing were required. In an example of an acoustic survey in Northern Broward County, acoustic ground discrimination signals were time-stamped with a differential Trimble GPS for accurate geo-referencing. The data points were plotted in ArcGIS as X/Y data: X and Y were the spatial geographic data while Z was the measured acoustic variable. The acoustic variable could represent simple bathymetry, or acoustic variables such as surface roughness or hardness. The Z variable in the example was EI, or the second part of the first echo return from EchoPlus which indicated acoustic roughness or spatial complexity. The individual track plots had been interpolated in ArcGIS using the geo-statistical analysis tools. This filled in all the missing points between the individual acoustic footprints gathered during the survey and a surface contour map was produced. The map was further refined by converting the general IDW surface into a GIS polygon. During the Broward County mapping, it was discovered that QTC was not very reliable in large-scale mapping of reefal habitats primarily because the output was discrete. The discrete class output did not allow for proper interpolation of the data. Determining classes between multiple surveys was problematic. There were also problems with consistency between surveys due to the intrusion of ambient noise. Echo plus showed great promise in mapping within-reef variability. Continuous data output allowed proper interpolation of the data. Before a final assessment is made about its efficiency, ground truthing is needed to determine what reefal structures are being detected. New acoustic products have been tested. The BioSonics system showed a lot of promise during pilot studies with this system. The BioSonics system allows for canopy height mapping. The QTC and Echoplus systems were recently integrated into the same box to produce a streamlined and transportable instrument. Most recently, the QTC system was fully operational and the EchoPlus system was being repaired for electrical problems. A new survey vessel was recently acquired. It was equipped with two new four-cylinder outboard motors. It is a dedicated survey ship which will eliminate problems with scheduling constraints. A BioSonics DT-X Echosounder was recently purchased. Its features include a 400 kHz transducer, integrated pitch-and-roll sensor, and an internally digitized signal which will reduce effects from ambient noise. It can be optimized for gorgonian

detection. The BioSonics offers multiple post-processing options. The Visual Bottom Typer (VBT) and Submerged Aquatic Vegetation (EcoSAV) software was ordered. The EcoSAV software allows for quantification of canopy height and percent cover. A corridor of Broward County that had already been extensively ground-trothed was surveyed with a 400-kHz BioSonics instrument that was on loan. The system showed great accuracy in predicting percent cover and canopy height. The new BioSonics unit will arrive in early December 2005. The settings will be optimized in December through February and the acoustic surveys will begin in February 2006 and will be completed by May 2006.

22. Vladimir Kosmynin said it looked like this methodology will work well for detecting octocorals. Greg Foster said there is a criterion of colony size and below a certain size scleractinian corals will be acoustically indistinguishable from hard bottom. It will be possible to reveal habitats that are or are not suitable for scleractinians. Vladimir Kosmynin asked what the difference in the signal between a meter in diameter of live coral versus a meter in diameter of dead coral and if additional surveys by divers in situ would be conducted. Margaret Miller also asked if diver surveys were a part of the project plan. Greg Foster said a large part of the project is going to be focused on the question of what is the relationship between acoustic diversity and surface features. Bench scales will be used for the different acoustic systems to create catalogs to answer questions such as does one sponge plus one sponge really equal two sponges or does it equal a gorgonian. Ken Banks asked if they looked at the signatures in areas of high coral cover and the cervicornis thickets. Greg Foster said they had wanted to do so when they had the BioSonics loaner instrument, but bad weather spoiled that plan but they definitely plan to in the future. Phil Dustan asked what the spatial resolution was and how large an area was the signal being returned from. Greg Foster said it is depth dependent but for example, at 20 meters, it would be about one square meter.
23. 1:20 PM Cory Naugle introduced Dr David Gilliam. David Gilliam said he would give an updated version of the presentation he gave last year. The presentation described some of the long-term monitoring programs in place in Broward County. The first program was on the local management level with the BC EPD and the second was on the regional management level (SECRElv1P) with the Florida DEP and the Florida Wildlife Research Institute (FWRI). Significant reef communities extend into Broward, Palm Beach, and Martin Counties. Broward County reefs are shore-parallel reef structures separated by extensive sand deposits. The offshore, third reef is 2.5 km offshore and 25-15 m deep. The middle reef is 1.5 km offshore and is 20-12 m deep. The inshore, first reef is 1.0 km offshore and is 5-10 m deep. The partners for reef monitoring program one are the BC EPD and the NSUOC. The initial purpose was to monitor possible effects on the reef system from beach re-nourishment activities. NSUOC, County, and the State of Florida plan to continue monitoring the system using a variety of methods. From 1997 to 1999 there were 18 monitoring sites; from 2000 to 2002 there were 23 sites; and since 2003, 25 sites have been monitored. The in situ field methods are time and work intensive and include data collection in fish and color counts and sediment traps. Broward County is a stony coral dominated system. Coverage was about 3% not including the cervicornis sites. *Porites astreoides*, *Siderastrea sidereal*, and *Montastrea cavernosa* are important coral species in terms of percent cover. Stony coral density was about 3 colonies per square meter, octocoral density was about 9 per square meter, and sponge density was about 11 per square meter. Fish species richness was greater than 200. The second coral reef monitoring program was the Southeast

Coral Reef Evaluation and Monitoring Project (SECREMP). The regional partners for this project were the Florida DEP, the FWRI, and the NCRI/NSUOC. In 2003 FWRI and NCRI established 10 sites in 3 counties. In 2004- 2005 NCRI monitored these sites continuously. In 2006 NCRI and FWRI will add three new sites in Martin County in order to increase the monitoring coverage from the Dry Tortugas to Martin County. The new Martin County sites will be installed in the St. Lucie Inlet Preserve State Park. Three attempts to select these new sites were made in 2005 but extremely poor visibility had prevented successful site selection so far. The purpose of monitoring all these sites is to provide timely and relevant information on the status and trends of Florida's coral reef and hard bottom resources with respect to coral species richness, benthic cover, and coral disease promoting management on a regional level. Types of data collected during the monitoring process included the amount of stony coral species diversity measured by taking station species inventory, the amount of benthic cover measured with digital video transects, the amount of coral disease and bleaching measured by photo-documentation in order to determine condition and status of infected colonies, and the extent of coverage of bio-eroding sponge species such as those from the genus *Cliona*. Species inventory data from 2003-2005 was consistent for all ten sites except for a decline in the number of species at the Palm Beach inshore site in 2005. Two of the four inshore Palm Beach stations were buried in sand possibly due to Hurricanes Katrina and Rita. Some sites in Broward County that were covered in sand after Hurricane Katrina were uncovered after Hurricane Wilma indicating the ephemeral nature of the inshore sites. The number of stony coral species in the Dry Tortugas, Florida Keys, and Southeast Florida did not change significantly from 2003 to 2004. As expected, species diversity declined going from the Dry Tortugas to Southeast Florida. In terms of coral diseases, the take home message was that in the sites being monitored at the times they have been monitored, there are not very many diseased colonies. In Broward County there has been very little change in percent stony coral cover from 1996 to 2004 excluding the high cover sites. The percent cover for the *Acropora cervicornis* site increased from 2003 to 2004 but David Gilliam expected to see a slight decrease in the 2005 values. *Lyngbya* sp. densities varied considerably between 2003 and 2005. It was present at all Miami-Dade and Broward sites in 2004 and 2005, but extremely reduced in 2005.

24. Vladimir Kosmynin asked if David Gilliam used the same 10 points for determining the percent cover of scleratinian corals used in the Florida Keys. David Gilliam said yes, it was the exact same methodology. Phil Dustan asked if David Gilliam had done an analysis as to the degree of change that can be detected with 1-3% coral cover using the 10 points because it may be below the level of detection and the changes seen may be an artifact of not sampling enough. David Gilliam said he had a student who was investigating that question currently. Phil Dustan said the size of the station needed to be 40 square meters in order to detect change. He said it may be necessary to increase the station size or increase the sampling effort. Brian Lapointe said he had done that and was up to 20 points (?) Phil Dustan said when you get much above that you get into correspondence analysis where if it is not this, it is that. You have too few categories when you have too many points so it may be better to have a larger area: or counting the same frames two or three times. Brian Lapointe said to make more quadrants. Phil Dustan said the sampling must be increased in such a way that an artifact is not created.
25. 1:50 PM Chantal Collier introduced Chris Bergh of the Nature Conservancy. She said she would like to take a moment to recognize what a privilege it is to have so many prominent scientists in

the coral reef field here working together on issues in southeast Florida. She said she thinks it really ties back to some of the things they have tried to accomplish with SEFCRI as well in bringing together people from many different areas and agencies. One of the unique things that happened in the last year was that SEFCRI found a way to partner with more people in the SEFCRI region and also with people in the Keys to start to look at the things we can learn from each other. The Florida Reef Resilience Program stemmed from an agreement that was signed at the Coral Reef Task Force meeting in December 2004 in Miami between the Great Barrier Reef Marine Park Authority, NOAA and the State of Florida to share information and exchange ideas about the idea of resilience and how we can learn from each other in different regions and apply these concepts to developing new management tools.

26. Chris Bergh thanked Chantal Collier. The Nature Conservancy is a conservation organization that for many, many years has been involved in purchasing land for conservation, managing those lands as preserves, and trying to move them to public or private entities for their management. In the Florida Keys program, the focus has been on marine conservation for the past twenty years to go hand and hand with the land conservation effort. The Nature Conservancy's vision is to preserve plants and animals and natural communities that represent the diversity of life on earth and protecting the lands and waters they need to survive. The Nature Conservancy is committed to building its own resource base to expand its impact to marine environments. The Florida Reef Resilience Program (FRRP) has been active for about a year. The Great Barrier Reef already has a climate change resilience program that focuses on determining the long-term impact of climate change, not just on the reef, but on the fishers and divers as well. Florida did not have a companion program so the Nature Conservancy started to work on that about a year ago. He and Phil Kramer were very happy to be working with SEFCRI and they are trying not to duplicate what SEFCRI and the Florida Keys National Marine Sanctuary are accomplishing but they are trying to forge better communication so we can all learn from one another in the same way we expect to learn from Australia. Chris Bergh introduced Phil Kramer, the technical lead for the FRRP for the Nature Conservancy. Phil Kramer said resilience is a buzz word seen a lot in the literature today. It is a word that is adopted for trying to tackle and develop new approaches to the same old goal. More importantly, we look at it as an opportunity to look at management tools that can be developed systematically that include whole ecosystem health including human values and to move away from the idea of managing for just one specific entity and try to manage functions. Managing for change is an integral part of this. One of the key changes is climate change. We are taking advantage of these changing systems and learning how the systems respond and function. There is quite a bit of data that has been collected but often it is not adequate to address the very complex questions about the interplay between local and regional factors. Corals are resilient when they resist bleaching, tolerate bleaching, or have the potential for recovery after a bleaching mortality. We are using this approach to better define in the case of south Florida what might be called more resilient and less resilient places. It is predicted that the frequency and severity of global warming events. A big effort of this study is to focus on the survivors. The FRRP is almost as interested in places that are able to survive and not experience the kinds of changes that are familiar as the places that have changed. As more exploration is done in the field, the story of the decline of the Caribbean reef is not true in all places at all times. The survivor story can help shed some light on the factors and causes of these systems. The FRRP is focused on finding where some of these more resilient places are.

The effort was started by examining all the existing data sets and realized for the kind of questions that needed to be answered, the data sets were wholly inadequate. An effort was made to create a broad spatial framework to identify all the different strata that have been identified through all the years of monitoring along with gaps in that data. It was determined that a new, massive data collection effort was needed to fill all the gaps. The FRRP is particularly interested in developing a response plan around specific bleaching events. The major questions to be addressed include what is the extent and severity of mass bleaching events and disease in south Florida, which habitats are the most and least affected by the event, and which species and populations in south Florida have been the most susceptible and the most resistant to these events. Questions about tolerance levels include, how has mass bleaching affected the condition of south Florida coral reefs, which habitats or zones have been the most and least affected, which species or populations in south Florida have experienced the greatest mortality or best survival three months after the event. Questions about recovery include how have south Florida reefs recovered in the wake of an event, which habitats or zones have recovered well or poorly from the event, and which species or populations have recovered well or poorly from the event after half a year, after one year, or after five years. It is not easy to sample the right sites that will represent the entire 400-km-long Florida reef system. Part of the problem has been a lack of really good habitat maps which classify the biotic cover and the geomorphic cover and help explain the factors that influence the way these reefs are structured today and in the past. Jerry Ault (RS1v1AS/UM) worked with Steven Miller and Diane Swanson on a massive effort to do a meta-analysis on all the existing data to come up with recommendations on how to best allocate efforts in order to sample the entire system as one. That analysis led to the protocol FRRP is using as well as an overall estimate of how much effort needs to be put into the protocol. FRRP feels this sampling effort fits in with longer term monitoring programs and will fill a particular gap. A "shake down" was conducted to see if the program is feasible or not. Many different entities were involved and, through a series of training workshops, finalized the protocols which are two 10 x 1 meter belt transects counting all corals within 4 cm by species and then recording their size and condition. FRRP sampled 118 of 196 total sites throughout south Florida in 2005. About 97 of the sites were reefs and the other 21 were non-reef. Twelve teams with 35 surveyors collected data over a six-week period from August 15th to September 30th 2005. Surveys spanned the most intense bleaching periods. Hurricanes Katrina and Rita caused significant delays. Of the 120 sites visited, 95 of these sites were surveyed using common methodology. The Dry Tortugas, Marquesas, and sites deeper than 20 meters were excluded. All data was entered into an electronic Excel form, checked for errors, and compiled into an ACCESS database. The bleaching index is one way of looking at bleaching. It is a weighted average of the occurrence of different visual scores of bleaching intensities. In this case, a score of a zero was normal and a score of three was completely bleached. Of the 97 sites, the highest amount of bleaching was observed in the Upper Keys to Miami region although all sampled areas had some bleaching. When looking from inshore locations to shelf margins, the bleaching is more pronounced in the inshore and mid-channel reefs, especially in the Upper Keys. The species most susceptible to bleaching were *Porites*, *Millepora*, *Siderastrea*, and *Agaricia*. Very little coral mortality was observed. Out of all sites there was a 0.5% mortality rate which was suggestive of normal background mortality conditions. Preliminary data showed the extent and severity of the 2005 mass bleaching event



in south Florida was mild to locally moderate. Overall impacts appeared minimal but follow-up surveys are needed to characterize extent of recovery or mortality. All areas showed some signs of bleaching. The Upper Keys and Miami areas were the most affected and Palm Beach and Martin Counties were the least affected by the bleaching events. Corals in inshore patch reefs and mid-channel reefs were affected more than deeper, offshore areas. The corals that were most affected by bleaching were *Porites furcata* and *porites*, *Millepora complanata*, and *Agaricia* sp. *Madracis*, *Manicina*, and *Leptoseris* were mostly unaffected. Other questions can be addressed with the data FRRP collected. The approach that was described is a demographic approach to sampling. FRRP was trying to estimate and sub-sample the entire population of corals in the whole south Florida reef ecosystem which is a big shift away from looking at just bottom cover. The sampling method can apply to many other organisms. Bill Fisher from the EPA is working to develop some standardized metrics from very simple field observations. The three-dimensional surface area of individual coral colonies is measured as opposed to measuring coral cover. Those measurements can be used to determine the percentage of coral cover. To estimate 3D colony area, the colony's height and diameter are measured to obtain the radius. A geometric formula for colony morphology is applied to obtain the 3D surface area and volume. Entire colonies are reconstructed, and models are then analyzed for height, diameter, volume, and surface area. Reconstructed models are then compared to laser-scanned colonies to characterize accuracy for different levels of measuring effort. Some of the preliminary size data showed the highest density, largest size corals are found in the Lower Keys and both density and size decrease northward. These types of standard metrics can lead scientists towards looking at the difference between chronic factors and more (??) impacts after the environmental gradients and stratifications that help explain the differences are backed off. To conclude, FRRP is a longerterm effort and the survey efforts will be repeated each year even if there is no bleaching. The database being built will greatly increase the knowledge of the spatial variation in reef condition as well as some of the factors that can help explain the difference in bleaching, initial response, and recovery from a major disturbance event and help to build new management tools.

27. Gene Shinn said he noticed that water visibility was not measured and he was concerned about that because the healthiest reefs in the Keys where turbidity is very high although scientists say that is not good for corals. Phil Kramer said that did not quite fit the model that the dissolved organic carbon theory that it is filtering out UV radiation and decreasing bleaching. He also pointed out that tolerance is a better measure than bleaching and whether there was mortality or not. The inshore reefs may be much more tolerant so they can bleach but if they do not die they will recover. Peter Swart said FRRP is missing a major opportunity to coral tissues and determine something about the actually bleaching because right now it is just an observational method. We need to somehow ground truth the observations and maybe do some other work with biomarkers or some sort of geochemical signal as to what the remnant of the bleaching is. Phil Kramer said they are pushing for a more standard metric to quantify the density of zooxanthellae more accurately and use that as a benchmark rather than a visual observation. Techniques for bleaching could be improved but the main thing is mortality and that is easier to measure. The overall approach was to establish a more integrated and coordinated monitoring system to deal with disturbance events and create a more uniform, spatially explicit, robust data set that can be analyzed for which areas are more or less impacted and ideally lead scientists to

specifically where to sample within areas that had been identified as significantly different in patterns in size or community structure than other locations. Genetics is another example. A lot of the inshore patch reefs are genetically different than *Montastrea* in other areas where it is just a tolerance function where they have settled and the fact that they have been exposed to these conditions. We need the framework and an understanding of how to put some more focused, detailed studies into that context. Phil Dustan said he wanted to talk about FRRP's fundamental sample size and ask how it was determined that ten square meters was big enough.

28. Phil Kramer said Jerry Ault and Dionne Swanson used all the something data(??) from the Florida Keys where they took roughly 200 sample sites and the question they asked was for the area we are looking at, we want to know what is the variance between sites and what is the variation within sites. Using that information, they came up with recommendations on where to sample because you want to put more effort where there is more variation. That analysis suggested that the maximum you need at a site is two. If you are trying to increase precision, it is better to increase the number of sites, not transect area. Phil Dustan asked if these numbers were published anywhere. Phil Kramer said a manuscript that had such has been submitted. Phil Dustan asked if they go back to the same site and how they randomly chose where to sample. Phil Kramer said he has a whole presentation on that topic but it is ultimately determined by a human. Phil Dustan said then it is not random sampling. Chris Bergh said the next step in the FRRP is to try to be more inclusive to go beyond the small steering committee and start a working group that will include anyone and everyone who wants to be involved. The group will hear reports from FRRP's technical side and social resilience committee. There is no meeting date or location just yet, but through Chantal Collier's program and through the Keys Marine Sanctuary will be getting the word out and we hope a lot of you will want to participate. Phil Dustan asked with the amount of area being sampled, how do you know(??) is not just due to the rarity of the coral. Phil Kramer said some of the rarer species are only represented by one or two colonies of the 4200 colonies that were sampled. The data is not adjusted by their abundance. Phil Dustan asked how they chose which day they would sample a particular place. Phil Kramer said they had a window and leave it up to the team. Phil Dustan asked if everyone went out at the same time during that window. Phil Kramer said he hoped eventually they would get there but it is essentially a volunteer effort. It is not optimal. Last year was a pilot study and FRRP is hoping to refine the efforts with more training and with paid staff. Mike Risk said it should now be abundantly clear that the decline of the Caribbean reef started about a century and a half ago so the FRRP is working on the wrong stuff. He would like to see them work on resilience to sedimentation.
29. Chantal Collier said the TAC had heard reviews of the existing projects and now they needed to talk about funding strategies for projects that have been identified as priorities. They have managed to include all the projects that were identified by the LBSP that fit within the grant they received from NOAA. There are a number of projects that are large in scale due to their complexity and also with the price tag that is associated with them that still need to be earmarked for determining new sources of funding. One of those is the development of a regional-scale water monitoring program. Chantal Collier had been talking to people at NOAA about getting additional funding for monitoring through NOAA. Money for the benthic monitoring program with SECREMP is funded by NOAA and while it is not typical to have

multiple grants coming from the same program, there is interest in what the TAC proposes to do, from NOAA. One of the things that needs to be worked on is developing a basic outline for what the TAC would want to include in a water monitoring program for the SEFCRI region. In May of 2005 the State of Florida passed the Florida Oceans and Coastal Resources Act and part of the act mandated the development of the Florida Oceans Council (FOC) which was made up of 15 appointed members. The primary goal of the FOC is to improve the link between research and management. The recommendations that come out of this council will be very relevant to future possible funding sources. Cory Naugle said the FOC has had six meetings and the next meeting was being held on the 11th and 18th of November. The agenda for the FOC's meeting was posted online at the Florida DEP website and there was quite a bit of overlap of projects. Chantal Collier said another possible source of funding was from the EPA. Phil Dustan said there was an EPA project he learned about last year that was a fellowship for graduate students called the Star Grant. Peter Swart said the deadline had already passed. Phil Dustan asked if there was a way to get money focused on this group's work. Fred McManus said that EPA could contribute about \$150,000. He said he would like to go out with an RFP sometime in December because he needs to get the 2005 money spent. Richard Harvey said he and Fred McManus submitted their budgets a few weeks ago and they need to get the ball rolling. He said he has \$100,000 of 2006 money. He said they used to have a lot of discretion even in the Keys work. Fred McManus said a technical review panel was established every couple of years to review proposals that came in which are ranked for certain criteria and then the money is distributed to the top projects. Peter Swart said there is an organization that gives money to universities and other non-profits with no bids necessary. Only members of the Caribbean and south Florida CSU can join. Chantal Collier said she would like to leave the meeting with a group of people who would put together the parameters for a water quality monitoring program (WQMP). She said she would also like to leave the meeting with a list of projects that were most applicable to the funding options available through the EPA. Chantal Collier said Cory Naugle would go over some other funding opportunities. Cory Naugle said she had become aware of some other funding opportunities. Possible organizations that may have funds available included the Clean Water Act, FEMA, National Fish and Wildlife Foundation (CRCF), and the United States Department of Agriculture (USDA). Cory Naugle said NOAA was in partnership with the Center for Watershed Protection (CWP) and they are interested in getting involved in a bigger way and there may be funding opportunities there. Phil Dustan asked if the CWP was a non-governmental organization. Cory Naugle said it was a governmental agency. Esther Peters said the CWP was a nonprofit organization. Cory Naugle said that she would confirm the official status of the entity and report back to the TAC. Cory Naugle said there were several projects, numbers 14, 27, 30, 28, 29, 31, that were all LBSP projects that were designed to help with the development of the mass balance equation. Two proposals have been written. Project 14 was hiring Cory Naugle which was accomplished. LBSP project 27 was the pollution from ground waters to coastal waters proposal. Cory Naugle introduced Gene Shinn to talk about project 27.

30. 2:40 PM Gene Shinn said the idea to monitor wells in the Keys came up in several meetings so Dale Griffin wrote the proposal for such a project. The sources of pollution are still unknown and groundwater may be one of them. He said there needed to be a way to prove that it is out there and the geological framework needed to be understood. The three reefs are old coastlines and back in the 1970's, a dredging company cut through the first reef. In that cross-section,

quartz sand, plant roots, cross-bedding, land snails, and a coral head were visible. It was dated to about 6,000 years old. When the Miami sewer trench was extended further offshore, a cross-section of that reef revealed quartz sand, plant roots, and coral heads dated at about 5,000 years. There was also live coral present. The USGS drilled through the third reef and it was mostly quartz sand about 50-ft thick Holocene coral reef built mainly of *Acropora palmata*. It appeared the three reefs were controlled by pre-existing shore lines. The presence of algae at some reefs suggested groundwater was bringing in high levels of nutrients. The possible sources are groundwater, ship channels, outfall, and atmospheric sources. An air sampling device was installed. It was proposed to do seismic profiles that will show 15 to 100 feet below the surface. If there was seepage, it would probably be on the crests of the old dunes. Gene Shinn said there was another device available that would presumably detect freshwater even below the surface and was used successfully in Biscayne Bay. Whether or not the device will work in deeper waters with stronger currents was unknown. That was the basic proposal. He thought the USGS would be able to get started before the end of the fiscal year before the weather got bad. Lisa Robins received money from Congress to do shelf work but Gene Shinn did not know if the money would be spent on projects on the east coast. If leakages are found, drilling will be conducted in those locations. Wells will be installed in two transects and in two circular arrays. Once the wells are installed they can be sampled for many different things.

31. Mike Risk said this work has to be of the highest priority. Unless you know where the pollution is going, you cannot manage the resource. Peter Swart asked if the wells would be drilled to just one depth. Gene Shinn said the proposal called for wells to be drilled to two or three depths at each location.
32. 3:00 PM Cory Naugle introduced Alexander Soloviev who was presenting a proposal on LBSP project 30. The title of the presentation was "Oceanographic Component of the Environmental Observational System on the Broward County Shelf." The proposal was based on six years of research conducted at the NSU OC. In southeast Florida there are very strong currents. Florida is affected by part of the western boundary current system including the Loop Current, Florida Current, and Gulf Stream. A strong highly baroclinic current is confined to flow over a rapidly changing three-dimensional topography producing an energetic regime on the southeast Florida shelf. There is substantial diversity in wind and weather conditions including hurricanes. In 1999, NSU and University of South Florida worked together to form an environmental array off the coast just south of Port Everglades. The array was designed to support the activities in the area and to collect a complete seasonal cycle for describing the western boundary current-continental shelf interaction, including during extreme conditions such as hurricanes. The array also provided useful data for understanding a variety of scientific questions. The mooring array included acoustic Doppler current profilers (ADCP), sea level and directional wave gauges, a combination of inductively coupled temperature and salinity sensors, a meteorological package, spread-spectrum radio communication link, and monitoring capabilities via ARGOS. Since 1999, the array was operated in different configurations and supported several Office of Naval Research (ONR)-funded activities in the area. These projects included a 4-D South Florida Ocean Measurement Center (SFOMC) experiment (1999), an adverse weather SFOMC experiment (1999-2000), a University of Miami acoustic experiment (Winter 1999-2000), US Navy Fleet Battle experiments (1999 and 2000), a Florida Atlantic University acoustics experiment (2003-2004), a pre-FACE pilot study (2004), and a response to Hurricane Katrina study (2005). Several

- oceanographic studies were done based on the collected data, and there is substantial interest for protection of coral reefs, navigation, and beach erosion.
33. Questions were asked and comments were made following the presentation.
  34. 3:40 PM. Cory Naugle gave a status report: The TAC would need to look at the proposals. Public comment would follow at 3:50, but in the meantime, the group would take a 10- minute break. She requested that the group reconvene at 3:50.
  35. 3:55 PM. Public Comment and responses to Public Comment. Public Comment was made by:
    - a. Stephanie Clark-Cry of the Water
    - b. Dan Clark-Cry of the Water
    - c. John Fauth-UCF
    - d. Kevin Carter-Broward County Environmental Protection Department
    - e. [Observers were requested to submit their comments in writing to Cory Naugle by December 1. Written comments received by December 23rd are recorded below.]
  36. Vladimir Kosmyrin responded that there is no high percentage of coral cover anywhere throughout the Keys or South Florida.
  37. Esther Peters requested clarification regarding funding of projects addressing water quality concerns.
  38. Chantal Collier responded that most LAS (local action strategy) funding came from NOAA and the State of Florida. NOAA restricted LAS project funding from its NOAA Coral Management Grants to resource management projects. Florida DEP has pledged matching funds. Separate funding programs need to be identified for water quality monitoring. It will be necessary to put together parameters of what a proposed water quality monitoring program for the SEFCRI region will look like for discussion with NOAA to ascertain whether they will consider providing funding for water quality monitoring in addition to the funding they currently provide Florida. FDEP (SEFCRI program staff) understanding was that there was no mechanism available for applying for money for additional monitoring projects, and that money from EPA would be unlikely.
  39. 4:15 PM Cory Naugle made closing remarks.
  40. Chantal Collier followed with two priorities that had been highlighted for today, the focus on existing funding, and the need for this group to decide the parameters necessary to be included in water quality studies. There will be time made in the Agenda for tomorrow to cover these two topics.
  41. The meeting was adjourned.

## **Thursday November 17, 2005**

1. 9:05 AM Cory Naugle called the meeting to order. She reviewed the day's Agenda, which was to include breakout sessions to go over the scopes of projects, saying that Vladimir and she would go over that; how you want to do that it is up to you. Chantal has asked that we set aside time for two items she wants accomplished: to define a project or projects to be considered for potential EPA funding, and to set some of the parameters for a water quality program. So, last time, it appears you broke up into two groups, one was for the mass balance, and the other one. Or if you all want input, we can go over them en masse, together as a group.

2. Vladimir Kosmynin reminded the group that they had divided into two groups last time, where they were able to outline proposals. He expressed concerns about breaking out into more than one group at a time. He would rather like to hear discussions from the other groups.
3. Cory Naugle explained that a summary report would be presented at the end, so everyone could become aware of the individual group discussions.
4. Vladimir Kosmynin explained that from subsequent discussions following last year's meeting, he would prefer to not have the group broken up, but for the discussions to involve everyone.
5. Mike Risk agreed with Vladimir, as did Dick Dodge.
6. Cory Naugle asked the group if anyone disagreed. Her one concern was that smaller groups might result in scopes being further developed than what they had. This is so that when she finds funding opportunity for some of these projects, she can turn to the project leads identified with the scopes and ask for their help in developing a proposal, based upon the RFP for that funding. We have to develop a rough scope to adapt it for a particular RFP.
7. Fred McManus requested help from the entire group in focusing on developing rough scopes of work. He brought with him an announcement of opportunity for federal funding that they (EPA) used two years ago, and it included all monitoring projects for the Florida Keys National Marine Sanctuary, plus a data management program, plus special studies for the Florida Keys National Marine Sanctuary. What they want to do this time is prepare specific scopes, which they will begin doing in the next two weeks and wants to include special studies for Southeast Florida Coral Reef Initiative. What they need is some rough scopes to include in the narrative of the expected announcement for the opportunity of federal funding, enough information to give researchers an idea of what kinds of proposals we are looking for, what kinds of information we seek. Most of these will be about a half a page.
8. Cory Naugle asked the group if they wanted to move the tables together into one square (instead of the current four groupings of tables). Fred McManus explained the first task at hand. They need rough scopes and some idea of priorities. As Richard said yesterday, they have about \$50,000 :from this (last) year and probably going to have about \$100,000 from this year, so we need to decide whether we want to include two, or do we want three or four, whatever you decide. It's [the TAC's] decision, and they will put it in the EPA's announcement of opportunity for federal funding. He described the subsequent process. When the preproposals come in, as described earlier, EPA will establish a scientific review panel to review the preproposals. All the preproposals that are accepted will be invited to submit full-blown proposals. Then another scientific group, a technical review panel, will review those, score them based upon the criteria that will be included here. Then they will be ranked and will be notified that they were successful in their application to EPA for federal funding. That's the process and how it's going to work. I have three copies of the past announcement, if that would help.
9. Dick Dodge asked if it would be helpful to have copies made for everybody's reference. (Copies were made and distributed.)
10. 9:15 AM. Cory Naugle suggested that now would be a good time to move the tables together. The group answered by moving the tables into a closed square, chairs along the outside of the square.
11. Cory Naugle: Vladimir, do you want to lead the troops?
12. Vladimir Kosmynin: We will start from mass balance and go from there. There are many parts. Aerosols we are already gathering data. Alex's part helps with the physical oceanographic part,

which helps to figure out the distribution of the particles. It puts the accent on oceanography, but part of the question is on the pollution load. There are parts we cannot figure out using the models or data. I would like to discuss if something should be added to this proposal? Does anyone have any ideas on how it should enhance it somehow?

13. Valerie Paul: I wonder if what we need is plume tracking, more like what John Proni is tracking, to really understand inlet water and where it goes and all that, rather than just setting up some measurements offshore that may not give you what you really need.
14. Vladimir Kosmynin: We discussed that, not just having measurements at one point. Talking about deeper inlets, have deeper southern of Port Everglades is much higher than up north.
15. Ken Banks: I wonder if you could use satellite imagery, something like the spectral signatures for the outfall, they've got to have it for the inlets, too.
16. Brian Lapointe: Charlie Simpson has already done a little bit of that.
17. Alex Soloviev: ...temperature and spectral information.
18. Brian Lapointe: Hyperspectral
19. Phil Dustan: There are a couple of issues here. Imagery is expensive. Every image has to be hand-done. Sometimes you don't see what you really want to see.
20. Brian Lapointe: It must be ground-truthed. What we haven't talked about yet is the full range in profiles, to tell you where the fresh water is coming in. We've done this in our study areas in northern Palm Beach County. You can tell where the groundwater goes over the reef surface. It depresses the salinity sign. That should be done in concert with plume tracking to show you exactly where the buoyant pollutants are coming out of the inlets or the outfalls and the groundwater.
21. Joe Boyer: Yes, the satellite imagery that was done on the west coast on a black water event is hugely important, because it was a spatial representation and there is good science behind it. It can show people what has happened.
22. Brian Lapointe: But it has to be ground truthed
23. Phil Dustan: Let's look at the products like SeaWiFS that are already there. We've got a time series to put together.
24. Vladimir Kosmynin: That's the main concern, in creating an instant slice. What do you get? So if it's coming, how frequent does it come? How long does it stay? How much flow are we getting from this? How much nitrogen and phosphorous? That's the trouble with an instant slice, but it is the same with film. There are already data out about skewity and how it is deflected with just one satellite image.
25. Phil Dustan: We can put together an animation time series. Probably a 4-km resolution will show integrated continuation. They usually use 1-km instrument, but with a 4-km, relatively simply.
26. Alex Soloviev: What about the buoy? To show the pollutants, we can put in a camera to trace satellite data.
27. Phil Dustan: It would be a whole, huge can of worms to work on the image process.
28. Alex Soloviev: In a pilot study a couple of years ago, they tried to find a signal from the plume, but couldn't.
29. Joe Boyer: A hydrodynamic model is needed. Plume tracking as an event needs to be done individually. Overall, we want to have a more continuous situation, of planning, to be in all directions and tides, under all different conditions. What that will do, is by doing all these discrete sampling events, and use these discrete sampling events to do a parameterized model.

Toe models are there. The people are there. I'm sure if there was money there, we could get people to do these ground-truthing experiments. That would give us a product to use in different situations, for What happens if... ?", e.g., "What happens if you put another inlet in?" and so forth.

30. Alex Soloviev discussed different kinds of software and models.
31. Joe Boyer: That doesn't rid us of the need to do plume tracking.
32. Phil Dustan: One of the things that is a disparity, that is paradoxical to me, is that we are finding deep-water corals are exhibiting more kinds of stress than shallow-water corals. Now John Proni is showing that the plume goes up and way down the coast, but then you are talking about entrainment. Possibly that's the mechanism we are coping with at the bottom. Actually, that's an idea I hadn't even thought about before.
33. Brian Lapointe: And you still have injection wells underground, too.
34. Alex Soloviev: Gulf Stream front is where it happens.
35. Phil Dustan: I was involved in a big project in Charleston to look at the path of the ocean environment, with the river coming in. We put two-thirds of our budget into the hydrodynamics model, and it showed the water was going out. It showed where the water was coming in and going out, but it was at huge cost.
36. Joe Boyer: Resolution has been bad with the models. I was involved with the Florida Bay model, it was a total bust. The Army Corps didn't listen to anybody. They just had their own model they used. Model had to be rewritten and now it is much, much improved and is much more useful. It is now tied to water quality. Before that, mistakes were made. The best thing we ever did was to get Bill Boicourt involved, and he brought in the concept of community models. He made sure that all the different hydrodynamic models that exist out there, could be brought together and integrated to talk to each other, even on a different scale. The original Florida Bay model had a thousand cells in the model. We asked him how long it would take to simulate a month, and he said, about a year, but by the time we get it done, computers will be faster.
37. Phil Dustan: I'm wondering if there is a way to have a modeling exercise at this point, at least parallel to it.
38. Joe Boyer: Oh, yes. You have to open it up to the modeling community. There's an interest in putting it together and developing a model for this stretch.
39. Dick Dodge: You have to write your RFP correctly.
40. Joe Boyer: Yes. It depends on what they think. If you get someone in there who knows these models, like Bill Boicourt, you can. Florida Bay has a model evaluation team.
41. Richard Harvey: There are always questions. Many years ago we had the Tampa Bay model and the Saint Andrews Bay model, for doing wastewater allocation and (...) discharges, and it never showed that anything beyond secondary treatment was ever needed, because the resolution of the model itself was too gross. You couldn't show the near-field effect. The concentration levels of the elements shown in the model were just not [adequate].
42. Dick Dodge: We need to specify that in the RFP, what you want.
43. Richard Harvey: ...That was 30 years ago, but I'm not sure anything has changed, unless you have a real fine-grained resolution, and the data to support it, it needs to be ground- truthed with the actual. It has always been that way with these models.



44. Phil Dustan: We just want to partition the stress. We want to figure out where it is coming from. Is it coming from the groundwater? Is it coming from the birds, or water coming up into the plume?
45. Joe Boyer: You need to specify to that, as to what scale you want it. You need to specify that you want to see upwelling on the reef, the tidal [board?]; you want to see enough resolution to see it in the plume. We want enough resolution to see the effects on the three different reef lines. You need to tell them where to concentrate their efforts.
46. Phil Dustan: What would be of interest of that would be the impact on the organisms; do a bioassay on organisms.
47. Joe Boyer: And then tie other things in, like the water quality, and tie in sediment transport and so on.
48. Richard Harvey: First you've got to look at the organism, then where the stress is coming from, like from your biomarker study. See if there are any indications of stress. Then go and back track from there, albeit whether it's groundwater influence, or injection wells, transport, or whatever.
49. Phil Dustan: I don't know. We're looking for signatures for different kinds of stressors.
50. Richard Harvey: We need to see if there's a problem out there and if there's anything indicative of land-based activities.
51. Phil Dustan: What we are doing is different. We don't have it.
52. Dick Dodge: If we don't have it, then we need a model to better predict where the sources of the problem are going, rather than go back to say whether there is a problem. Do you agree, and I think most people do, that we have a problem, or do you think we need to find out if we have a problem?
53. Phil Dustan: No. We have a problem. What I was asking is that we need to build a model with a top-down perspective. Do we see that water is going this way, and therefore affecting the corals because the water is going this way because the model says so, or do we say, hey, what's bothering you coral.
54. Dick Dodge: It is both.
55. Joe Boyer: Both. They are parallel exercises. It is the same as the chicken and the egg. The model is not going to explain everything.
56. Vladimir Kosmynin: Absolutely. Yesterday they showed when used water from the inlet and they used just pure, clear water, there is no difference. The difference is in something else. But how much is known?
57. Brian Lapointe: They could have showed it with Bahamian coral, could have shown an effect. Coral has memory. That coral was a local coral.
58. Dick Dodge: Or like water on another day, it might be different. The water might be going north sometimes.
59. Phil Dustan: Variability can be huge.
60. Joe Boyer: We need to find out where the water is really going, to simulate it, then show it, so people will say "wow," it isn't at this station here. Three-fourths of the time, water is not getting here.
61. Vladimir Kosmynin: That brings up another main point, what brings more hydrogen and phosphorous, on a hot day, or what is coming out of groundwater, outfalls, and which part? It may be equal, it may be 25/75.

62. Valerie Paul: That's another thing that might come out of a good water quality monitoring program.
63. Joe Boyer: We've done it both ways. We've used estimates in Florida Bay where we used a loading model. And we've used estimates of Everglades input, atmospheric input, exchanges within boundaries, groundwater. And then when Coral Circle came down and did a water-quality model for the Corps, although the Army Corps had a lousy hydrodynamic model, they did a great job with the water quality model. They needed to restrain some of these loading dikes, and specific boundaries. You are going to have a tough time measuring tidal (vorhees???) input, because of a huge boundary and episodic sequencing. The model helped constrain that number whereas the inlets are easy. The model will help you with some things whereas direct measure will help you with others.
64. Mike Risk: I'm a little confused. I've been coming to these meetings for years, with the purpose of this group is to assess land-based sources of pollution. I hear Phil say we know there is a signal out of align. I don't think we can demonstrate that to the legislature of Florida. There is a mind set elsewhere in the state that wants to blame all coral reef decline on global [climate] change. I don't feel up to speed here. I thought two years ago we decided on projects designed to detect stress and communicate to the public that there was a problem.
65. Dick Dodge: I think we all think that there is a problem, but are we able to say yet that sewage is 75%, upwelling is 20%, and the plume is 5%? I think we're not.
66. Valerie Paul: No.
67. Dick Dodge: Then somehow we've got to somehow be able to partition what sources we think are the sources at issue. I don't know how we are going to get there, other than measuring loads.
68. Brian Lapointe: I thought we were going to get land-based loads, too, but I guess we're not, under the Task Force funds.
69. Cory Naugle: We are going to get the information, from Tallahassee. We were able to get a summary of the report of land-based loads from Tallahassee.
70. Valerie Paul: Is that the effluent?
71. Brian Lapointe: Yes, that's just at the outfall, and they've got every canal structure, here at the District's...
72. Nancy Craig: But what is coming out, is within a couple of miles. But that effluent structure is not what's coming out of the inlets, and that's no reflection on the effort. They are working on the canals and we are trying to connect it up to the coastal zone. But I don't think we can use those numbers, to say what's happening two miles from here, is coming out here, because you can't. It is not the same as what's coming into the ocean. It goes through a whole pipeline.
73. Brian Lapointe: But it's a start. And the estuaries. Then there are the injection wells, that's all on file; all that is easily gathered data.
74. Valerie Paul: But we need to compile the data.
75. Margaret Miller: What we need is to measure what is coming out. That is the point of concern. What is hitting the reef is what is important.
76. Richard Harvey: Going back to your comment, do we have an impacted resource? Because we try to justify the utility to whoever has the big bucks. The first argument to me is always that there is no problem and if there is a problem, we weren't the cause of the problem and if there's

- a problem and we weren't the cause of it, then we shouldn't have to pay to fix it. First we need to make sure to convince everybody that there is a problem out there to a valuable resource.
77. Mike Risk: We are years away from usable result, on that. To me, so far there is nothing to my satisfaction that guarantees that that resource is under stress due to land-based sources of pollution. And if you don't have that, and certainly if it is not conclusive to me, certainly not to the legislature. So I think step one is to demonstrate that it is under stress.
78. Valerie Paul: I want to comment on the biomarker study. I think it is a useful tool, but I want to echo what Margaret said yesterday. We have no idea how to interpret that data. For instance, do you think an overall increase in biomarker presence on almost all the offshore reefs, you can interpret that as stress from anthropogenic forces, but you might also conclude they are light stressed, or some other abiotic factor, that has nothing to do with land-based sources. And as Margaret said, until the actual experiments are done to demonstrate what that data means, you can't really interpret it. Certainly as Mike said, you couldn't interpret that with any degree of satisfaction to convince anybody.
79. Mike Risk: If I come back to this meeting next year and someone says we're still working on biomarkers, then I'm going to stop coming. There are tools out there right now that can demonstrate stress; why aren't they being used?
80. Brian Lapointe: I think for a very little amount of money you could analyze xxx and that would give you the index of nutritional state of the corals here and you could compare that with your Bahamian corals. That would give you a lot of good information.
81. Margaret Miller: What is proposed for the next step in the biomarker study?
82. Cory Naugle: The original funding was from a grant prior to the implementation grants. That funding needed to be spent on a project and the biomarker project was ready. Since this project had previously been accepted for funding through the NOAA Coral Management Grant, funding is being sought through the same mechanism.
83. Margaret Miller: Then maybe we need to get the most mileage out of it in terms of next steps. Let's see how we can make it the most fruitful, since it is grandfathered under the other funding source.
84. Cory Naugle: My recommendation would be to know what's going on in those next steps, but for EPA funding, to look at other projects. Which of these other projects can we get ready to go?
85. Phil Dustan: I want to suggest the idea that we have no clue about what biomarkers are here in the United States, but there's a lot of data in other parts of the world. It's becoming forensic ecology and that's building a very large background of information. However, we do not have the ability right now to do the kinds of dosing experiments that Margaret would like us to do, that we would like to do. We don't have that capability here and we have had long discussions about how to do more dosing experiments, but we don't have the right facilities. We need tanks that are lined with Teflon and pumps that are xxx, and that sort of thing. That would take \$100,000(s) to build that sort of thing.
86. Joe Boyer: I don't know if we have Teflon tanks, but we've got that kind of facility. There's one at FIU. It took a big hit with Wilma, though. It's a stand-alone facility.
87. John Fauth: What we propose to do, before we got the lab results, was to continue monitoring to make sure it is real, that we will get the same profile all the time. Then the next step we were proposing to do dosing experiments. We want to screen for potential compounds using toxicity assays. We are looking for is what constituent in the water and in the sediment is causing stress;

to narrow down our possibilities. We already know from Port Everglades water, that it is not just the water per se, so we'll look in the other logical places to try and narrow that down. Then do a really directed dose-response experiment so we can match up the biomarker profiles to known concentrations in the lab. The next key is to do contaminant analysis of the coral tissue to let the corals tell us what they are susceptible to.

88. Margaret Miller: That's right. It seems straightforward. Then it is just the matter of getting the analysis done. I guess that gets expensive to get them run, even the samples you already have.
89. John Fauth: Yes, it is very expensive. And you need some idea of what you are looking for.
90. Esther Peters: The different analytical methods require different strategies.
91. Phil Dustan: We also like the idea to develop our control site in the Bahamas, and get more data on that. Same latitude, but totally different situation. We are only looking at one species right now. We narrowed everything down to a bare-bones perspective. Of all the species we looked at, this species appears to be the least responsive.
92. John Fauth: And this coral is insensitive.
93. Margaret Miller: It is an appropriate, conservative approach to use a relatively insensitive species because the demonstration of stress in such a species provides a convincing case that community-wide impact is occurring.
94. Joe Boyer: It also seems to be the only species out there.
95. Margaret Miller: Exactly. I don't have a problem with that focus; that seems to make sense to me, that strategy.
96. John Fauth: Another thing is that *Porites* gives a greater suite of biomarkers to work with. The nice thing about these enzymes is that we have studied them in other organisms, we know exactly how they work. So, it's just a matter of working out, in the lab, to see if they work the same way in these.
97. Alex Soloviev: What about those in the Bahamas? Might they be different [due to] oceanographic conditions. What are the possibilities across that channel? It's a very strong possibility. xxxxxxxx
98. Phil Dustan: That's why we're doing it in situ.
99. Joe Boyer:(????)
100. Gene Shinn: xxx
101. John Fauth: ... and that led us to a lot of discussion about how we got to biomarkers.
102. Joe Boyer: That's what we also wanted to be doing, to look at biomarkers was to look at that use of regeneration at the organismal level for proxy of the xxxxx.. But if we had the ability to do more population modeling or some way to look at the size structure of the corals. Are they recruiting? Is it a sustainable population or not? That's what a lot of the monitoring projects aren't taking into account. We need to know about population dynamics.
103. Margaret Miller: And I'll second that, too. This is what I've been saying for a while with regard to our general topic of linkage between organisms and land-based sources of pollution. The key is the organismal performance or population performance. I think a critical component of that, is linking it back, not just that organisms have it stuck in their bodies, or eating it, but how it has an influence on the ecology. I agree that that's a crucial point, to follow up with growth rates and regeneration and is obviously an integrator of a lot of those things, and how the organisms operate, but the population is likely also important in terms of, again, building a convincing case that the resource is at risk.

104. Vladimir Kosmynin: So why don't we treat the whole community?
105. Margaret Miller: Ultimately, yes, but we have to start on the organismal, then population levels, but ultimately, yes, that will lead to the community level.
106. Vladimir Kosmynin: Our ultimate goal is to show how the load of nutrients is changing the population, and get that across to the legislature and to the public.
107. Alex Soloviev: There are problems comparing the Bahamas and Florida populations. The loads are different, a different composition. We are making an inference. xxxxxx There is a complication.
108. Vladimir Kosmynin: But the anthropogenic part is eliminated.
109. Phil Dustan: On the regional scale, to some respect it may be eliminated, there may be a significant variation on the local scale, but we try to minimize that within our sampling. Then there's another aspect, there is the global scale issue. The layers can be piled in.
110. Alex Soloviev: The upwelling is different. What are our limits?
111. Gene Shinn: This goes back to our original assumption. Do we have a problem? We assume we have a problem. I like to quote Danny Hubbard. Danny Hubbard says if you get on the wrong train, then every stop is the wrong stop. Let's make sure we're not getting on the wrong train.
112. Phil Dustan: Then let's get back to first principle. We know we have a problem that corals aren't around like they used to be.
113. Gene Shinn: Yet the staghorn are growing like crazy here, yet they are dying in the sanctuary. That's our canary [in a coal mine] coral.
114. Phil Dustan: I've been diving here a long time. I think if you take someone diving here who dived a long time ago, then brought them back to the same places, they would see a difference. There are exceptions, but I think there is clear evidence that there has been a change. Would you agree to that?
115. Mike Risk: Well, no. That's what I've been trying to get across. Pretend that I am a member of Congress. I understand that you've seen some dead. Show me the evidence; show me the hard numbers. I'm glad we have Cory on board now, because that gives us some institutional memory. From the Minutes from last year's meeting, it was explained that there are techniques out there that will give multiyear detailed series of estimates for land-based sources of pollution on these reefs. It is an on-the-shelf technique that is available right now, but that hasn't come up here at all today. Why not?
116. Brian Lapointe: It will, it's just not one of these projects we are discussing.
117. Valerie Paul: They are in Projects 32 and 33, and we should be looking at those.
118. Mike Risk: It sounds like we're reinventing the wheel. A lot of these discussions went on last year and the year before. Let's stop doing that.
119. General agreement.
120. Esther Peters: What we need to get at is the exposure vs. response. The reef is being exposed to what is included in the groundwater. We definitely need to do water and tissue chemistry. We need to do water quality surveys. It wasn't quite clear to me, is the water quality program that we come up with going to be funded by the county, or is that supposed to be another SEFCRI-funded project?
121. Nancy Craig: Not unless someone gives us lots of money.
122. Cory Naugle: SEFCRI does not have the authority to run a program for the four counties. However, Broward County has set up protocols for their program, as has Palm Beach County.

The Florida Oceans Council has become interested in water quality monitoring programs. So the important thing for you to do, if you want to skip to this now, or if you wish, later after lunch, is to talk about the criteria you want used in the program, compare the language with them and evaluate gaps, so you can come up with and recommend a water quality monitoring program. What we can do is present that, as being brought forth from the TAC, to the counties and to the Florida Ocean Council, because we don't have authority to fund that program through all the counties.

123. Nancy Craig: We had hoped to go out and start on Tuesday, but we were weathered out. It's going to be a slow start [in Broward County].
124. Cory Naugle: That's what we hope you guys can do, is to come up with protocols, when the programs get set up, look at the gaps, and determine what is necessary.
125. Richard Harvey: I thought we were looking at two basic tasks. First we were trying to figure out the condition of the resource, and whether or not it is stressed. Then try and figure out of the water that the resource needs, what are the factors that are influencing the quality of the reef, and making that health relationship between quality and the reef. First of all, we need to make sure that we get nailed down that the reef is under stress. Mike is right. I've tried too many times in the past, to get people to spend huge amounts of money; just to take one Broward County plant and upgrade it from secondary to advanced wastewater treatment (AWT), that can cost a hundred million dollars. It is not a trivial amount of money. You better make sure, because they are going to say, you guys have to give us sufficient reason, and if it is, is it global warming or is it stuff coming from Africa or any other place causing the problem. We must demonstrate a problem locally with the mass balance approach. I thought we had a very good meeting a few months ago where we tried to partition where the water on coral reefs come from, and which land-based sources of pollution have the most significant effect? I thought those were the most basic. If we can do that, that is a huge step forward.
126. Joe Boyer: Talk about getting on the right train. (Reading from LAS booklet): Here's the first issue of the local action strategy here. The first issue is determining reef capacity and reef function. Second, determine sources and extent of pollution. Third, determine the link between these. Fourth design and implement activities from these. There it is, let's just stick with that, with our priorities under these four, and move on.
127. Cory Naugle: We cannot invent new projects at this point. We have to prioritize among these projects to see how we are going to get these done.
128. Joe Boyer: Were these from the top down?
129. [Many clarifying comments from many sources, that these projects were the result of stakeholder and focus group meetings decided upon in the past.]
130. Joe Boyer: We don't need to comment on all the projects, do we?
131. Cory Naugle: We need to prioritize just the projects listed in the Agenda. We do have some funding available, and we need to know where to start to get these done.
132. Esther Peters: Of the projects we already have scopes for, those were already prioritized, right?
133. Cory Naugle: Yes, exactly.
134. Esther Peters: As I understand it, of the other two, somebody stepped forward and prepared these. How did these proposals happen?
135. Vladimir Kosmyrin: Very simple. Remember, at the last TAC meeting, we divided into two groups, we outlined what should be in the two proposals. Then, in the spring, we had three

smaller meetings the proposals. I encouraged people to write proposals. Some people wrote proposals, some did not.

136. Cory Naugle: Is this right: there could be multiple proposals for the same LAS project, but at this point, we have two proposals, and have funding available, but we would still need project teams to write scopes, so we can look for funding.
137. Vladimir Kosmyrin: The TAC does not write the proposals. Someone else must write the proposal. No one is obligated to write a proposal. We can encourage individuals to write proposals, but it is up to them to write the proposals. The TAC does not write proposals.
138. Valerie Paul: In the past, the problem has been there hasn't been funding available.
139. Vladimir Kosmyrin: Dale and Gene did their part. In the meeting last spring in St. Petersburg, we decided it was not just groundwater. Nothing will start without our initiation. There was lots of criticism of what Phil and John did, but they did something, they got us started.
140. Cory Naugle: I need the scopes developed; I need the parameters and scopes (project summaries) so I can find funding opportunities for each project.
141. Fred McManus: Are you fully funded for phase 2 of the biomarkers?
142. John Fauth: It requires another sort of bootstrap approach. We had \$53,000 last time. To do another lab experiment with the samples we've got, piggyback a bunch of stuff on that.
143. Brian Lapointe: Is your Phase 2 in this Funding Tracker?
144. JohnFauth: Somewhere.
145. Cory Naugle: Yes
146. Laura Geselbracht: I'm curious, too, how do we resolve the issue of the Florida Ocean Council. My understanding of the politics there is that down the road, they are expecting some significant funding. It seems to me that this group is doing their work for them, at least in this one region of the state, in showing them exactly what the priorities for funding are.
147. Cory Naugle: They are setting up their parameters in a short period of time. It is a continuing body. They are at some level aware of us now. They are meeting now. We have one of our members up there now. When they want our help, we can step in and do that. We have room for involvement. We don't want to interfere with what you are doing now. We don't want to have monitoring set up and have separate protocols. That doesn't serve the resource.
148. Laura Geselbracht: I think this is a much better body to help direct research dollars. Right now, the Florida Ocean Council's research priorities seem to be sort of an agency wish list so far. SEFCRI appears to be doing a more thorough job of incorporating input from a broad range of stakeholders.
149. Cory Naugle: Right now, what you see is a policy body.
150. Gene Shinn: We can talk to each other. The Ocean Council group cannot talk to each other, because of government in the sunshine laws. They can meet all together with the public there, but they can't pick up a phone and just talk to each other.
151. Phil Dustan: Can we go back to the question, how much money do we have?
152. Cory Naugle: \$100,000 for phase 2 biomarkers.
153. Phil Dustan: Instead of \$80,000 in the first year, and \$20,000 in the next for a grad student to keep it going, we'd rather have \$80k in each, but the idea was that we'd try to get some results in the first year, then try to bootstrap more money into the next year. Yes, we've got a proposal in. We want to examine and do more work on the population level, the linkage, to understand biomarkers on the population level. It doesn't bring in dose response experiments, because at

that particular time, we hadn't identified any facilities to actually do that. We had no facilities for it, but now with the possibility of the F1U facility, we might be able to do it.

154. Brian Lapointe: Do you have coral tissue analysis in there?
155. Valerie Paul: Yes, that's important.
156. John Fauth: Well we are going to wait on that until we know the stress marker so we know where to start looking, because it is so expensive. For example, if the cytochrome sticks to the top, then it's likely from a pesticide, so then we'll concentrate on known pesticides. That's where your database will help. It will tell us which ones create that mode of action.
157. Brian Lapointe: Are you planning to use stable nitrogen isotopes, you might get a correlation between those and your biomarkers. And they are cheap.
158. Phil Dustan: We've had very limited research money, very limited time, very limited sampling. With enough time and funding, we could do a lot of that stuff.
159. John Fauth: Brian's point is very important. To partition the sources of stress, we want to know what is responsible for the variation. The more different components of stress we measure, the more likely we are to get a more complete picture. So we need to do it at the same places at the same time, so the more things we can co-locate, and the more different specialists you can bring in to take measurements, the more powerful.
160. Joe Boyer: It is very straightforward.
161. Alex Soloviev: We need statistics.
162. John Fauth: That's our struggle now. With our current funding level, we can only afford to go out and sample once or twice a year. So we are missing some of these big events. If a hurricane comes through, or a water release, we may not be able to respond to that.
163. Cory Naugle: Do we need more funding?
164. Phil Dustan: Sure!
165. Cory Naugle: Do we get the information we need with the funding we have? Let's look at other proposals that are on the table that we have possible funding for. We need to look at these other proposals to look at the complete picture, to fill in the whole puzzle. We have this funding, but we can look for more in other places. We'll need that information ready so we'll have it if we need to make another proposal.
166. John Proni: Just one comment. In these projects that have been undertaken, where we have specific measurement sites have been determined, it would be useful if that information was available to other members of the TAC, because we may bring to bear other resources to supplement what is being measured in specific sites, so if that information was available, I think it would be quite useful.
167. Cory Naugle: Right now LBSP team is working on writing scopes for the IMS website through FWC, will have the data points so you can see GIS maps covering Broward County's monitoring sites and all sites for all our research projects.
168. Phil Dustan: Ken has been pivotal in focusing on certain areas, especially in co-locating sites. And he's made available a nice boat and it's been free.
169. Fred McManus: What about projects 27 and 30, also 32 and 33?
170. Cory Naugle: We need to discuss those things, and which is the priority to fund. Second of all, who are going to be the project leads?



171. Brian Lapointe: I like Project 32. That speaks to what Mike Risk was speaking about, the idea of having an off-the-shelf techniques for the octocorals to look at detailed scale of changes in the animals.
172. Cory Naugle: Let's look at the rough scopes done last week, to see if we can come up with the parameters and come up with a potential donor. Look over those scopes that were in your packets from yesterday. Do they still stand, or is there something else that should be included, Mike, after these discussions?
173. Mike Risk: It was fine last year and it is fine today. [In response to questions/comments about differences in techniques:] Peter is a large thinker, who is sometimes concerned with details that just don't interest me. He uses nitrogen isotopes. I get answers from an octocoral which gives over a 50-year record of pollution at that site. Mine is a simple-minded approach.
174. Dick Dodge: He's not here; let's be fair.
175. Mike Risk: Peter and I have had this discussion. Peter has said, to use this technique properly, you need to analyze water samples, you need to get the nitrite and nitrate signal, the ammonium signal, the DIN signal, and the DON signal. But after 20 years, I'm still talking about the basics. I've found this method works like a charm everywhere it has been tried. You don't need to forge your own hammer to drive a nail.
176. Brian Lapointe: If you look at the signal from the outfall, you know what that signal is. We've measured that, and it is probably within a narrow range. You can measure all of that signal from what is coming out of the pipes.
177. Mike Risk: The application of this technique in the coral reef studies is actually an application that has been in the [diodiet] literature longer than that, this is probably a thirty- or forty-year-old technique, and the technique still works. Why not use it here?
178. Mike Risk: I thought we were going to do it last year.
179. Cory Naugle: Is it a priority for funding?
180. Valerie Paul: Yes.
181. Brian Lapointe: Yes, it still stands.
182. Margaret Miller: Yes, but without details of the sampling, how to layout, where to do what, to get the answers that we are looking for, so I would be reluctant to prioritize it.
183. Brian Lapointe: We need a whole proposal.
184. Cory Naugle: We need a project team and project leads to decide the priorities for this project, then have the team write the proposal, then circulate it around the TAC.
185. Vladimir Kosmynin: I think that is a good idea.
186. Valerie Paul: Aren't we getting ahead of ourselves? EPA or whoever will pay, their RFA has to be opened to everyone. All we are setting today are the scopes for the RFA. We are not writing projects.
187. Cory Naugle: But who is going to write this proposal? How are we going to get the projects?
188. Fred McManus: We need only a draft, a summary scope of work, just an abstract so when the RFP goes out, people will understand what we are asking for.
189. Cory Naugle: So is that acceptable, Margaret, just to set the priorities?
190. Valerie Paul: Yes, just a description of what we want in terms of what will go in the RFA.
191. Esther Peters: Just a paragraph.
192. Vladimir Kosmynin: And when we meet again next year, we will have the prioritized list. Anyone can write it. Anybody can write a proposal.

193. Margaret Miller: If it is in an RFP, people will write proposals.
194. Dick Dodge: I thought you were going to solicit three proposals based on these three scopes and then choose which among the preproposals to be granted. And then choose the proposal that will be granted.
195. Cory Naugle: Fred will explain the process so we can all get on the same boat.
196. Fred McManus: You all have a copy of the last RFP that went out two years ago for the Water Quality Protection Program of the Florida Keys National Marine Sanctuary. You'11 see on page 3 the priority topics for special studies last time. So, we asked for preproposals from people who thought they might like to submit proposals to do that work. Preproposals were submitted, and from those preproposals, we saw who had the right idea. Then we contacted those folks and said you've got the right idea, on your own track, now come back with full proposals for consideration for funding of the project using EPA federal funds.
197. Joe Boyer: So the TAC would determine these groupings?
198. Fred McManus: Well, the TAC and some technical staff from the Florida Keys National Marine Sanctuary. SEFCRI doesn't have a science plan at this time, but these priorities were developed by the technical advisory committee and others working in the FKNMS. So we took these priorities out of the Sanctuary science plan. We said this is the kind of info we need, the types of scientific studies we need answers for, so that the managers can take the appropriate actions. We want to provide this information so the elected officials and citizens down here can proceed to Issue #4, that is to design and implement best management practices and other activities to reduce LBSP affecting the nearshore area in this four-county area. So what you give us for the priorities is it. We will not be coming back to you again. We will take the priorities you've given us. Then, it will be up to disinterested third parties on the scientific advisory panel, to work with Bill Kruczynski and I, to determine which projects are the best. Certainly if we brought it back to you, there would be conflicts of interest, and we don't want that. So we are getting the input we need from you right now. That is, what is the most important project or projects that we can fund?
199. Cory Naugle: Do you have enough information by these projects listed to create the RFP?
200. Fred McManus: No. So to use this as an example, if you can provide to me today or sometime next week, two or three paragraphs that describe in sufficient detail to give a researcher an idea of what kind of projects we are asking for, and the information we want to gain from those scientific studies.
201. Cory Naugle: So do we want to do that right now?
202. Joe Boyer: But first we need to decide which project in that package we want to prioritize, in three or four areas.
203. Margaret Miller: I suggest a different approach. Projects #32 and 33 both look at tracers of LBSP in coral reef organisms. So shouldn't we phrase a description for the RFP to say we solicit for proposals that are going to look for tracers of land-based sources of pollution in reef organisms. Then the proposals will come in, using different methods. So we only need a couple of paragraphs that describe a tracer study, then it would leave it up to the researchers how they did it. That would give us the proposals we need. They would then be evaluated on scientific merit. I propose that the second project type would be a feedback loop to link between the exposure and the performance of the organism at the organismal level, the population level, and the community level, because that is not covered in the tracer studies. That would be a

separate category, but one that should appear in that RFP. It would be to demonstrate not only a linkage, not only in the presence, but also has an impact on how the organisms can perform. There are two categories of projects under the linkage category. Two topics, this could lead to a suite of projects.

204. Vladimir Kosmynin: We should have this ready soon. All these projects will be divided among the \$100,000. Four projects or 10 projects, not how many projects, just the total will be \$100,000.
205. Joe Boyer: Can we take and shop this to other agencies?
206. Margaret Miller: Let's start with the best opportunity we have.
207. Vladimir Kosmynin: We just have to make sure that we are ready.
208. Esther Peters: LBSP signals in coral reefs in South Florida could be a priority topic, but we need paragraphs about the tracer.
209. Margaret Miller: I will help write it over lunch.
210. Cory Naugle: Do you all want to add something?
211. Mike Risk: I feel that's a reasonable approach. I feel a bit conflicted saying anything about tracer studies, because this is my work, but who knows whether I'll ever be involved down the line. I think we can say that we need one brilliant sentence that says we encourage proposals on tracer studies that identify land-based stresses to our local reefs. That's it, just one sentence. I'm not sure why we need another whole paragraph.
212. Margaret Miller: I believe we need the other paragraph to demonstrate and explain that we have a problem. A little background.
213. Joe Boyer: We need to lead them on a little more than that.
214. 10:25 a.m. Cory Naugle: Let's take a break now. Margaret Miller, Erin Lipp, and Esther Peters have said they would work on the abstract for the one.
215. 10:55 a.m. Reconvened.
216. Vladimir Kosmynin: If we are looking at \$150,000, we want to be wise in our funding. We don't want to miss any opportunity.
217. Richard Harvey: Certain money will be dedicated to Keys projects, but you can assume annual funding; \$100,000 will come from us to SEFCRI. You can't bank on it, but if it helps you in your planning.
218. Vladimir Kosmynin: We need to look at what we can support and how. Monitoring is going. Other projects, Jim's on the water project is going. Other
219. Richard Harvey: We will try to give money annually, but of course, we can't promise. The money we asked for, for the Miami Task Force meeting, was cut in half.
220. Vladimir Kosmynin: We might be able to get it for 2 or 3 years. Maybe we would partition the same way, determine which projects to push harder. My experience is if we wait or only push a little, it is no good.
221. Fred McManus: We hope. We usually do 2-year cycles. Our last one was in FY04. We will try to put enough in the RFP for \$300k for 2 years. So think along those lines. Since we'll only do it one time, we'll already have a proposal on the shelf when we get FY07 money.
222. John Proni: Is your AA for water Diane Regas?
223. Richard Harvey: No, its Ben Grumbles. Diane heads the O-lab and office as well. Interestingly enough, at a recent meeting for next year, when they announced they were going to zero us out, Diane came to our aid. She said "Don't zero them out."

224. Mike Risk: There's no pot for an international relations program. National Research Council, Canada's equivalent of the NSF, does have an international relations program. It will fully fund foreigners to work with Canadians on directed research, which can be tenuously relevant to Canada, but they don't have to be a resident of Canada. Some of the modeling stuff would be a good fit with some of the stuff that's going on right now; an ideal model is portable anywhere. If people are interested, everything is on the NSERC website. I can be a front man to help find someone to collaborate, if anyone is interested. The NSERC website can lead to relatively easy money.
225. Joe Boyer: How much funding is available from The Nature Conservancy?
226. Laura Geselbracht: TNC is not a funding organization; we search out funding to implement priority projects that we have identified.
227. Richard Harvey: You've done some great work, especially with .....
228. Laura Geselbracht: You mean the ecological assessment of state marine and estuarine areas and the threat assessment/strategies prioritization for the state's marine and estuarine resources. We hope to identify major donors that could help us to implement some of the high priority strategies that were identified. It's great to have a suite of projects available to direct potential donor funds.
229. Phil Dustan: Who funds your resiliency program?
230. Laura Geselbracht: State and private funding, and we're going to seek out some more private funding to keep it going.
231. Cory Naugle: I can contact some philanthropists interested in funding environmental research. Big companies fund research for tax breaks. In addition to prioritizing projects, I need you guys to prioritize possible sources of funding.
232. Vladimir Kosmynin: Margaret, you will write something?
233. Margaret Miller: I've got just a paragraph on each right here. They probably need flushing out. Do you want me to read it or email it?
234. Vladimir Kosmynin: Read it.
235. Margaret Miller: I just have this for the first title: "Identification of Sources of Signals of Land-Based of Pollution in South Florida Reefs." (Reads proposed text. See Attachment A.)
236. Vladimir Kosmynin: That will include two or three proposals. That is general. We need to put in something else.
237. Margaret Miller: We have a second. Let me read it. "Linking Ecological Performance to Pollution Exposure." (Reads proposed text. See Attachment A.)
238. Joe Boyer: We need another topic as well.
239. Margaret Miller: We need mass balance, too; I didn't volunteer to write that one.
240. Dick Dodge: You and Alex need to write it.
241. Vladimir Kosmynin: Jim, do you need to be included in this priority?
242. Margaret Miller: One paragraph to say we have a plan for doing a mass balance model for Southeast Florida; we need such components such as the flux from groundwater, flux from atmosphere, the flux from inlets, flux from upwelling and oceanographic processes. We are looking for proposals that provide these parameters for a mass balance model. It seems like all that's all we need for the RFP.
243. Ken Banks: Within this geographic area.
244. Margaret Miller: Yes, within southeast Florida, within these four counties.

245. Fred McManus: We need more information. If you think #27 is a priority, EPA can work with the Dept. of Interior through USGS, through an interagency agreement and not have to jump through the hoops. If you want to address Task 1 and fund that for about \$50,000 without having to go through the whole competitive process. Gene and I can get together and fund task one of #27. But is this your number one priority?
246. Richard Harvey: Gene, is there matching?
247. Gene Shinn: Yes, there is. We have coastal in our prospectus. There is interest and money. Congress gave money for coastal and shelf work.
248. Cory Naugle: Is #27 a priority? Yes?
249. Margaret Miller: We still need to write something for other agencies. We still need to write for the mass-balance equation.
250. Mike Risk: Collaborating in Canada. It's not hard to apply for. It funds travel, subsistence.
251. Brian Lapointe: They would support work in Florida.
252. Mike Risk: Provided that the link is shown. Link it to deep-water coral productivity levels.
253. Cory Naugle: Where are we Vladimir?
254. Vladimir Kosmynin: There are 70 Russians ...
255. Fred McManus: About next year's money, let's think now about extra money from next year and this year. We need to think about a couple of other priority projects to put in this RFP for the next year (2007).
256. Brian Lapointe: A big issue in EPA is injection wells. There's a high priority on the fate of injectate, that fits directly into this project.
257. Gene Shinn: Some people don't want the answers.
258. Richard Harvey: We'll check to see if funds are available.
259. Gene Shinn: I suggest another plume project. With more hurricanes, mud gets dumped into the Keys. Corals are getting buried by sand, etc. That happens out here periodically. With instruments out here that could detect them, we could monitor those.
260. Mike Risk: We could invite proposals designed to assess impact of episodic events on the reefs, or would it need to be catastrophic events?
261. Cory Naugle: It could be tweaked, under broad ranges.
262. Margaret Miller: Cory, can we shop these around to other agencies? When there isn't money on the table, it is hard to motivate people to come up with proposals, but once the EPA money is there, the proposals will be written, and then perhaps other funding will be sought for those projects that the EPA doesn't fund. Also, once we're at the end of a fiscal year, in some cases, there may be some left-over moneys that can be used on some of these.
263. Ken Banks: We wanted to shop them around last year.
264. Cory Naugle: It's hard for me to fit the scopes we have here to an RFP. We need more information so I can tell what the project is supposed to be about. These descriptions that we had are too general. They don't say what you want.
265. Margaret Miller: It will generate proposals and motivate people to do the work.
266. Cory Naugle: Maybe we could investigate possibilities with White Water to Blue Water.
267. Phil Dustan: But is that USA?
268. Cory Naugle: Its major thrust is ecosystem management, emphasis on MPA networks. There is a booklet, guidelines. NOAA is involved, their MPA group, and task force. I forget what it is called. I'll send it out to you. There may be overlap with what you are trying to do here.

269. Alex Soloviev: We need an estimate of flux, by salinity, temperature, and density for the proposed project.
270. Margaret Miller: We might add another paragraph. Are we talking about a nutrient budget, or an everything budget?
271. Richard Harvey: We want to partition it. If a slug of water is coming across the resource, we need to know what's in the water and where it is coming from. How long...
272. Margaret Miller: So we want to know about specific pollutants, like pesticides and so forth?
273. Vladimir Kosmynin: We need contributions from different sources.
274. Margaret Miller: I was going to have it read a nutrient/pollution mass balance equation. Is that appropriate language for the RFA?
275. Richard Harvey: Isn't it sort of a water-balance budget, too?
276. Margaret Miller: well, as a proxy, it is okay.
277. Vladimir Kosmynin: Water transport, as Alex was talking about. For outfalls, it is clear what is coming out, but nothing is known about groundwater or upwellings.
278. Margaret Miller: (Reads proposed text. See Attachment A.)
279. Mike Risk: That's brilliant. It's perfect the way it is. Leave it vague.
280. Vladimir Kosmynin: Aerosols.
281. Margaret Miller: Even if we get pieces of it, like from Florida Keys work, getting a couple of pieces is still useful.
282. Alex Soloviev: A full MBE is impossible; let's be realistic.
283. Vladimir Kosmynin: As an issue of accuracy, how far can we go with it.
284. Dick Dodge: Within the mass balance, would an oceanographic model fit? Do we need a hydrodynamic model which can facilitate a mass-balance model?
285. Mike Risk: I don't want to constrain people who might apply.
286. Margaret Miller: Dick is trying to include more people, people who do hydrodynamic modeling.
287. Joe Boyer: What about nutrient loading from various sources:
288. Mike Risk: The fewer words the better. We don't want to have a book.
289. Fred McManus: It would help to get the biggest bang for the buck. What should we attack first?
290. Mike Risk: Water quality.
291. Fred McManus: What about wastewater vs. storm water?
292. Richard Harvey: We built the water treatment program in the Keys....
293. Margaret Miller: What should we title this? Quantification of components of...xxxx. Mass budget balance.
294. Cory Naugle: I was asked if there anyone from the South Florida Water Management District. The answer is yes. He is involved with email and phone. He is not allowed to use work time
295. Vladimir Kosmynin: He tried, and wasn't even allowed to come on his own time off.
296. Cory Naugle: I'm also in contact with people on the South Miami-Dade Watershed Advisory Council.
297. Joe Boyer: Contact someone at Wildlife EMA. EMA funds water quality monitoring of Biscayne Bay, and the state funds from Florida Bay, up the coast to Naples and Ft. Meyers. Why doesn't the district fund water quality studies up this coast?
298. Brian Lapointe: Because they're in a very difficult situation in Lee County, St. Lucie County, and Martin County. It's in the literature with their releases.
299. Cory Naugle: I have a list of monies granted to counties for water resources.

300. Vladimir Kosmynin: They might.
301. Brian Lapointe: They [the District] may have less money, too. They're withholding \$40 million of tax money from the District until they are comfortable that the Everglades Restoration doesn't increase pollution in Lee County.
302. Richard Harvey: They're building some kind of reservoir.
303. Joe Boyer: Check with EMA.
304. Cory Naugle: We have 20 minutes left. Let's prioritize 27 - 33 and after lunch we can go into water quality management programs.
305. Dick Dodge: Why do we have to prioritize?
306. Cory Naugle: So I can look for funding. On another note, outside people are calling and asking about LAS projects. They have projects that have to do with SEFCRI goals that they see on the web site. They need to know about them.
307. Joe Boyer: On the west coast, they hired XXX from USF to make a searchable database. It takes a lot of effort. It's grouped projects by category. It's a good way to know what projects are going on in the area.
308. Cory Naugle: If you want these projects done, it will take someone a lot of time to research what grants can help get these funded. It has a greater purpose. We need collaboration to get these projects done. Another point to discuss was brought up in yesterday's public comment about projects 1 and 2. There was some good information given.
309. Dick Dodge: What does this have to do with project 1 and 2?
310. Cory Naugle: At the recent LBSP meeting, we talked about finding a little money and perhaps submitting a preproposal for NOAA grant funds to add more money for getting some analysis done of the data, but that was not part of the scope. There was a teleconference between the project team, Chantal and myself. We discussed if we were going in to change the scope, add the analysis of data from Project 1 and 2, or leave it as it is. It was determined to leave the scope as it is. To get the information Dan Clark was asking for, that we all want, is contained in reports Linda Home sent from Tallahassee. We discussed compiling the information of what is in the inland estuarine sites, however these sites do not show what is getting to the reef and is not part of the scope or of the SEFCRI focus on the actual coral reef habitat. We seem to have a communication breakdown. It seems there is no way to reconcile the different information because they are available in different media. At this time we have no way to do that.
311. Brian Lapointe: Just plot out the data that's put out their on the web site by the district and graph it out. Plot out the flows. There's seagrass and all that data..
312. Dick Dodge: No, I don't think they are going to graph out, are they?
313. Nancy Craig: We're not doing an analysis. As I told you before, that data are for structures too far inland from the reef. Our scope is to do what's on the reef. It's two miles inland from the reef. There's tremendous population, resident issues, the port; there's a plethora of stuff coming out of Port Everglades.
314. Richard Harvey: Looking at an overall aerial load, that would be a point source urban area. And urban areas add to the load. Then you have to find out the extent to which is xxx, and then you figure out how much of the residual gets offshore. Talk about an order of magnitude of nutrients, and toxins, and...
315. Nancy Craig: Right, but that's beyond our scope. Kevin's looking at the load to the estuary. We're working together at what's coming out of Port Everglades. We are working together to see if we

can tie that all together. That's going to be a lot more realistic estimate, once we get it, to see what's on the reefs.

316. Vladimir Kosmynin: We talked about this. There are lagoons, port. We are starting at the mouth of the inlets, but lagoons are different. We are looking for what's coming out from the land. First we look at what is coming, how it works, then we look at the amounts.
317. Richard Harvey: We're looking at land-based sources. We need to quantify the amounts to identify point or non-point sources so we can take corrective action. We need to know the relative contribution from the different sources. Down the road we will partition, but for right now, we need to get the relative order of what's coming out and down across the reefs. It sounds like you are making progress.
318. Nancy Craig: But we can't ignore the stuff in between. There's coupling. I don't think you can use that number. We need the benthic-pelagic number.
319. Brian Lapointe: It is a real number. We've done it on the Caloosahatchee, we've done it on the St. Lucie. We can go back 40 years on the Caloosahatchee. There's data on non- point source loads coming in over time, and you can literally plot it out.
320. Margaret Miller: But it doesn't tell us about the reef.
321. Brian Lapointe: It gives you an order of magnitude assessment of a very significant portion of the land-based contribution in the coastal waters.
322. Esther Peters: The tasks in the projects were re loads. You are talking about something else. It's not in the scope. That would take a change in technical direction.
323. Cory Naugle: It's not in the scope. Is there a place where the point sources are mapped?
324. Richard Harvey: Yes. Linda has a database. It's harder to figure relative loads.
325. Dick Dodge: Purpose of 1 and 2 was to provide a literature review and data review. It wasn't to obtain the data, create a database, or analyze the data, but just to find out where the data was.
326. Richard Harvey: But it needs to be done.
327. Dick Dodge: I totally agree.
328. Laura Geselbracht: We have people with analytical capability who volunteer to analyze data.
329. Richard Harvey: Staff at UCF, they have a universal xxx equation approaches to quantify nonpoint source loads. Land-use data. Rainfall data. Alex's data. At least you could compare those loads, and calculate those non-point load sources, develop a comparison of the loads through the system to see how much is actually reaching the reef
330. Laura Geselbracht: So the work is to be done, just not in land 2. So we don't need additional work to be done in 1 and 2.
331. Nancy Craig: To the estuaries, but not to the reef.
332. Laura Geselbracht: I just want to make it clear, for quantifying water going into the canals, wells, etc., if there is something fairly straightforward, and the data is available and it wouldn't take more than a couple of days of dedicated time, we could probably get that done.
333. Brian Lapointe: A graduate student could do it, but not one of my graduate students tight now.
334. Cory Naugle: There was a communication breakdown. I just wanted to be clear with the TAC about what was said yesterday about Project 1 and 2 during public comment. Those members of the public were not on the conference call because they were not members of the project team, but I want the TAC to know that it was discussed. I want to clear up any miscommunication.
335. Brian Lapointe: I'm still confused about the scope. Can we get a more flushed out scope?



336. Dick Dodge: You can see from the progress report, we revised the scope, project description etc. We flushed it out more. What more do you want?
337. Dick Dodge: (read revised scope).
338. Brian Lapointe: But that doesn't really include looking at water management district data.
339. Nancy Craig: Kevin is going to look at this.
340. Brian Lapointe: So it is getting done. Okay.
341. Nancy Craig: Just not in this project.
342. Richard Harvey: Let's write it down. I agree with Brian. I'm not sure I understand what is being accomplished by the revised scope. What will be produced from #1 and 2? What will the gaps be?
343. Cory Naugle: Is that not in the final report?
344. Richard Harvey: Let's talk about public comment periods. We need to give the public an opportunity to participate. Three minutes is too little. We need to give the public time to speak.
345. Nancy Craig: I talked to D for a half hour after the meeting yesterday.
346. Cory Naugle: He was aware of his time. The TAC determined this, as well as the idea that it would invite further discussion of any items brought up in public comment, as you may recall, Vladimir did.
347. Richard Harvey: We shouldn't cut the public off. If we have a hundred people, that's one thing. We need public support for our projects. We need to show [respect] for their views. We shouldn't cut anyone off. If we give everyone three minutes, and someone asks for five more, unless we've got a hundred people lined up, I think we should listen. We need flexibility.
348. Cory Naugle: I can't show [favoritism] as a coordinator. As facilitator, I have to allow equal participation to each person.
349. Esther Peters: We should have changed the length of time when we knew we only had 3 or 4 presenters.
350. Vladimir Kosmyrin: We could divide the time. This is not a public meeting. From the beginning, I've said, this is the Technical Advisory Committee.
351. Phil Dustan: It is important for the public to vent.
352. Cory Naugle: They need to be here. How you want to deal with it is important, because not all public comment will be in person.
353. Mike Risk: What about making policy for the TAC that public comment comes after 3:30 to 4:30 for all public submissions.
354. Laura Geselbracht: How about taking the total number of people and dividing by the time available.
355. Cory Naugle: That's not always going to work. Not everyone will raise their hands. This time we had someone else arranging the meeting, sometimes I'll have to do it. I don't have time at a meeting to stop and figure that out.
356. Gene Shinn: The point is, public participation is essential.
357. Cory Naugle: Everyone has three minutes. One-half hour for public comment, depending on the number of people there, after three minutes, the TAC can decide to allow more time for observers.
358. GROUP: If they have more to say.
359. Cory Naugle: Let's move on to our next thought before lunch and think of new TAC members. Four members are no longer members. Do you want to add four new TAC members?

360. Vladimir Kosmynin: Some of the four we never had any response from, although one wanted to but could never make it because of schedule. Alina unfortunately had to drop because she was overloaded. What about new members? I do not think it is necessary to introduce new members. We have a group that works together and all know each other. If we introduce new people, they will start all over.
361. Laura Geselbracht: I think there is some value in including and requesting specifically in the district, and governing boards and the executive director. Do government agencies such as the water district send representatives here?
362. Cory Naugle: To the TAC?
363. Laura Geselbracht and Brian Lapointe: Yes.
364. Vladimir Kosmynin: No, just scientists.
365. Cory Naugle: The LBSP is one thing, but the TAC another. They are made aware of our meetings and can come and observe. I don't think government representatives should be on the TAC.
366. Vladimir Kosmynin: Best to have just scientists.
367. 12:10 LUNCH break.
368. 1:10 p.m. Resumed.
369. Mike Risk: I think we need to add Walt Jaap. He is a book of knowledge of these Florida ecosystems.
370. Gene Shinn: He is well known and well connected. He does work right out here. Why wasn't he already included?
371. Dick Dodge: He was not allowed to until he retires. He's a smart guy.
372. Vladimir Kosmynin: Well, basically, he's in the other group.
373. Cory Naugle: He's in the MICCI group, coastal impacts. Any other comments?
374. Joe Boyer: Let's discuss the balance. Are we well represented by scientific issues? What are we maybe missing?
375. Mike Risk: Coral people are more than represented. We're missing a fish person.
376. Margaret Miller: Someone with experience with hydrodynamic modeling.
377. Cory Naugle: Send me the names.
378. Vladimir Kosmynin: Do we even need to increase the TAC?
379. Esther Peters: We could always just ask people to come speak, so we would not have to add people.
380. Joe Boyer: How many do we have on the TAC now?
381. Vladimir Kosmynin: 18 right now.
382. Mike Risk: I would withdraw my suggestion if we find we don't have the expertise to discuss a project, to just bring in people for one or two meetings as needed. We can drag someone in if we need them.
383. Cory Naugle: We have 17 active TAC members.
384. Phil Dustan: CMRC is not represented. Their lab is in the Bahamas and they do work on this coast. We should have John Marr, the director of CMRC.
385. Cory Naugle: Send me these names. We can have a teleconference to discuss it.
386. Vladimir Kosmynin: What about someone from FMRI (or FWC)?
387. Esther Peters: Someone just brought in wouldn't have a history of our meetings. We could have just speakers come in.
388. Cory Naugle: Speakers?

389. Vladimir Kosmynin: That's right. They would have no clue what was discussed before.
390. Cory Naugle: Please exchange information with each other, keep in touch about these people. Any other comments? Okay, time to turn to water quality. What would a water quality monitoring program look like? What are the SEFCRI questions?
391. Esther Peters: What are the nutrients.
392. Phil Dustan: There's a laundry list already.
393. Brian Lapointe: We came up with a laundry list last year.
394. Mike Risk: I'm against a laundry list or a "wish list." What I favor is a short list of parameters, of what to monitor. I look at only three things myself: chlorophyll, DON, and FPN.
395. Phil Dustan: That's water quality, but we also want to look at what are bothering the biomarkers.
396. Erin Lipp: Microbes.
397. Joe Boyer: If we had the money, I would suggest hierarchical over space and time. Pick a few sites monitored at high frequency for episodic events. If we work back spatially or temporally, we miss all the episodic events. What questions you want asked will determine how the system is tailored.
398. Phil Dustan: The Gulf Stream isn't monitored.
399. Joe Boyer: It can be transected, randomized and end up with two sites next to each other. Design is a really difficult thing.
400. Brian Lapointe: I would argue some transect sites work well and some priority sites that can be monitored. We need to get some long-term monitoring sites. These can tell us about dry years, about wet years, and see discharges.
401. Vladimir Kosmynin: That's how, not what, to sample.
402. Esther Peters: Our range of depths.
403. Joe Boyer: CTD [conductivity-temperature-depth recorder] at each site, chlorophyll, turbidity, and to give surface and bottom readings in discrete samples.
404. Phil Dustan: On the web, they have Mark-hydro, at the Florida Water Management District, which gives the flow of ground water through the system. I don't know much about it. They may already have the data we'd need to model. They already even have the models that describe how it might work.
405. Cory Naugle: Marni-Dade has a model.
406. Phil Dustan: This may exist already. Would that be the inlets?
407. Brian Lapointe: Fresh water. It doesn't extend out. They have grids in the model that go to shoreline. Water levels are projected, but not extended over to the islands.
408. Vladimir Kosmynin: What comes out of the inlets is important. Lagoons have lots of processes going on.
409. Phil Dustan: Ag vs. runoff. Shall we invite them to give a talk, compile what they've done.
410. Brian Lapointe: What they've modeled is how water levels will be impacted. What about the nutrient loading. I was told that wasn't included.
411. Phil Dustan: Do they have the concentrations?
412. Joe Boyer: Boundary of the model. That's the problem with a 2 x 2 model. The problem is with the edges, the input-output at the edges.
413. Phil Dustan: Actually measuring at many heights might be a huge effort that could help us, but we shouldn't have to reinvent the wheel. How do we find that out?

414. Joe Boyer: Don't depend on the District.
415. Cory Naugle: We need to find out. What would a long-term WQMP look like? How do we fill gaps yet not overlap.
416. Nancy Craig: N, S, and xxx profiles at Port Everglades and further xxx surface and deep, but we have no resources for a transect yet.
417. Cory Naugle: Make me a skeleton. What is missing? What about site selection?
418. xxx: We want co-located sites so we can get a lot of bang for the buck.
419. Vladimir Kosmynin: We need it from around the inlet. One or two where drilling will occur.
420. Esther Peters: I wonder if any of the sampling locations are going to give us any biomarker information; do we have any groundwater or other water monitoring sites; so is this program going to do anything like that?
421. Erin Lipp: We know where we sampled for biomarkers.
422. Ken Banks: The most northern spot. We want all sites to overlap.
423. Joe Boyer: We want fixed sites.
424. Brian Lapointe: We need the gradient from the land to the sea for the dilution curve.
425. Mike Risk: I'm really confused why we are doing this exercise. If this is going to be funded by an external agency, via a proposal, then surely somebody would evaluate it by some criteria, certainly what we are already discussing here. I am really opposed to reinventing the wheel. If we are going to persuade a local government to fund this in their county, then someone here will have to sit down with them and flush it out. I really prefer we not spend too much time on it.
426. Cory Naugle: Because SEFCRI says it's important. The stakeholders have said this is an important thing to do. A water quality monitoring program is a priority. We can't fund it over the four counties. We can go to them and ask each of them to do it, but we need to present them a structure to make it easier for them to do it. However, NOAA may fund a long-term program for all four counties. We can't go to any funder if we don't have any structure. We don't know at this point who those funders will be. If Broward does a monitoring program and then Miami-Dade does, but they use separate not the same criteria, where will that leave us?
427. Joe Boyer: What are the questions we want to answer? Again, what do you want to get out of this? That will determine how we design this. What do the counties want to get out of this; what does the state; what do the stakeholders want to get out of this? That has to be asked first.
428. Brian Lapointe: It needs to be framed around the outfalls. Then look at nutrient pollution from those other sources.
429. Richard Harvey: Is there a way to leverage this? Utilities could help fund this. John, what are some of the utilities' interests? Aren't they going to fund the monitoring of some of this?
430. John Proni: Yes, utilities are going to be expending some money. One of the things I'm doing here, is looking at what is discussed here that might merit our support for you or some of these groups.
431. Laura Geselbracht: Tell us about the utilities group. Is this statewide? What utilities are involved?
432. John Proni: All of them,
433. Laura Geselbracht: FPL?
434. Richard Harvey: Sewage utilities.

435. John Proni: All of the sewage utilities. I have a question for, I guess, Ken: If these are your monitoring sites, when you go there to obtain your data, do you go there every so often and have permanent measurement systems in there, or are these water samples that you get?
436. Nancy Craig: These are samples that we get monthly, at the surface and near the bottom.
437. Ken Banks: We'll get data along the shoreline with an ATD-Wi-Fi. It will be hardwired at online real time. We're ready to go online next month.
438. John Proni: Do you have equipment for that? Is the ADT-DFSI in there right now?
439. Ken Banks: No. Tue Navy is going to provide the equipment for that.
440. John Proni: We are interested in that, because we're going to be doing xxx conservation in some locations here, including in situ bacteriological xxx. So, we'd like to know where the sites might be. I'm also interested in the percentage oxygen at a given sites given by water managers and the different hydrotopic ratios and the effect of exposure and oxygen fractionization through tissues in organisms in different water masses. I'm here to learn about what's going on here.
441. Richard Harvey: There's got to be an opportunity for complementation.
442. John Proni: I'm sure there is.
443. Laura Geselbracht: Can you tell us a little but more about this utility body? Is this a statewide utility coordinating body you are sitting on?
444. John Proni: No. It's FACE. Florida Area Coastal Environment. It is made up of representatives of five or six agencies of various xxx. It was formed to address long-term significant environmental issues, but the quality and nature of the data is sparse. So this organization was formed and developed over the course of the last few years... An example is XXX.
445. Laura Geselbracht: It sounds like a governor's council. Who organized it? Who set it up? An NGO? Who funds it?
446. John Proni: The federal government, utilities and some other sources.
447. Richard Harvey: Several years ago a problem came up regarding ocean outfalls and impacts on the marine resources. Also, a number of years ago, a problem came out about effluent monitoring, discharges were monitored to protect toxins in drinking water. 11ris is a third voice.
448. Joe Boyer: There was no real appreciation several years ago in the dilution model for the difference between background micromolar at mean micromolar concentrations; they had no clue about the numbers in the environment.
449. Cory Naugle: When was that?
450. John Proni: 1979-1986. There is an interesting philosophical question about the water quality. Perspective of water standard was dependent on the prime underlying motivation for water monitoring program. Which was important, was it purely regulatory and thus based on lab stuff, or is your motivation that an effect on the environment can be seen? Depending on your underlying motivation is how you set the standard. If you look at the very nature of what is contained in the standard, recognition of sampling spatial and temporal variabilities need to be included. If you set a hard number as a standard, but don't understand what that number means, its variance, you can't address subsequent things down the road. If you take into external consideration other unanticipated applications, desalinization, dredge discharge, risk analysis, there has to be an integrated overview. In an integrated overview, so viewing not just a case of state ocean standards, but federal ocean standards, too. I always take opportunities to learn. That's what I'm doing here, learning here. Eventually I'm just here to help. I serve as an external referee in other regions.

451. Richard Harvey: Regarding the criteria of water quality standards, in the effluent toxin test, whether or not nutrients are present to influence flora and fauna. John, taking advantage of your experience, looking at corals, typical criteria include presence of toxic concentration levels of nitrogen, phosphorous, xxx, the same language as in the Everglades restoration. Clearly it would be helpful if you could help us from your work whether it would be worthwhile to establish numerical values for certain parameters. Maybe you can help us to look at a whole new set of parameters; they might not be nitrogen and phosphorous, but perhaps some other set of problematic parameters we've not thought of.
452. John Proni: Indeed. I am also very interested in the retention of flexibility. It makes a big difference if you want to retain the ability to utilize dilution in what you find, you have to be careful not to xxxx. variable xxxlution.
453. Richard Harvey: It is still rather complicated. We want to get the desired result.
454. Cory Naugle: What do you think about this program after hearing all this?
455. Richard Harvey: I think the message we want to convey is that we are very interested in complementing these efforts now and in the future. Right now, we may be in a position to gain more from you than you from us. But when we can hear about We need to be in the loop so we don't duplicate efforts.
456. Laura Geselbracht: Funding question, are the utilities funding research as well?
457. John Proni: Funding sources have to be detached from the work effort. The most important thing to do is to preserve scientific neutrality. This program's structure provides a means by which they voluntarily contribute, but have absolutely no say in what is done.
458. Laura Geselbracht: But they still contribute.
459. Richard Harvey: How much from utilities, what magnitude are we talking about?
460. John Proni: More than \$1 million per year. Hard to maintain a program of this magnitude and complexity. What are funded in FACE can be big like a desalinization plan, or the invasive species program. There was a big effort involved in Brevard County. At this point, I also want to make mention of a new federal program now coming out of Congress, called the Water/Energy Nexus program, with emphasis on water, waste water and renewable energy. Looking for future partners, the emphasis will be on renewable energy as much as possible. This effort here is helpful.
461. Vladimir Kosmynin: We still have to come up with what we want for a water monitoring program, even if it is general. We need to prioritize.
462. Richard Harvey: John has been real quiet. Maybe John [Proni] has some recommendations? What parameters and why you look at certain ones?
463. Brian Lapointe: I thought part of their permitting required monitoring in their receiving water, but they don't do that. They monitor effluent, not the source. So they don't have a realistic pin-point dilution model.
464. John Proni: We know that. Minimum dilution is 20:1; the number is a significant number because that has the impact of the Florida Administrative Code. New monitoring design protocol, that monitors outfalls. Considering the water on the reef, we need to think what fraction of time is water principally from inlet; from outfall; from xxx. Then how to identify them. You need in situ monitoring instruments; you need adaptive sampling system. We have been working on an adaptive, fixed, in situ system which can give two- way communication back to shore. There's a new system going in between Port Everglades and Boynton Beach Inlet. We

have had for a number of years a xxx, the xx[MALMS?]x program that has monitored different constituents. As you know, dredge forms a plume very similar to sewage effluent discharge. I am discoursing here, but am I giving you what you want?

465. Cory Naugle: This is important information for the team. First, let's think bigger, then if we need to constrain that, we can scale back.
466. John Proni: From my perspective, if you pick a monitoring site over there, I'd like to know, so we'd be putting in instruments. And we could staff in such a way so we know whether we have something occurring over here or we don't; where we have a site or not. If we have an episodic event, whether it is a storm front or some other. What's the full picture?
467. Cory Naugle: What's the perfect scenario? How many in situ monitoring sites do we want to put out there?
468. Brian Lapointe: Tie the water quality to the health of the reef.
469. Margaret Miller: That's the number one, the questions we have are relating it to the health of the reef.
470. Brian Lapointe: Getting indicator organisms, algae or corals, while we are measuring water quality in the water column, integrating into the system.
471. Cory Naugle: Don't constrain your ideas.
472. Richard Harvey: For legislative folks, if you guys identify what kind of argument, what kind of database would we need in order to put together to justify a change discharge levels. They are looking to see what the resource is doing.
473. John Proni: That is a fundamental object of hopeful discussion. Many discussions. We are all public servants. Utilities are public servants. We all work for each other. Reality is that people must spend big bucks here. What is the philosophy and issues of reefs, of ocean discharges for the whole Florida area. We are really talking \$3-5 billion down here. Our responsibility as scientists is to try and help guide and identify what is really significant and important. We are going to make a recommendation that will have effect 20, 30 or 50 years down the road. We can do this, we can do it carefully and come up with some good, reliable results.
474. Richard Harvey: That's basically what we're trying to do. Resource impact can lead to argument that there are impacts that need to be changed.
475. Fred McManus: The purpose of these long-term studies is the link between land-based sources of pollution and the resources we are trying to protect. Is there any change over time? As elected officials of Southeast Florida implement some of these best management practices programs, upgrading wastewater systems, establishing stormwater structures and utilities, as they change the way to manage golf courses, way to apply fertilizer and pesticides to yards, is this making an impact on water quality? So we want to set up a program to establish trends over the long-term, for at least ten years, probably twenty or thirty, to tell the public as we are making these changes, is there an effect on the resource, is the water quality the same, better or worse. Is the monitoring program long term? Will it detect trends? Is that the purpose of this water quality monitoring program, is it to detect change over time?
476. Margaret Miller: Yes. It is definitely one of them. Do we have concise picture of what the stakeholders want in terms of the water quality monitoring program?
477. Joe Boyer: Have Ken give an overview of the water quality monitoring program. How long did it take, how much did it cost to design?
478. Ken Banks: It's a management plan.

479. Fred McManus: We can ask scientists to develop discrete monitoring programs. Status and trends monitoring program. Chesapeake Bay monitors only a few things.
480. Esther Peters: Contributions from inlets, outfalls, indicators that would show these things.
481. John Proni: The more different types of data you have, the stronger, the better. Conversely, from the regulatory side, what lack of data are you willing to accept?
482. Ken Banks: 30-year target of removing nutrient to 40%. Algae bloom offshore.
483. Brian Lapointe: Can use algae to monitor.
484. Cory Naugle: Logistically, it's good to base on what is already functioning.
485. Joe Boyer: It asks a different question.
486. Nancy Craig: xxx
487. Cory Naugle: Is it possible to have in situ also and long-term, or must it be one or the other?
488. Fred McManus: At the beginning, as scientists sitting around a table, we designed a first-class Cadillac water quality monitoring program. Then we discovered we couldn't pay for everything. When we found out how little EPA funding was available, we designed program around funding, by trying to monitor what matters. Paraphrasing, Einstein: Everything that matters isn't always counted, and everything that's counted doesn't always matter. I think we need offshore and inshore transects, and count what's needed.
489. Brian Lapointe: If you remember those heated debates on fewer stations high frequency or lots of stations doing low sampling.
490. Cory Naugle: Don't limit yourself right now by money, think bigger; what about an ideal. When funding is an issue, then we'll determine what's the minimum, based on a protocol.
491. John Proni: One of the reasons I'm here is that after you select your stations, we might want to place things at your stations. I'm here to learn. Another development we have is rapidly deployable, integrated, electromagnetic acoustical networks, spatially deployed sensor systems that will communicate data to the central core and immediate link to satellite real time communication. That concept is there for special things.
492. Cory Naugle: Think big. There are other partners out there that are interested.
493. Phil Dustan: What about the ocean observing systems that have things like CTDs at Rutgers.
494. Mike Risk: We're spinning our wheels. We know we will not design a water quality monitoring program here today. Best we can do is to outline the general principles and not worry about the details.
495. Vladimir Kosmynin: Explore the gradients, main sources and along the shore. Are there changes reflected in the organisms?
496. Cory Naugle: I can't give anything to Chantal from this discussion.
497. Joe Boyer: First question is trends, then loads. Episodic events, onshore/offshore gradient. What other questions?
498. Esther Peters: The resources, where are they? Need CTDs in areas of high coral populations.
499. Vladimir Kosmynin: xxx
500. Joe Boyer: So you're adding a biological?
501. Esther Peters: What are the corals being exposed to.
502. Phil Dustan: Are you saying the biological community is the sink?
503. Dick Dodge: Determine for the resource, characterize conditions, water quality, and relate the two together.



504. Brian Lapointe: Last year we talked about integrating and overlapping the water and coral monitoring.
505. Margaret Miller: That is sort of a skeleton. Inshore/offshore gradient in terms of monitoring stations.
506. Ken Banks: Minimally, we want water quality sites to be SECREMP sites for the reef.
507. Mike Risk: Make a three-person committee and adjourn committee.
508. Cory Naugle: We need a little more information. Who can I bother through email, to make a subgroup for water quality monitoring program, to get it off the ground? [Fred McManus, Joe Boyer, Brian Lapointe, John Proni, Nancy Craig, Dick Dodge]
509. Gene Shinn: USGS water resources have moved to this area.
510. Dick Dodge: Benthic resources, how to relate water quality to reefs.
511. Richard Harvey: What is the quality of the water coming into contact with the corals?
512. Cory Naugle: This is the Water Quality Monitoring Program.
513. John Fauth: Link the two together to get the answers; you don't need huge numbers.
514. Ken Banks: People don't want to give up their biological, even if they are lousy ones.
515. Esther Peters: Why would they have to give them up?
516. Ken Banks: Because they weren't chosen when we knew where things were, but we do have data since the 70s.
517. Margaret Miler: Benthic is already in place; put the water quality monitoring program around it.
518. Vladimir Kosmynin: One of the issues is frequency of monitoring might miss main events, though you sampled over 10 years.
519. Gene Shinn: For some of those sites on the board, conditions change over an hour.
520. Margaret Miller: Capture both scales of processes.
521. Joe Boyer: Prioritize the questions to be asked and get acceptance from the rest of the TAC.
522. Cory Naugle: Let's follow up with some deadlines to coordinate with other programs.
523. Joe Boyer: xxxx
524. Fred Mc.Manus: Let's get the group together with some maps. We could come here.
525. Vladimir Kosmynin: Use email and telephone.
526. Cory Naugle: We need a skeleton ASAP. I will email you about the details. Let's come up with dates for a spring meeting. What about March or April?
527. Vladimir Kosmynin: Numbers of what is coming to the water, describing where the plume is going.
528. Joe Boyer: We can take these questions and design xxxx.
529. Esther Peters: What good was the power analysis?
530. Joe Boyer: Look at what Continental Shelf did.
531. Esther Peters: Apply what we find here to eastern seaboard or just to south Florida?
532. Joe Boyer: Design accordingly.
533. Cory Naugle: The subcommittee was formed. A long-term program, structure for long- term events, in situ, nested hierarchical design.
534. Dick Dodge: Time and space scales.
535. John Proni: I might like to participate during the NOAA meeting with Chantal. Gradient and rate of vertical mixing.
536. 2:45 PM: Meeting adjourned.

## **PUBLIC COMMENT**

- 1) Dated 11/16/05: This comment pertains to the Florida Reef Resilience Project. The sampling design is impressive and very detailed, and will yield tremendous insights into patterns of coral bleaching. For very limited expense, the project could monitor determinants (=driver=forcing functions) of bleaching, such as elevated sea-surface temperatures and turbidity. I strongly urge TNC to consider not just response variables, but predictors-we need to identify mechanisms of bleaching to devise effective management strategies. Signed: John Fauth-UCF
- 2) Dated 11/16/05: Broward County Environmental Protection Department has been monitoring water quality with the basic urban core for almost 35 years now. As part of our data analysis over the last few years we have been compiling and graphically analyzing flows from South Florida Water Management District coastal salinity structures. These flow data estimates are based on stage elevations, but gave us important insight to dynamics within portions of our estuary. We are planning to look at all structures within the county and would be willing to look elsewhere. One gap for the group to consider is estuarine residence time of these water masses as they move through inland water to inlets. The water coming through the structures is not the same as going out inlets. Signed: Kevin Carter-Broward County Environmental Protection Department.

[Observers were requested to submit their comments in writing to Cory Naugle by December 1. Written comments received by December 23rd are recorded above.]

- 1) Dated 11/17/05: I am biased, but our proposal is really good! Signed: E.A. Shinn
- 2) Dated 11/17/05: \* Fund Gene Shinn. \* You don't need more monitoring. \* You do need a proper water quality program. Signed: Mike Risk

## **ATTACHMENTS**

### ATTACHMENT A

#### **Identification of Sources and Signals of Land-based Pollution in Southeast Florida Reefs:**

Reef communities in southeast Florida are downstream from a range of potential pollution streams including land-based sources such as agricultural runoff, sewage outfalls, and stormwater. There is insufficient information to definitively link degradation of coral reef habitat with land-based sources of pollution. Demonstration of indicators of land-based pollutants in reef organisms is a necessary step in establishing this definitive link. We seek proposals to investigate chemical or biological tracers in reef organisms to evaluate exposure to land-based pollutants. Examples might include stable isotopes or microbiological tracers. It would be especially valuable to demonstrate changes in exposure over time as well as present exposure.

#### **Linking ecological performance to pollutant exposure:**

In order to definitively link reef degradation with land-based sources of pollution in southeast Florida (Miami-Dade, Broward, Palm Beach, and Martin Counties), it is necessary to demonstrate that pollutant exposure at quantifiable levels affects the ecological performance of reef organisms, populations, or communities. We seek proposals to demonstrate effects of pollutants on organisms. Such effects may include physiological, organismal level (e.g. growth, fecundity) or population level responses. Experimental studies that can demonstrate cause-effect relationships would be particularly valuable.

#### **Quantification of Component Fluxes for Nutrient/Pollutant Mass-Balance Budget for Southeast Florida Reef Area:**

In order to frame appropriate management actions to curtail land-based sources of pollution for greatest benefit to reef resources, it is necessary to partition the relative sources of such pollutants within the southeast Florida (Miami-Dade, Broward, Palm Beach, and Martin Counties) coastal waters. A mass-balance model is an important tool to assist allocation of mitigation efforts among different pollutant sources. A mass-balance model requires many component inputs, including but not limited to flux of materials from inlets, sewage outfalls, oceanographic processes, and groundwater, and aerosols to reef areas and organisms. We seek proposals to quantify these component fluxes that can contribute to ultimate compilation of a mass-balance model.