

**FLORIDA KEYS NATIONAL MARINE SANCTUARY  
WATER QUALITY PROTECTION PROGRAM**

**STEERING COMMITTEE MEETING**

**July 7, 2010**

**Florida Keys Mosquito Control District – Conference Room  
503 107<sup>th</sup> Street, Marathon, Florida**

**MINUTES**

Members Present:

Shelley Trulock—Project Manager WQIP, U.S. Army Corps of Engineers  
Jon Iglehart—Director, Florida Department of Environmental Protection South District  
Regulatory Office, representing Secretary Mike Sole  
Richard Harvey—Director, EPA South Florida Office, representing the regional administrator  
Billy Causey—Southeast Regional Director, NOAA’s Office of National Marine Sanctuaries  
Pete Worthington—Marathon City Council  
Bob Johnson—Director of South Florida Natural Resource Center  
Charles Brooks—Key Largo Wastewater Treatment District  
Gerald Briggs—Bureau of Onsite Sewage Programs Florida Department of Health  
Tom Genovese—Florida Keys Service Center Director for South Florida Water Management  
District, representing Mike Collins  
Sandy Walters—Citizen Representative representing maritime interests in the Florida Keys  
Steven Blackburn-- EPA, R4 Florida Keys Coordinator  
Gil McRae—Director, FWC-Fish and Wildlife Research Institute  
Chris Bergh—South Florida/Florida Keys Program, The Nature Conservancy  
Anne Morkill—Florida Keys National Wildlife Refuges, US Fish & Wildlife Service

**I. Opening Remarks:** Mr. Jon Iglehart - Director, South Florida District DEP  
Mr. Richard Harvey, Director, EPA South Florida Office

Mr. Jon Iglehart welcomed everyone and thanked Joy Tatgenhorst and Nancy Diersing for assistance at the meeting and Mr. Fussell for use of the facility. He also acknowledged and thanked the Sanctuary Friends Foundation for providing the refreshments.

Mr. Iglehart noted that the steering committee is meeting a little earlier this July due to scheduling issues. As a representative of Secretary Sole, he made some remarks about commitment to this committee. About a year ago, the committee had some healthy discussions about the doing something concrete and at the last meeting, Richard Harvey brought forth concerns about the future of the monitoring program and the need to demonstrate management use of the monitoring data to secure funding. As a result, assignments were made. Steve Blackburn began to put together the document summarizing how data have been used, but he worked basically in a vacuum and drew from older reports. There are still threats to the monitoring funding and this is a critical endeavor and this is a chance to do some work outside of the meetings to getting things done. It is about commitment and follow-through and it is human nature to fall short sometimes even though everyone desires to see these projects move forward. However, commitment is needed to obtain the results essential for this committee, the sanctuary and the Keys.

Mr. Harvey stated that normally they would be presenting a budget at this meeting, but they are not doing so because they still haven't heard from the management agencies how the data are being used by them. EPA's funds are shrinking and another \$120k has been taken from the budget. A strong argument is needed to maintain those funds; otherwise, others will continue to see those funds as available. EPA knows that they will need good water quality, coral and seagrass monitoring programs to track the condition of the resources in the area and is not saying that they plan to eliminate the program. Without the information on how the managers are using the data to make decisions, it makes it tough to make the argument for keeping the funds. Documentation would help in Washington justifying why funding needs to continue. EPA put out an RFP and has received some proposals. They are using the information they have at hand now, unless people can provide additional information to decide how the money will be spent. It may be that we will significantly change the way monitoring takes place. We were supposed to have a series of meetings before this meeting, but we didn't because we didn't have input from the managers.

Mr. Steve Blackburn added that they received proposals for \$2 million dollars total, but they only have 1.15 million available. Money is being lost because of the Everglades lawsuit.

Mr. Harvey added that a few months ago, he thought most of the money might be going for the oil spill. Dr. Causey noted that everyone has been very busy because of the oil spill. There is a Keys science conference coming up in the fall. He thinks that they should reserve judgment on how the money should be spent until they hear the science. He noted that the results of this research program are being used every day intuitively, but sometimes it is hard to articulate exactly how. The special studies and research has been used in Tallahassee to make the case for cleaning up the water and all of the construction seen on the highway in the Keys is evidence of wastewater improvements based on monitoring results. There have been improvements and changes, but whether these changes are making an immediate improvement is harder to determine. For so long, people believed that cleaning up the water would save the reef, but with the results of the coral program and others, we can now say that the decline is due to multiple factors. Seagrass and water quality data have indicated hot spots in the sanctuary. This reef can teach us a lot because it has more monitoring data and more of a record than any other piece of reef in the world, including the Great Barrier Reef.

Mr. Harvey stated that we do have the ability to modify management actions to make sure we accomplish the goals of the WQPP. For example, the seagrass might have to change some sampling sites and that sort of thing. Mr. Iglehart added that there is a threat to the funding and documentation is really important in government.

Dr. Causey is concerned and would not want to see the funding shrink and if there is a moment in time to get more funding, that time is now. The community is putting a lot of money into wastewater and stormwater. He appreciates what the state, county and EPA has done over the years. This is America's coral reef.

Mr. Blackburn sent out an email requesting information from the committee and some agencies did respond. He incorporated that information in the draft monitoring report. Mr. Harvey noted that the management committee didn't meet. He, Steve and Bill Kruczynski have to respond to the planners in Washington to document why we continue to need funds. Mr. Blackburn added that they have already sent the monitoring document up to DC for the oil spill, even though it may be incomplete.

Mr. Gil McRae inquired as to whether they are not hearing from the agencies or not hearing information that would make a strong case. Mr. Iglehart said that they heard from about 3 agencies. Steve conducted research on the internet and would like people to review his summary to make sure it is correct.

- **Review Agenda**, Mr. Jon Iglehart  
There were no changes to the agenda.

- **Discussion and Approval of Minutes**, Steering Committee Vote

The minutes were approved unanimously.

- **Review Management Committee Membership**

## - Announcements

Dr. Bill Kruczynski offered an apology because he has been involved in the book and much of the work has fallen on Steve. Steve was given a round of applause for his work on the document and committee.

Dr. Kruczynski announced the conference, *Linking Science and Management*, which is being held in the Keys. John Hunt is one of the main coordinators of the conference. This is an opportunity to hear recent scientific findings and to communicate with managers. The Keynote speaker is Dr. Jeremy Jackson, a world-renowned biodiversity expert, who is a wonderful speaker. The conference is dedicated to the late Dr. Brian Keller.

Dr. Kruczynski pointed out that a dummy copy of the book is being circulated. He will discuss the progress during his presentation.

Mr. Iglehart suggested that Mr. Blackburn send an email to all members on the management committee to make sure they still want to serve and Steve agreed to do so.

## II. Update on Compliance Deadline for Wastewater Facilities, Mr. Jon Iglehart, Mr. Gus Rios

Mr. Gus Rios provided a hand-out summarizing the new wastewater legislation for Monroe County, Section 38 of Senate Bill 550. The legislation extended the deadline for the Keys and went into effect on July 1, 2010. This will help since one of the problems was that the package plants were required to upgrade and then would have to pay an additional fee when the central system came online in that community. He provided a handout with the highlights from the new legislation, which was intended to address the package plant concern. He will discuss Florida Department of Environmental Protection's role and Mr. Gerald Briggs will address onsite systems after his presentation.

Mr. Rios explained that Section 38 of Senate Bill 550 added subsection 10 to the Florida Statutes Section 403.086, which is used by FDEP to regulate wastewater discharge. Basically, it incorporates the previous requirements of Chapter 99-395 has been repealed and replaced by this subsection 10 of Section 403.086. Although the 2010 section was repealed, local governments are still required to complete the wastewater connections identified in the Monroe County Sanitary Wastewater Plan.

Mr. Rios reviewed the highlights of the legislation. The statute refers only to domestic wastewater facilities in Monroe County and extends the deadline for completion to December 31, 2015. It also requires local governments and special districts like KLWTD to complete the connections according to the Monroe County Sanitary Wastewater Plan and in the rules of the Administration Commission of the Area of State Critical Concern, under the Department of Community Affairs. It requires all facilities to meet the advanced wastewater standards for the smaller plants. These are the same best available treatment required for injection wells formerly in Chapter 99-395. This statute still requires deep injection wells for larger plants, but a shallow injection well can be used as back-up when the primary well is out of service. It also extends current permits for wastewater facilities within the designated local government/special districts connection areas until December 31, 2015 or until the facilities are connection to sewer, whichever comes first. Those facilities that are in cold spots must renew their permits before they expire and must complete the necessary upgrades by the deadline of 2015 to achieve compliance.

FDEP has undertaken actions to help facility owners comply with the new section. They are working very hard to send letters to treatment facilities and are in contact with their general counsel. They will continue to expedite permits to continue connecting to central systems. Again, the intent of the legislation is to provide additional time to comply, but he urges that everyone move forward as fast as possible and he will work with people to expedite things.

Mr. Iglehart asked Mr. Rios to address concerns about the new law reducing the standards at certain facilities. Mr. Rios explained that there are some facilities that have already meet the standards (12 to 15) because they either constructed their facilities to meet 2010 or received a permit recently from DEP. Right now, their permits say that

they have to meet Best Available Standards or AWT . They have been in touch with their office of General Counsel to determine whether these facilities will be allowed to operate for the next five years or until they are connected. Steve Johnson handles the compliance and he attends these meetings. Mr. Chuck Fishburn, engineer for Key Largo Wastewater Treatment District, stated that they are counting on all of the wastewater possible in order for their systems to operate at peak efficiency. He added that last night the board of KLWTD reviewed the package plants in Key Largo and it was thought that there were no exceptions to the rule. Key Largo package plants do not have until 2015, but have until the district is ready for them to connect. They have all received a one year notice and are about to receive a 30 day notice regarding this matter. Mr. Rios added that local connection ordinances are still in effect and this legislation does not affect their ability to enforce the rules. It was noted that there is one plant (Tradewind Hammocks) in the Key Largo district that falls into this category.

Mr. Gerald Briggs explained that the new statute addressed onsite standards. It gives a clear enforcement authority and guidance to local governments and special districts to ensure that the upgrades happen according to the Administration Commission. The two-fold approach is still in place.

The most noticeable effect change in 550 is that the interim standards have changed. They no longer have the authority to permit aerobic systems in areas expected to be sewerred. The only interim standard that is allowed is for repairs where they have paid the connection/assessment fee. New modifications have to come to the new nitrogen reduction standards. In Tallahassee, they expect the upgrades to move forward and not to wait until 2015.

A \$3.5 million EPA grant was awarded to FKAA for a demonstration project to address the remaining systems in the Lower Keys and that is a positive sign. They are working with FKAA and Monroe County on that project.

Mr. Myles Milander asked Mr. Briggs about new construction. He stated that he heard at a recent staff meeting that there would be a meeting this Friday to see where they stood in regards to new construction for the onsite systems that are 2010 compliant. He didn't know anything about this and would like to see a list provided possibly at that meeting that shows what systems are acceptable. Mr. Briggs stated that the systems that can be used are the ones approved by Monroe County and they have been using them all along for systems outside of the sewerred areas. Essentially, if they are adding onto the house and that triggers a change, and that would drive them to a new standard.

Commissioner Worthington inquired about property owners who live in Area 3 in Marathon and have already paid their assessments. They have been denied permits for pools at this point; he would like to know if there is some kind of waiver since they will be connected and have complied thus far. One contractor has three pools that he is waiting build and that has been tough in these economic times. Mr. Briggs explained that they have variance authority and they can request that variance to the Monroe County Health Department. They will have to demonstrate a hardship and there is information on the webpage.

### **III. Update on stimulus package funding for the Keys, Ms. Shelley Trulock, U.S Army Corps of Engineers/Jacksonville District**

Ms. Shelley Trulock thanked everyone and explained that she is there representing District Manager Colonel Pantano and also has the pleasure of being the project manager for the Florida Keys Water Quality Improvements Program.

She provided a quick status of federal funding and provided background information for the project. The PL 106-554 authorized the COE to provide up to \$100,000,000 for technical and financial assistance to carry out projects for the planning, design and construction of treatment works to improve water quality in the Florida Keys National Marine Sanctuary. There is a Federal/non-Federal split with 65% covered by the Federal side and 35% by the non-Federal partners. The total program cost is \$153,800,000, with \$53,800 provided by local municipalities. In 2000-01 an intergovernmental task force decided how the \$1000, 000,000 should be split amongst the municipalities should it ever become available.

In January she informed the committee that the program received \$25,408,000 in American Recovery and Reinvestment Act (ARRA) funding (formerly Stimulus). Key Largo, Key West, Marathon and Islamorada split

equally the \$25,408,000, each receiving \$6,352,000. Islamorada deferred all but \$106,847 to Marathon and Key Largo, which were prepared to spend it faster than Islamorada. They did this for the better good of the entire Keys community and this action spoke very highly of Islamorada and shows the team approach that has developed over the years. By June 30, 2010, the program had spent the entire \$25,408,000 of ARRA funds. Marathon and Key West really came through in terms of spending the money and she offered her sincere THANKS to all the municipalities! From 2000 to date, the program has spent a total of \$35,297,000.00, with \$30,955,242 (includes ARRA and Congressional Add money) reimbursed to date. She still has just over \$4 million in the checkbook ready to spend, but wanted to spend the ARRA money first and is hoping for more ARRA money in the future.

More money could become available because projects elsewhere were not able to spend their money (as this project did). She is encouraged that more ARRA would become available. Currently, Ms. Trulock has \$5M in invoices ready to process once additional funding becomes available. The strategy is that once she has invoices totaling \$8M in hand, the request will be made. A few months ago, she recognized that extra funds were a possibility and polled the municipalities as to how much they could spend between July 1 and September 30 should more funds become available. Key West, Key Largo and Marathon answered that they would be able to spend a total of \$18M and they reported that number to Washington. The \$8M mentioned is about half of that total request of \$18M.

The Keys have been very fortunate to have a Congresswoman who has lobbied so hard to obtain Congressional Add money. The Keys showed a united front and showed that they spent the money the way they promised. Municipalities need to continue to invoice Ms. Trulock. Things are going much better than 8-9 years ago.

She provided hand-outs from everyone. The \$8M number should be reached fairly soon because two more invoices are expected soon (Key Largo and Marathon). This is the true invoice amount and the non-Federal contribution has already been paid locally.

Dr. Causey thanked Ms. Trulock for the great work. She emphasized how appreciative she is for the cooperation of the local community. The turning point for this program took place about a year ago when they met for lunch during the WQSC meeting and worked things out as a team. It would have been a huge black eye if we had missed the deadline and it was really great that Islamorada stepped up as a team player. They will have an entire third quarter to spend any additional funds should they become available. The municipalities have made it so easy for her to make things work.

Commissioner Neugent is disturbed that it has taken 11 years to get a small portion of the money that was promised. He read in the paper that the Congressional Representative for the Keys is not in favor of additional funding. Ms. Trulock is not sure if that is true. Commissioner Neugent finds this disturbing and the people of Monroe County need this money to bring the costs of sewer/water bills down. She does know that the program is supported by the Corps and has not heard anything from the Congressional side of things.

Dr. Causey pointed out that the Congresswoman is the co-chair with Lois Capps from California of the sanctuary caucus. He has not heard anything himself, but it would seem that someone should ask if this is true or not. Mr. Brookes read the same article and was very disappointed, but understands that support might be carried by Nelson instead. He inquired about the commitment of the \$8M. Ms. Trulock explained that the money is not in the bank at this point. It may become available, but they will only reimburse \$8M at a time. For even more ARRA money beyond September, they would have to extend the deadline beyond September. It would be very hard to spend more than \$18M in that short time frame. The municipalities have to spend it first before they can invoice the Corps.

#### **IV. Status of Implementation of Monroe County Wastewater Master Plan and Wastewater Upgrades by Municipalities and Key Largo Wastewater Treatment District**

Ms. Liz Wood, Monroe County, Mr. Fishburn, Key Largo, Ms. Susie Thomas, Marathon

Ms. Liz Wood gave an update of the progress made toward wastewater upgrades. The federal stimulus funding has helped fast-track the projects in the county. She empathizes with Ms. Trulock who has processed quite a few invoices this year. She thanked Ms. Trulock for her work.

There is still a need for millions of dollars that meet the readiness to precede requirements, specifically down in the Lower Keys for the central collection system and wastewater plant for the Cudjoe area. This project is ready as soon

as money is available. At another time, discussions could be held about how the county could shine if the channels were in place to make Corps money available in the lower Keys. The focus in some areas is shifting from construction to connection and that will mean costs for residents. Last meeting, we discussed the households that would have difficulty meeting those costs and have applied for some grant money for this purpose. In keeping with the Area of Critical State Concern mission, managers are prioritizing assistance for low income households. They continue to make progress of the master plan. In November 2007, 38% of residents Keys-wide were in connection process and in January 2009, 58% were in this process. She can work with the entities to update the numbers.

Monroe County has received a Disaster Recovery Grant through the Department of Community Affairs Community Development Block Grant Program. The primary use of funds is for hurricane damage repairs; the housing assistance plan includes sanitary sewer lateral connection assistance. Therefore, they can use these funds for disabling septic tanks and lateral connections. They currently have a \$2.5 million dollar grant jointly applied for by the county, Marathon and Islamorada to achieve the purpose of providing assistance. It will be used first for elderly and disabled home damage and then for connections. This is an important component and could really disrupt the low income household. When code enforcement begins, she would like to be able to give people some options.

Ms. Wood reported that North Key Largo Utility Corp is nearly complete with their treatment plant, with an estimated cost of \$15 million. They are also seeking funding support. The Big Coppitt Service Area connections are nearly 50% complete. The plant was commissioned last July and she knows of no issues there. The FKAA is a partner in this project with the county. Duck Key WWTP expansion and upgrade underway and the collection system design complete and permitted and needs funding. The KLWTD service area map contains 13,466 EDUs. Notices of connection requirement will be sent out later this year.

Mr. Fishburn provided an update of the capital spending plan for KLWTD. He pointed out that costs have been lower than originally thought and this has lowered the cost per EDU from \$11,000 to \$9500. Grants have increased and prices have fallen. They are down to \$13 million unfunded and believe that if they had to borrow, their rates could pay that money back. All along, FDEP has been their partner and they have received \$10 million every year in State Revolving Loans (federal funds). They also saved money because the most recent legislation did not require a second deep-well. They borrowed \$30 million on March 1<sup>st</sup> from BB&T because they maxed out their revolving fund because they were moving so fast. They borrowed against their entire assessments from residents (\$5k per household).

The entire island is engineered and under contract. They have four contractors competing and they bid on phases and then award change orders. FDOT was gracious enough to delay their road improvement project until the lower area transmission line was done. They will be powering plant on August 25 and will be clean water testing, etc. They will send out 30 day notices to everyone in the North on the August 25. They will notify package plants in the September-October time frame. They own six vacuum stations and they own the land for all of them. People in A and B have been connecting voluntarily at this time. They almost made the July 2010 deadline.

The unique properties like the ones at CR 905 were not done. They are cold spot that will be getting grinder pumps next year. Ms. Wood thanked Mr. Fishburn for their progress in Key Largo. He said that it worked well to form the district. He has 32 employees and the economy has really made prices more affordable. Hopefully, they will be done with most connections by December 2010. They need 5000 gallons per day in the plant to operate at AWT levels. They are hoping that the Army Corps money will help cover the remaining \$13 million. The base fee for sewage/water is \$33.60 per month and is paid whether any water is used or not. Then, it is \$5.25 per 1000 gallons. Essentially, the water bill will double once the system is in place. Key West is debt free and they have a low base. Ultimately, they would like to get the rates down further.

There are a lot of storm-water improvements taking place in the Big Pine Key area.

Commissioner Neugent commented that he is very grateful for the money that they have received and wants to be clear about that fact. He explained, though, that 10 years ago when the initial authorization was made for the \$100 million from the USACE, he thought that they would be getting the money sooner and in larger amounts. The initial plan was to dispense \$30 million to Key Largo, Islamorada and Marathon. Now, the state is dangling money and he wonders whether in this present climate there is any chance of getting funding from the state. He thinks that the federal and state governments have to step up to help the residents of this county with this mandate. There is

also the storm-water issue and the county will be addressing that in the future. This will be costly to the residents. This kind of thing should not be done without recognizing the economic impacts on Monroe County.

Mr. Charles Brooks announced that Key Largo will be done in the beginning of next year and will primarily be in connection mode. It is unique that we have a project that is done.

Ms. Wood introduced Ms. Susie Thomas, who gave the Marathon update. Marathon has also made great progress toward completion. Ms. Thomas explained that the area is divided geographically and they have a total of 6 treatment plants. They are fortunate in that they are addressing storm-water, sewage and roads, so that once they are done, they are really done. They are about 70% complete at this point and are having good luck with hook-ups. People are required to pay whether they are connected or not. Connections are underway for portions of Service Area 4, 5 and 6. Marathon has 2 WWTPs remaining to be constructed; all collection systems are under construction. They think they will be totally complete as of July 2011. The base rate is \$35.97 and \$8.04 for each 1000 gallons.

Big Pine rates could be very high without subsidy. Commissioner Neugent pointed out that the sewage/water bills have already increased and this is very difficult for fixed or low income people. In addition, Marathon people are also paying a stormwater bill annually and paying for the wastewater over a 20 year assessment. Commissioner Worthington stated that they may be able to reexamine the operation and maintenance costs in the future and they could come down. They had no grant funding at the time, so their costs are somewhat higher to cover the unknown. The research Marathon has shows the average user is about 4500 gallons of water per month.

Mr. Brooks said that in Key Largo, they estimate that the average bill will be about \$50 per month for the sewer bill. He is not paying this yet, but feels he will be in that range. He and his wife are using 3-4,000 gallons. Key Largo has already received increased costs and it doesn't seem to have caused a major population shift or unacceptable shock wave and it seems to have been absorbed fairly well.

Mr. Myles Milander gave an update for Islamorada. They have had a difficult time and are starting to build confidence with the community. They have had lawsuits to address. In phase I, they are addressing streets that are a constant problem. To address this, it will be \$1.5 million to fix and a company is under contract to design and correct these issues. They have a library of 7 engineers and he has worked closed with Hazen and Sawyer. Islamorada has struggled politically over the past few years and the plans have been changing continually. They are still trying to purchase land, but still have two sites—Coral Shores High School. There will be another master station in Key Largo. They have done an excellent job working with Hazen and Sawyer on design and this will help bring rates down. They are making use of what has been learned over the years. Hopefully, they will get the agreement with Key Largo. The council has rescinded the \$23 million dollars raised by the 2009 assessment and that was repealed about 3 weeks ago. This is a major setback as it left them with no money. Now, the city is talking about a new design bill to go forward with finances. They will try to do an ad valorem of \$1 million to pay \$1.5 million for the North Plantation plant. They are also hoping to put the re-use system in the next 8-10 months.

There were no questions. Mr. Iglehart thanked everyone and noted that people were getting very close in some areas.

## **V. Oil Spill Update, Mr. Sean Morton, Mr. Kent Edwards**

Acting Superintendent Sean Morton explained that he and Kent Edwards will be tag teaming on this presentation. He will cover the response to the spill and the current status; Mr. Edwards will cover the pre-assessment. Acting Superintendent Morton stated that every five years there is a major spill drill and the sanctuary started working with the Coast Guard in January and completed the drill in February. In March, they conducted an after event action plan. As part of that process, they stood up a local unified command and environmental unit. When the spill took place, the sanctuary was already in the process of getting ready for this kind of emergency.

Fish and Wildlife Service, parks, FDEP, and others contributed to the environmental unit. At the same time, the deepwater horizon spill happened; we had tar balls showing up in the Keys. Up to this point, there have been 75 different reports of tar balls throughout the Keys since the end of April. None have been sourced back to the BP spill. However, there are 12 different distinct fingerprints of the tar balls found thus far. Samples were sent overnight to the lab in order to be identified quickly. It is possible, though, to definitively identify BP oil.

Every part of NOAA has been assigned a role in the spill. The National Ocean Service Office of Response and Restoration is contributing staff to assess conditions and is responsible for conducting the National Resource Damage Assessment (NRDA). The National Weather Service is contributing weather forecasts and oceanographic data. The National Marine Fisheries Service is engaged in determining fisheries quotas and surveying for where the oil is located. The National Environmental Satellite, Data and Information Service is monitoring the loop current, providing satellite and oceanographic data. The Office of Oceanic and Atmospheric Research is also providing oceanographic data.

The following NOAA assets are deployed daily: satellite imagery, multiple over flights (helicopter, fixed wing), oceanographic and fisheries survey vessels, oceanographic monitoring -buoys, dropsondes, remote sensing, multiple weather forecasts, water sampling, and marine mammal, seabird and turtle observers. He showed a recent screen grab of the Loop current and its gyres and eddies. This map was created by the NOAA Environmental Modeling Center. There is quite a bit of modeling taking place by different agencies and lots of data are being managed. He pointed out the Franklin eddy and noted that the oil has been staying north for the most part.

Acting Superintendent Morton also showed a map depicting the different assessments taking place (over flights, oil observations). He explained how the Geoplatform tool can plot ship tracks, the oil, etc. ([www.gulfplatform.gov/gulfresponse](http://www.gulfplatform.gov/gulfresponse)). A handout describing what to expect in the Keys was produced by NOAA and posted on the NOAA website. This handout discusses the threat to the Keys, which will be primarily from tar balls and is a good one to distribute at public meetings.

The Florida peninsula has a set of trigger points that are activated when oil passes near them. Sentry vessels are deployed off the Tortugas where they are towing plankton nets to see if there is any oil in the water column. If oil is found, this would require more vessels out there and an elevated response. Much information is available on the local page of the weather service. NOAA and others have satellites, planes and boats out looking for oil.

Mr. Harvey inquired as to whether BP fine money, if it becomes available, can be used for sewage infrastructure improvements. Acting Superintendent Morton explained that the first step is stopping the oil impact and the second step is restoring damaged areas, which would be done by the NOAA Office of Response and Restoration.

If tar balls do arrive, it might be wise to leave them alone in many sensitive areas so as not to do more damage when trying to clean them up. The local environmental unit, led by Scott Donahue, created a matrix of habitats in the Keys and appropriate responses to oil in these habitats and when to consult experts. Heavy machinery is probably not a good idea over hand removal. In some cases, it may be best to have natural degradation.

Commissioner Neugent asked about modeling and whether or not anyone has done anything about the long-term impacts to the lobsters and other resources. Dr. Causey explained that they have been using the trajectories developed by NOAA and unified command. They have been discontinued recently due to the low level of threat to the Keys. They have been focusing on the real-time projections. It is not likely that we will get oil like in the marshes. Commissioner Neugent inquired as to the effects of tar mats on long-term fishing and the resources. Dr. Causey explained that he doesn't know of any projections for this area at this time. Data are still being assembled. Scientists will be looking into that aspect in the future. Now, it is time to focus on the current impact and then on restoration.

Mr. McRae added that FDEP has found that up in the Panhandle, the water around the tar balls is fairly clear and seem to be self-contained. However, there is dissolved oil at low concentrations in the water column in places and that is the bigger concern for early life stages of lobster and other marine life. Commissioner Neugent mentioned that they have been told the dispersant life is short-lived, so impacts should primarily be from the oil. Dr. Causey said that dispersants are short-lived alone, but when they get attached to oil, they can last longer. There is still a lot of work being done on that question right now. The purpose of the dispersant is to break down the oil into smaller particles, so that the microbial community can break it down.

Ms. Anne Morkill added that there is uncertainty because there is no precedence for a constant stream of oil coming out from a deepwater source. Secondly, in the shoreline countermeasures, there is a lot of information about liquid oil, but very little information about tar balls. Therefore, the refuges have had to develop their own matrix by habitat



and describe what methods to use to extract tar balls. There is uncertainty as to what to expect, but determining the baseline is very important.

Ms. Walters said that Ms. Morkill raised some concerns that she also shares. Ms. Walters wrote her Master's Thesis on oil spill contingency planning for South Florida and that included preparing a matrix as to how to respond by habitat. This matrix served as the basis for the original Coast Guard matrix. She noticed in the most recent matrix, there is no distinction between sheltered and shoreline mangroves as was in the original. She is most concerned about the sheltered mangroves because once the oil gets back in there in the roots and sheltered areas, it cannot be effectively clean up. On the exposed shoreline, the wave action can break up the oil. Ms. Morkill added that they consider the site specificity in their response and that there are different kinds of habitats. On the NRDA side, the mangrove working group has the mangroves broken down into different types.

Mr. Kent Edwards provided a summary of the NRDA response, including the status of the sampling effort. Some of the data collected from sampling efforts might help answer questions in the future. As Acting Superintendent Morton explained that the first stage involves the preparation, response and cleanup activities followed by the natural resource damage assessment process. The NRDA process entails collecting and analyzing information to evaluate the nature and extent of injuries resulting from an incident and to determine the restoration actions and compensation needed to bring injured natural resources. Ecological services play a large role and the goal is to bring back services to baseline and make the environment and public whole for interim losses. The natural resource condition is assessed first as a baseline condition and later, if there is an impact, sampling takes place again. The difference between baseline and impact ecological services will be basis for the restoration efforts and compensation. In the north Gulf, they are collecting baseline, impact assessments and cleanup assessments all at the same time, whereas in the Keys, we are more in a planning phase.

The focus of NRDA sampling is on easy to measure endpoints that are clear oil-related effects and can be translated into resource and service loss and restoration. NRDA identifies Technical Working Groups (TWGs) and sampling must be done according to TWG-approved protocols, with detailed requirements for QA documentation, Chain of Custody, Photos, and GPS. Clear, accurate, and complete documentation is critical. At this time, the focus is going toward areas that have been impacted, but the Keys are part of the plan. Mr. Edwards focused on the shoreline, specifically; the mangrove, TWG and others in the Keys are participating in the shallow-water coral TWG. They also addressed the potential impacts of tar balls in the mangroves. As this information is collected, it will be fed into the restoration process and modeling. They will want to monitor the effects of oil, if there are any and the way monitoring is done is very important and different from typical science since it may need to be legally defended in court. Sediment and water samples were taken by Keys sanctuary staff and other agency staff on May 25-26. Characteristics of the sites were considered to determine sampling locations. They followed NRDA protocols determined for the five states, FDEP and NOAA. He expects to see a low level background hydrocarbon contamination and that could be used in the litigation as the beginning of the assessment.

There are other resources, specifically the shallow water coral group, which has a work plan that involves the Keys. This plan incorporates the historical monitoring already taking place. The CREMP monitoring creates a great baseline for such activities. The national parks have an ongoing coral monitoring effort. There is a coral biopsy procedure for collecting coral for genetic markers or protein/enzyme generated in response to oil. The seagrass TWG is looking at monitoring seagrass and they have a work plan under FWC Fish and Wildlife Research Institute (FWRI). Efforts are currently underway to use existing historical data, including the WQPP Seagrass program data, to define baseline conditions. There are mangrove and oyster work plans as well and these include all kinds of very specific metrics that will easily detect impacts by oil and can be easily monitored. FWC is maintaining a website with this information—[www.nrdata.org](http://www.nrdata.org). They are planning to expand that site, but it now contains a map with sampling sites and protocols.

Mr. Rios added that the FDEP website has a page on the sampling locations, including the Keys. Mr. Edwards mentioned that this brings up non-NRDA sampling, which is also taking place.

Commissioner Worthington asked about oil in the water table off the Florida west coast shelf. Superintendent Morton believes that there was visual sheen 150 miles off of St. Petersburg, but that has not been confirmed. Mr. McRae added that was not confirmed to be oil and the consensus is that no confirmed cases of oil have been seen in that area yet. There is oil tied to BP subsurface, but it is in very low concentrations at any distance away from the

well head. But, these are very small droplets of oil that have been dispersed and no one knows how far they will go and what their behavior is in the water column. They are continuing to apply dispersants below and at the surface and the science is lacking regarding the impacts of these actions. The oil discovered in the water column is not visible, but dissolved and it can only be detected through chemical analysis. The sentry ships are really looking for the tar balls on the surface.

Mr. Edwards added that they did find some subsurface oil 1000 to 1400 meters down and the oil was not completely dissolved. They are presumably sending ships with equipment that detect this kind of oil. These plumes were heading off to the south and west. The monitoring only took place within 50 miles of the wellhead and it may be that they need to extend sampling out farther to truly capture what is happening to the subsurface oil.

Dr. Kruczynski pointed out that an incident like this shows us how unprepared in the Keys for something like this that could come this way. The current water quality sampling regime of 155 stations does not include hydrocarbons, only nutrients. There are SeaKeys monitoring stations that could have oil sensors installed on them in case they are needed for the future. Maybe installing hydrocarbon sensors on the SeaKeys stations could be one thing this committee supports.

Mr. Rios noted that a lot of people have been concerned about dispersants and their effects on the reef. He did attend the SAC meeting and someone from NOAA stated that the dispersants degraded within hours. It was actually Jon Fajans from FIO that made this statement. Mr. Rios found this to be an interesting discussion.

Commissioner Neugent expressed frustration as people sit and wait. He asked Dr. Kruczynski what more could be done to avoid being in a reactive mode. Ms. Morkill responded to that question and pointed out that until something like this happens, the value of the long-term monitoring may not become apparent. It may be worthwhile to add hydrocarbon sampling to the water quality monitoring program now that we have already had a scare. This could be the baseline for future impacts. The sentry ships have shown that there is a background source of tar balls, although their impacts are relatively small. As resource managers, we should consider putting additional baseline sampling in place. This might be paid for by BP or by some other fund. Now, we know that this information is lacking. While it is very difficult to justify this money, it is so important.

Mr. Iglehart thinks that in the Panhandle the strategies for dealing with the spill are changing frequently and they are learning a lot on how to deal with this kind of thing, including keeping the oil from getting to shore. We can observe and learn from the current response. Commissioner Neugent added it would be nice if they would pay attention to close enforcement and standard operating procedures to prevent a blow out. Mr. Iglehart concurs, but added that they have improved their response as to how to handle estuaries.

At Dr. Kruczynski's request, Dr. Boyer commented on idea of putting oil sensors on the SeaKeys stations. The sensors that are being discussed are optical sensors. There is quite a bit of organic matter in the water, which could be picked up by this sensor, too. To see what the sensor is detecting, it would still be necessary to take a sample to confirm the presence or absence of oil and distinguish it from organic matter, etc. There is other technology, but there really isn't anything that can be used from a platform readily. It sounds like a good idea, but it will only pick up a high concentration and if the source is far away, then it won't be picked up. Tar balls would not be picked up that well either. Right now, such instruments might not serve us so well.

Mr. Ruzicka stated that CREMP is putting down devices that will be deployed for 28 days before they need to be retrieved. They are in small containers and can be bio-fouled by marine organisms and hydrocarbon detecting membranes degrade in the environment. They will continue to deploy them at CREMP sites until the deepwater horizon is over or they receive confirmation that there is no threat. These devices use a technology that is different from the optical kind, but it is probably not a good alternative because of the logistics involved in maintaining them. They are not a long-term solution for continued monitoring.

Dr. Causey wanted to point out that the agencies are prepared for oil incidents. The local, state and federal agencies, including the Coast Guard, have been very well prepared. Of course, there are many scientific and management questions that have arisen because of this incident and these questions need to be answered. This is an opportunity to get answers for the future as oil drilling will not go away in the Gulf. The training scenarios conducted by the sanctuary have always been related to the reef right here in the Keys and usually involved a spill incident on the

reef. On the heels of the Exxon Valdez, that Governor Martinez started pushing for the *Area to Be Avoided* to be established off the Florida Keys. At the same time, pressures were mounting to drill off the Florida coast, water quality and coral health were declining and the Florida Keys experienced three major ship groundings in 17 days. We should take advantage of any opportunities that arise from recent events.

**Break** (15 minutes) The committee did not take the scheduled break.

#### **VI. Keys Reasonable Assurance Document Update, Mr. Richard Harvey, EPA**

Mr. Harvey commented that a lot of people have been following the Keys reasonable assurance development process over the last few years. FDEP has submitted that document to EPA for review. Because of logistics and some other factors, EPA in Atlanta selected himself to review the document. He promised to give it a thorough and objective review, despite any comments about the Reasonable Assurance Document (RAD) he has made previously. He is regularly communicating with FDEP and is consulting with expert scientists like Drs. Boyer and Fourqurean to get a better understanding of the status of offshore resources. He is hoping to complete his review in coordination with FDEP and submit a recommendation to the managers in Atlanta in September. He again assured everyone that he will review the document objectively and hopefully things can be wrapped up this fall.

#### **VII. Nutrient Numeric Criteria Development for the Keys, Mr. Ken Weaver, FDEP**

Mr. Ken Weaver acknowledged the work of his colleague, Ms. Chandra McGee, on developing nutrient criteria. They are part of the numeric standards group in FDEP. He thanked everyone for being invited to this meeting. FDEP has been developing numeric nutrient criteria since 2001. EarthJustice had become impatient with the rate of progress in establishing criteria and filed suit against FDEP with EPA in August of 2008, kicking off litigation. It was a mandatory duty case and the case was settled with a settlement agreement with implementation dates. That schedule has been modified somewhat since then. The current dates are November 14, 2011 for the Estuary Proposal and August 15, 2012 for the Final Estuary, south Florida flowing waters, and Downstream Protection Values (DPV) rule. They were able to push back the dates because the state of science for estuaries is not as advanced as it is for freshwater inland bodies.

EPA will convene a special panel, Science Advisory Board (SAB), to review approaches-- Estuarine and coastal waters, South Florida flowing waters (canals) and DPVs to protect estuaries. EPA is accepting nominations to the SAB until July 12, 2011. FDEP will be nominating national recognized people for this board, some of whom have worked in Florida. EPA/DEP technical document will be publically available October 1, 2010. The public will have the opportunity to submit comments to the SAB or on the document. The SAB workshop will be held in DC on November 1-3, 2010. They will deliberate and draft a report to be released by February 2011.

In response to EPA's determination that numeric nutrient criteria were necessary in Florida, DEP created an initiative to work with EPA and other experts around the state to develop numeric nutrient criteria and to look at the systems individually. The idea was to provide that information to EPA or for state rule making processes. They will most likely not go forward without EPA. Ultimately, the idea is to make this information available to the SAB and EPA for rule-making purposes. The state was divided into 33-34 systems around the state that were ecologically unique. Staff were assigned to each of these systems and directed to get together with experts and compile information about that system. He showed a map of the areas around the state. They held a series of workshops in February and March of this year and heard from the experts. South Florida was covered at a meeting in Miami at Rosensteel School of Marine and Atmospheric Science. It was a two-day very productive meeting.

Water quality criteria are defined to be a concentration, level or narrative statement that represents a level of quality that will support a particular use. When criteria are met, water quality will protect the designated use. Florida's existing narrative is one of the better ones around the country. It reads: "In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna." The problem is that the criteria are supposed to prevent imbalances and this narrative is reactive because it allows for the response only after there has been an imbalance. The goal is to prevent the imbalances from occurring.

FDEP has invested a lot of time in this process because good water quality is so important to Florida. FDEP recognizes that nutrients exist naturally in the environment. Nutrients are chemical elements and compounds found in the environment that plants and animals need to grow and survive. Nutrients are not typically toxic and the biological responses are highly site specific, related to many factors unique to each water body. When defining a healthy, well-balanced aquatic community as basis for a water quality standards endpoint, they are really talking about the attributes of community structure and function. Healthy, well balanced communities are not restricted to those described as “pristine” or “100% natural”. This description relates to EPA’s tiered structure for communities that allows for some change, while maintaining ecosystem function. Basically, it is acceptable to have modest changes in biological community structure (compared to background) as long as : there are reproducing populations of sensitive taxa; an overall balanced distribution of all expected major groups is maintained; and ecosystem functions are largely intact due to redundant system attributes. Mr. Weaver showed the outline for the Florida Keys Technical Support Document. It will include a summary of the geographical and physical description of the system.

1. Background on schedule and deadlines
2. DEP’ Marine Waters Initiative
3. Geographical and physical description
4. Sources and fates of nutrients
  - a) Nutrient sources and loading estimates
  - b) Assimilative capacity and productivity
5. Biological summary
  - a) Seagrass: FKNMS Benthic Habitat and Seagrass Monitoring
  - b) Coral: FKNMS Coral Reef Evaluation and Monitoring Project
  - c) Mangroves
  - d) Other biological resources
6. Water quality studies
  - a) FKNMS Water Quality Monitoring Project
7. Waters on the 303(d) list
8. Numeric nutrient criteria recommendations
  - a) FKRAD
  - b) OFW Baseline
  - c) Existing Condition

Magnitude, Frequency and Duration

Mr. Weaver emphasized that it is really important for the experts to understand certain unique things about the Florida Keys. It is a small land mass with a large receiving water body. There are many external sources of nutrients entering the Keys, especially from the Gulf of Mexico. He has reminded EPA that if they are concerned about downstream protections, then they need to set those criteria in the Mississippi River to protect the Keys and the Gulf of Mexico. Mr. Harvey asked a question about external sources of nutrients. There are some changes in Keys waters that point to near shore changes in species composition of aquatic vegetation. It is very similar to what is seen in the Everglades, but down here the function has not been altered yet. It is important to prevent any functional changes in advance. When we establish nutrient criteria for coastal waters, we need to make sure that we stop the degradation that has already been documented. That means stopping the early signs of changing community structure from sources that originate in the Keys and not in the Gulf of Mexico. You do have changes offshore, but you can’t say that you are not seeing any impact from nearshore sources in the Keys. Mr. Weaver acknowledged that Mr. Harvey was correct in that there are definitely local sources (stormwater, wastewater, submarine groundwater discharge).

Mr. Weaver pointed out that the document contains a biological summary, which will contain information from the 15 years of monitoring work done in the Keys. For seagrass, there is the Elemental Indicator (EI) and the Species Composition Indicator (SCI). At EPAs request, they used these indicators to evaluate trends and looks for common symptoms of eutrophication and then evaluated whether or not any changes in biology could be attributed to nutrients or if the changes occurred for other reasons. If they were due to nutrients, they might then be able to develop some approach to derive criteria, but that has eluded them thus far. There are few instances of

eutrophication in the far field, but there are some locations near shore. Low DO concentrations have been observed in canals. There have been phytoplankton blooms in Florida Bay and other blooms due primarily to highway construction and hurricanes. Epiphyte growth is highly seasonal and recent studies have not found correlations with nutrients, but this may be due to the activity of grazers. Their analysis of existing data shows that sites closest to land and with the highest N concentrations have the highest abundance of macroalgae. They have recently also examined other significant stressors/periodic events and any trends in nutrients over time. The seagrass beds are significant resources that deserve a lot of consideration. They did not see any significant changes in the seagrass indicators between the 2006 and 2008 period compared to the 1995 baseline. However, there are biological symptoms consistent with eutrophication at specific sites, including loss of seagrass, composition changes.

Information is also being gathered from the water quality monitoring project for the FKNMS water quality protection plan, which has been collecting water quality data from 1995 to the present. There are 154 stations in the Keys and other stations just outside of the Keys. Other sources of data might include Storet and the IWR database, but they need to make sure there are no data overlaps. The waters of the Keys were on the 1998 303(d) list, primarily attributed to the area called the Halo zone, which includes waters up to 500 meters offshore. Nearshore influences were attributed to nutrients and the reason we have a RAD instead of TMDL.

There are several criteria options being considered, including looking at the RAD for water quality targets. If they can build the documentation to satisfy FDEP and EPA, that might work since the RAD replaces the TMDL.

They are also examining the baseline period for 1985 Florida Outstanding Waters and evaluating the subdivisions proposed by Boyer and Briceño. Dr. Briceño has also recently presented a threshold analysis with chlorophyll a that may use a line of evidence to support these criteria, which will more than likely be some combination of approaches supported by a weight of evidence approach. They may break down the criteria further into nearshore (less than 500 meters) and offshore area because of the nearshore vs. the farfield sources issue based on the RAD. The RAD targets are really Insignificant-Increase targets and are based on the concentration increase above natural condition within 500 meters. The RAD targets are: 10 µg/l increase above natural TN concentration and 2 µg/l increase above natural TP concentration. These targets are based on modeling using the 20 individual water body segments. He showed an example of criteria for the Northern Keys based on the RAD approach.

The Outstanding Florida Waters baseline breaks criteria into bay and ocean side. This is a limited data set taken over a short period of time. They have been very encouraged by the cluster analysis work being done by Boyer and Briceño using the water quality monitoring data (salinity, nutrients, etc.) to develop subdivisions in the Keys. Sites with similar characteristics were classified in the same subdivision. For each of these 10 subdivisions, they will use distribution statistics to describe the range of nutrients associated with the existing conditions and designated use. This approach is predicated on the premise that maintenance of the frequency distribution associated with designated use support will protect those uses into the future.

They may also be applying the magnitude, frequency and duration concept, where the magnitude can be interpreted as the central tendency of the baseline distribution plus an insignificant increase. The frequency and duration components could be used as an assessment test of whether the distribution has shifted upward from the long-term average. Natural variability, climatic cycles, and assessment cycles would be considered. A second assessment threshold at a higher level. They would be 90% confident that if the assessment threshold is exceeded greater than X out of Y years, then the long-average has increased from baseline. This approach would involve 3 to 7 year assessment periods.

Another approach involves summarizing the existing condition of TP and TN. They are working with Briceño and Boyer to identify represent time periods and have not necessarily yet concluded that all subdivisions in their proposal are healthy/support designated use. They are talking about very low numbers consistent with the RAD.

FDEP's future plans include comparing various lines of evidence to support numeric proposal and submitting system specific technical support documents (TSD) to EPA for inclusion in SAB review. They will be posting the TSDs to DEP website at: (<http://www.dep.state.fl.us/water/wqssp/nutrients/estuarine.htm>). After the documents are released for about a month, they will hold another series of public workshops statewide to discuss FDEP TSDs and receive feedback from experts. They will also participate in the EPA SAB, submit comments and potentially attend meeting and provide verbal comments.

They are considering putting together an estuarine committee to provide guidance on those criteria.

Dr. Boyer presented the results of numeric nutrient analyses he completed with Dr. Briceño. He mentioned that FIU has been doing the water quality monitoring down here for many years and that he and Dr. Briceño offered to advise on how these data can be used and provide information to FDEP, EPA, park service, local governments, etc. Some of the information was conveyed in Mr. Weaver presentation, such as the sources and fates of nutrients. He showed diagrams completed by his graduate student depicting the sources of phosphorus and nitrogen loading the Keys. It brings forth the external loadings and upwellings, although, that is not to say that all loadings are external.

When developing criteria, several models could be considered, including hydrodynamic models, a seagrass nutrient model (FATHOM) and the RAD model. Nutrients are not the only thing. The light field is very important and is driven by the turbidity in the water, which is not necessarily related to chlorophyll values. The particulate matter affects the light field a lot more than chlorophyll. There are some data showing biological responses to nutrients. Dr. Boyer summarized the studies that show responses of various taxa to nutrients. There is information for phytoplankton, but not much for zooplankton. Literature exists for seagrass and for coral, but not for most invertebrates, fish and wildlife. It is important to consider the role of people and that is part of the MARES program.

Dr. Boyer briefly described some of the scientific studies/papers that extensively review the impacts on corals, which could include increased disease incidence. There have also been large scale studies on corals that have not seen nutrient effects. There is an interesting new hypothesis that involves the zooxanthellae and the coral. If the nitrate concentration is increased, the zooxanthellae don't need to be coupled so tightly with coral. In this condition, the coral can bleach at a lower temperature. It is a theoretical model at this point and not fully tested. Jim Fourqurean's data from the sanctuary showed changes are occurring in south Florida seagrass beds are consistent with increased nutrient availability in the system – but increases have not been observed in the water column and we have not witnessed the loss of seagrass beds.

In the nutrient criteria development process, it is important to consider zonation because water quality in different areas is driven by different factors. The zones exist because of differences in salinity and not because of nutrient differences alone. There are benefits to having zones, but may not be good to split the zones too much and then try to apply criteria. There may be value in describing conditions in comparison to an existing condition. While this approach may not be that possible in the Keys, it has been done along the Great Barrier Reef. If the existing conditions are assumed to be protective, then there are several approaches that can be used in developing criteria. These include: 75th percentile approach, ecosystem indicator approach (eg. CHLA), modeling and threshold analyses. Indicators have been developed for chlorophyll-a in Florida Bay and the Everglades.

Another approach involves comparing the Keys reef with other coral reef ecosystems. Dr. Causey pointed out that the Flower Garden Banks NMS has very high coral cover (50-60%), but he doesn't know what kind of water quality data they have for the region. Pat Bradley, EPA, added that they would be doing a survey in October trying to use the Flower Garden Banks as a reference for the Keys. It has been said that the Flower Garden Banks are the way that the Keys used to look.

Dr. Boyer reviewed the various approaches and studies that have been done pertaining to the development of nutrient criteria. Bell et. al. presented nutrient criteria developed in 1987. Chlorophyll was one of the main criteria, along with secchi disk, an optical measurement. The state of Hawaii created criteria for the reef tract. Their criteria include chlorophyll and turbidity targets as well as others. The current water quality monitoring program measures light extinction that can be correlated to secchi disk. This program developed EPA water quality criteria using a 75 % percentile approach that compares to a baseline in 1995. Targets include chlorophyll values, surface irradiance  $K_d$ , dissolved inorganic nitrogen and total phosphorus. From 2006 and onward, the chlorophyll data is better than the 75%, so most collections are below the criteria. For nitrogen, there were some years that it was higher. This is one way of tracking water quality trends and more analysis could be done on specific sites, etc.

Dr. Boyer emphasized how important the light field is for corals and showed two graphs plotting surface irradiance ( $K_d$ ) vs. depth. At the surface irradiance standard arrived at by the EPA/WQMP, the corals will receive 10% of the surface irradiance at 11.5 meters depth. Ten percent of surface light is what has been determined to be needed by corals. Using the secchi standard set by the Great Barrier Reef shifts the depth at 10% surface irradiation to a little over 15 meters. Thus, how and where the light criteria are set can affect the depth to which corals can grow. He

would very much to see light criteria as part of final EPA criteria.

Dr. Boyer briefly explained the threshold approach developed by Dr. Briceño, which helps identify when the values are below or well above average. He showed an example for TP in Florida Keys, Florida Bay, Marco-Rookery, etc. In this example, this approach shows that the 75% value is probably too low for Florida Bay and in those cases, using the mean might be more appropriate. This gives an idea of which analyses gives which result and can be done for other parameters.

A nutrient criteria comparison matrix was presented to summarize the various approaches. There is good agreement for chlorophyll values amongst several studies. There is fairly good agreement for TIN between the RAD, Boyer and Briceño, and Briceño threshold value approaches. For TP, the Keys is much lower than anything prescribed in Hawaii or the Great barrier Reef, but you can see four different ways of working the data. These results bolster the results of the RAD because the RAD falls in the range of other studies. He thinks the light field value is somewhat high relative to the Great Barrier Reef and should be around .15. This is another criterion that should be tracked and incorporated into the criteria.

Dr. Boyer explained that it became apparent during the EPA phone call, that they will only be setting criteria for waters within three miles of land, which leaves out the shelf and waters off Key West toward the Tortugas. Some reef sites will not be included because they are beyond the 3 mile jurisdiction given by the Clean Water Act. Dr. Boyer thinks we should push to be able to incorporate criteria beyond the 3 mile zone in these criteria. This is not based on state waters because they extend out 9 miles on the Gulf side. Apparently, EPA received some an interpretation from their attorneys based on a precedent that sets EPAs jurisdiction to 3 miles within shore. The state may be able to go out further, especially on the Gulf side. The question then became whether or not those data outside the zone can be used in the analysis.

People are shocked at the limitations and inconsistencies and were not aware of the situation. This issue of jurisdiction was thought to have been resolved in the Supreme Court.

**Lunch** (90 minutes)

## **FLORIDA KEYS NATIONAL MARINE SANCTUARY WATER QUALITY PROTECTION PROGRAM**

### **STEERING COMMITTEE MEETING**

#### **Afternoon Agenda**

Mr. Iglehart convened the meeting after lunch and announced that if anyone had public comments they should fill out a public speaker card and turn it in. He informed everyone that Chris Bergh has agreed to postpone his talk (*Ecological and Economic Consequence of Sea Level Rise in the Keys*) until the next meeting.

#### **VIII. Update on FKNMS book, Dr. Bill Kruczynski – EPA, Region 4**

Dr. Kruczynski provided an update on the ecosystem book that he has been compiling and provided a draft copy for circulation around the room. There is also a seagrass chapter draft circulating for everyone to see. The title has changed recently. It is now called *Tropical Treasures*. The project began in 2006 after completing 10 years of data in seagrass, coral and had made sewage treatment improvements and wouldn't it be nice if people could understand the results. To bring the experts together we hosted workshops. It soon became apparent that any book needed to be comprehensive and not just focused on the Keys, especially since there are influences from far field sources. Over the years, the book grew in size up to 400 pages and that meant having to change the format to 6.5" x 9". Since this past January, he and his partner Pamela Fletcher, have really been pushing to get the book done. They hope to have it completed by this fall.

Dr. Kruczynski moved his office to Fish and Wildlife Lab and that has been good and he appreciates being able to work there. The book is organized into 8 chapters and 5 chapters have already been reviewed. Three of the big chapters will be going out for review this month and after incorporating the comments, it will be sent to three external peer reviewers. Sanctuary Friends was able to fund an external review by experts in the Gulf. These should be done by September and then a draft will go the WQSC, SAC, TAC and others. If a committee member wants to byline the book, they can have their logo put on the cover along with the other ones from NOAA, EPA, UF, Sea Grant, and Protect Our Reef. Dr. Kruczynski can have the logos from the committee put on the cover if that is what is desired.

They plan to print about 1500 copies and hopefully it will be distributed to authors and committee members at the Keys science conference in the fall. There is room for a forward in the book. It could be offered to a political person, dropped or have a popular person like Jimmy Buffet. Senator Graham and George Bush Sr. were suggested as writers. There was general agreement that there should be a forward in the book. There will be about 1500 free copies. It will also be available on the web as fact pages that can be downloaded for free in 8.5" x 11" format. Pamela has already met with educators and Sea Grant has extended her employment with them so that she can make diagrams available for teachers. University of Maryland will do the second printing and will be available on web for \$15 per book, \$20 per hard copy and \$2 per chapter. It will all be done for cost and there will be no profit.

The original idea was that this could be a living document and the internet document could be updated. He thanked Anne Morkill again for the use of her office.

It was also suggested that Brian Keller's major professor, Jeremy Jackson, write the forward or maybe have a few words from Fiona Wilmot, Brian's wife. Dr. Kruczynski stated that he will try to make that happen.

When Dr. Kruczynski does retire, his position will be relocated to Atlanta.

Other agencies might be interested in printing the additional 1000 free copies that were originally planned. Mr. Bob Johnson stated that his agency can contribute toward printing more copies through the conference in the fall. A round of applause was given to Dr. Kruczynski.

Mr. Bergh asked if the person filling in after Bill will attend these meetings. Mr. Harvey stated that the position will evaporate from his office, he and Steve Blackburn will be left and he will be retiring himself in 1.5 years. The Water Division has other priorities, including nutrient criteria and mountain top mining. Some people think we have done all that can be done in the Keys with implementing the wastewater plan and documenting the status of the resource. Dr. Causey feels that they need to map out a strategy as to how to approach the region and/or go to Washington. They have supporters at the Coral Reef Task Force level.

The EPA administrator will be down in October. This strategy needs to be developed before the next steering committee meeting. Dr. Causey added that what the WQPP has done collectively is bigger than people and is a model for other programs used in California in Monterrey. This program is something that should be around the nation and not diminishing. Mr. Harvey noted that other agencies need to pick up a share of the funding since EPA has carried the program for so long. Mr. Iglehart expressed that he would like to talk about some next steps.

**IX. Annual Reports on the Comprehensive Monitoring Program and Data Management Program for the Florida Keys National Marine Sanctuary: Project Principal Investigators**

**A. Water Quality Monitoring, Dr. Joe Boyer, Florida International University**

Dr. Boyer will give a 15 year update at the Keys science conference in October.

**B. Coral Reef Evaluation and Monitoring, Mr. Mike Callahan/Mr. Rob Ruzicka, Fish and Wildlife Research Institute**



Mr. Rob Ruzicka explained that his team is in the field today in the Keys. He mentioned the names of people who are working on the program with him, including the statisticians. He showed a map of the CREMP stations including the 12 sites in the Dry Tortugas. There are additional 17 stations along the Southeast coast that are monitored by NOVA University. Right now in the FKNMS, we have 34 Sites/97 Stations (Installed 1996) with stations at the patch reefs, shallow forereef and deep forereef. They added six new sites to monitor patch reefs in the sanctuary, but the results for today are not included. Mostly, the results presented will be from the video transects that are done at each fixed station.

This is the first time that a significant increase has ever been noted in coral cover increase from one year to the next, from 2008 to 2009. From the graph of percent cover, there were no changes in coral cover in the Dry Tortugas. The biggest gains were seen in the patch reefs. Increase was consistent across the Keys except in the Dry Tortugas and Back Country Patch reefs. They also had an increase in macroalgae and coral cover in the same year, which is interesting. Throughout the study, macroalgae cover mean hovers around 11%. In the Dry Tortugas, macroalgae is considerable higher than elsewhere in the Keys. This increase was not consistent throughout the Keys and depends upon the site. Throughout the study area, octocorals also increased significantly in 2009 and was the highest amount ever recorded.

The cold snaps might be one of the most significant events affecting corals for the past 30-40 years. He showed a temperature graph based on temperature loggers they have in the field. They visited four sites for winter mortality assessment three weeks after the two successive cold fronts moved through in January. Based on the temperature logger data, the first front did not cause a severe drop in temperature, but the second front did and that one caused damage.

They visited sites off Long Key near Florida Bay and noted a temperature that reached 9° C (48° F). The duration of exposure to lethal temperatures exceeded 4 days, with 16° C being the lethal temperature for most corals. Water temperatures were as depressed at forereef sites as compared to the nearshore sites, where the greatest losses were observed. Mortality varied by station due to species composition. Species were affected somewhat differently. The big take home message is that there was a significant decline in mean cover across all 8 stations-- about 50%. The absolute change in coral cover was a decline of 7% (17% to 10%) across all 8 stations. Encrusting, lobate and branching species all suffered mortality. Octocorals were also severely affected and declined 12% across all 8 stations. It was basically an instantaneous death, probably from freezing. This summer they have seen some isolates or one or two polyps that survived from a larger colony of *Montastrea*, which showed the greatest decline in terms of cover. *Porites astreoides* had nearly 100% mortality at some stations whereas *Siderastrea siderea* was the most tolerant species (low prevalence and severity) and species like *C. natans* suffered partial mortality.

Mr. Ruzicka presented a graph of long term trends in percent cover of macroalgae, stony coral, octocoral and sponges. Macroalgae were highly variable over time; sponges remained stable. Octocoral showed a slight increase and stony corals showed a slight decrease over time (1996 to 2009). He presented another map depicting increasing and decreasing trends at various types of reefs throughout the sanctuary. For stony coral, 21 have decreasing trends from 1999 to 2008. The data from 1996 to 1999 was omitted so that they could measure and what has changed since the initial mortality event. Some of the sites show no significant changes, two show increases, but about 50% show a significant decreasing trend in stony coral coverage. When the decreasing sites together are clustered, it turns out that most of them are in the Lower Keys or Dry Tortugas. When examine individual species, a decline was noted for all species, except *Siderastrea siderea*. Most of the decreases are related to declines in *Montastrea annualaris*, which has always been the most abundant species by size.

Macroalgae cover did not change at most of the sites, but there is no consistency across the Keys. He presented the results of a study conducted by Schutte, et. al. that is consistent with what they have found. The Schutte study looked at reefs throughout the Caribbean and concluded that Keys reefs have not undergone phase-shift to macroalgae dominated reefs. Most Caribbean reefs have not experienced this shift either. The CREMP data support this notion that a phase-shift has not taken place. It appears Keys' reefs may have appropriate top down controls to regulate macroalgae cover based on the past 15 years of CREMP data. The mean macroalgae cover in the Keys is slightly less than on Caribbean reefs. This is good news.

At most of the sites, an increasing trend in octocoral cover was noted and this increase is most apparent at the

shallow offshore reef sites. They are not sure whether the increase is due to recruitment or linear extension of canopy cover. It takes a while for CREMP to pick up smaller changes as the method favors spatially robust species. It is possible that the octocorals are increasing at sites that lost *Acropora* species. Similar findings were noted in the Seychelles after mass bleaching in 1998.

For the future, they will be expanding the SSI survey to include coral colony density and disease prevalence. Demographic surveys for octocorals and stony corals are being conducted to show recovery if taking place on offshore reefs.

In summary, 2009 was the first time CREMP ever recorded a significant increase in coral cover. There was also a significant annual increase in macroalgae and octocoral cover. The preliminary results from the 2010 winter mortality indicate coral cover declined substantially at patch reefs. The severity of mortality observed varied by reef depth, proximity to Florida Bay and species composition. *Montastraea annularis* and *M. cavernosa* were most severely impacted. Declines in octocoral cover were greater than declines in coral cover.

During the last decade, coral cover has continued decline across the region. Fifty-seven percent of all sites show a declining trend. However, 8 of the 9 Atlantic patch reefs have showed no significant decline in coral cover.

The Keys may be entering into a new alternative state dominated by Octocorals. This is most apparent on shallow forereef sites where octocorals are replacing *A. palmata* and *M. complanata*. Sponge cover has shown a negative trend while macroalgae cover has remained similar throughout the project.

Mr. Ruzicka also reviewed one additional slide showing the temperature data from Looe Key and Sombrero Reef. This graph shows a trend at Looe Key where a narrow band of cold water came in across the bottom with the tides and this did not happen at other locations. The bottom contours are very important. They have not looked at the mortality in that location yet.

Mr. Harvey stated that if he could fund only one component it would have to be this one since people associate this area with the coral reefs and people will always expect documentation of the reef. Three largest declines seen in the past 15 years have been related to the Hurricanes in 2005, bleaching 1998 and then most recent winter event. Other things are going on, but these larger stressors show up in the monitoring. Improving water quality in the Keys may be benefiting corals at this point, but he is not sure. He doesn't know if corals are the best proxy to monitor water quality conditions.

A question was asked about macroalgae. Mr. Ruzicka explained that right now, all macroalgae are lumped together. When they make the move to high definition next year, they can tease apart the macroalgae since some are beneficial and others are not. They are working on refining the resolution in this area.

Dr. Causey commended the team for getting out in January to really see what happened. It was good that they did not wait until the summer, but conducted episodic sampling and can't point to the reason for declines. These data also show that they Keys reefs are not being overtaken by algae and that takes a long-term data set.

Mr. Ruzicka explained that they worked with TNC on conducting some surveys and they are working with Dr. Lerhman to get the data published. They used their own funds to conduct this sampling and it has been helpful to have that extra information.

### **C. Benthic Habitat, Seagrass Monitoring** Dr. Jim Fourqurean, Florida International University

Seagrasses make up about 90% of benthic cover on the seafloor of the sanctuary. Seagrass help to maintain water quality and losing them will have a permanent and irreversible change in the stable state of the ecosystem from a clearwater system to a turbid water system and the corals will never come back. Dr. Fourqurean stated that there are two things that he wants you to remember. There are widespread indicators of eutrophication of seagrass beds across the sanctuary and that evidence comes from a number of independent indicators. This observation applies to both inshore and offshore, lower keys or upper keys sites and these sites are not showing early signs of getting better. Current water quality conditions are not protective of the resources and the water quality over the last ten years is allowing the resources to slip.

Dr. Fourqurean added that in one of the papers that he authored, he makes that statement that isotope ratios (N:P) are much more sensitive indicator of relative nutrient status than epiphyte communities and epiphyte communities are better than water column indicators. Dr. Boyer asked about the relationship between light conditions and eutrophication. Dr. Fourqurean explained that loss of light and eutrophication go hand in hand and if sunlight were blocked from reaching the bottom, that would generate the same kind of N:P ratios as nutrient enrichment. Dr. Boyer noted that by increasing the light reaching the bottom, the condition might be obviated and that it could be said that the light regime is impaired. Dr. Fourqurean explained that the current light regime of the last 10 years of data is a description of the regime in existence while the resources have been declining and to use that a metric of the seagrass resources would not be productive and allow them to continue to decline.

Monitoring programs are more useful when they can inform resource managers before there is a massive change in the ecosystem. So far, the area has only seen seagrass losses related to hurricanes, but the sites with grass are indicating that there is an increase in nutrients in the system since 1995. The change toward a more nutrient rich environment causes shifts in competitive dynamics of plants, with slow-growing plants like turtle grass dominating in nutrient-poor environments and fast-growing epiphytes and phytoplankton dominate in a nutrient-rich environment. They are tracking the relative balance of slow versus fast growing plants to see if shifts are taking place in the benthic communities. They are seeing a relative increase in the faster growing plants, which is an eutrophication effect.

They are also looking at the N:P ratios in seagrass. The N:P ratio is that condition in which there is ample light and ample nutrients plant growth and there are essentially no limiting factors. In an environment with ample light for seagrass as has existed in the Keys, usually the environment is rich in either N or P, but not both. A movement of the ratios toward this particular N:P ratio of 31 suggests decrease in light availability or an increase in nutrient availability. If the native nutrient-limited state has a N:P ratio of 60 (a nitrogen rich, phosphate-limited system) then a decrease is indicative of eutrophication and this happens nearshore in the keys. Offshore, in the nitrogen-limited system, the N:P ratios are typically low and they increase toward 31 when trending toward eutrophication.

Dr. Fourqurean reviewed some of the ecosystem behavior models for detecting anthropogenic nutrients. In the carbon isotope model, nutrient pollution will shift seagrass Carbon 13 towards more negative values because plants become isotopically lighter when they receive less light. In the nitrogen isotope model, nutrient pollution will cause some kind of change in the nitrogen isotopes of primary producers. If sewage leaking out of properly treated system tends to have heavy nitrogen signature, then progressive increase in nitrogen isotope ratios suggests there are anthropogenic processed nitrogen. Anthropogenic fertilizer has an isotopic signature of about zero, so it also possible to have a decrease in nitrogen isotopes and still have an anthropogenic effect. If plants are shaded, then they can discriminate and the ratio can go down. Therefore, nitrogen isotopes give mixed signals and not an easily applied as a monitoring tool.

The benthic monitoring program covers a large spatial area—18,000 square kilometers of bottom. His students sample both random and fixed sites all over the place. This program was not originally designed to pick up other threats like prop scars or the fertilization of the nearshore seagrass beds because of the septic tanks. This program is wonderful for estimations for the sanctuary as a whole, but not so good for 50 meters from shore. He showed a map of their permanent monitoring sites and added that some new sites will be added in the Dry Tortugas next year at the request of the park. He showed an older graph of the sites in the water quality monitoring program and noted that the last time a big analysis was done on those data, most sites were not increasing in chlorophyll over time and several nearshore sites on the oceanside actually were trending down over time. The water column itself is not showing signs of eutrophication itself. Dr Boyer will be analyzing more recent data very soon and is not certain if these trends are still holding. Epiphytes are not showing the increasing nutrients either and at this broad scale, there is no correlation between epiphytes and nutrient availability. Epiphyte load as a monitoring tool in the Keys is not very good.

In this slide showing data from a site off Key West, turtle grass has decreased down to only 5% coverage and is being replaced with other faster-growing plants. In Newfound Harbor, there seems to be a competitive shift from turtle grass toward calcareous algae. Faster-growing plants are more dominant than they were when this study started in 1995. At 19 of 30 sites, species composition has shifted in a manner consistent with increased nutrient availability (19 of 30 in 2008, 13 of 30 in 2007). Some sites are at different points in the eutrophication process, with some increasing in *Thalassia* density and others decreasing. A few sites scattered about are not showing

changes at all. Further analysis indicates that stations with increasing abundance of fast-growing algae are those with more nitrogen in the water column. There is a spatial pattern in the relative availability of N and P (offshore waters are nitrogen-limited whereas nearshore/bay waters are phosphate-limited). This natural condition makes it challenging to develop water quality criteria because to set outflow criteria to protect phosphate limited part nearshore could have a lot of nitrogen and then have a huge effect on the reef tract as it moves offshore. At 13 of 30 sites, N:P is trending towards “seagrass Redfield ratio” (10 of 30 in 2008, 5 of 30 in 2007). There are only two shifting away from Redfield ratio and they were the sites denuded by Hurricane George and they have been gaining biomass since then.

There is an interesting pattern when analyzing isotope ratios for carbon and nitrogen across the sanctuary. With depth, seagrasses become isotopically lighter because there is less light at depth. At 7 of 30 sites, significant  $\delta^{13}\text{C}$  decreases are seen in the stable isotope ratios that is consistent across the years, suggesting decreasing light conditions when compared to 1995. In terms of nitrogen isotope ratios, 14 of 30 sites show significant trends in  $\delta^{15}\text{N}$  (15 of 30 last year). Dr. Fourqurean summarized the site-specific indicator data from 1995-2009 in a single table that is color coded and organized by geographic area. There are only two sites that do not show signs of eutrophication—one at Carysfort off of Key Largo and the site is located off of Key West. Two sites off of Tavernier show strong signs of enrichment as do several other sites.

The program has defined two criteria to track the status of seagrasses based on their conceptual models. The first, Species Composition Index, SCI, is based on the relative dominance of slow-growing species and a decrease in SCI suggests that *Thalassia* is becoming less dominant. The second, Elemental Indicator (EI), is based on nutrient content of the slowest growing species and indicates how far away the ratio is from Redfield. A decrease in the EI suggests increased nutrient availability. The baseline for SCI and EI was calculated from data collected from 1995-2005. EIs and SCIs were calculated for 2006, 2007 and 2008. There may be a slight decreasing trend for SCI when compared with the baseline and there seems to be a downward trend in EIs since 2006.

The question can be asked whether these patterns are describing locally-induced changes, responses to larger-scale processes, or natural cycles. Changes seem to be evident throughout the sanctuary. The benthic indicators of eutrophication are measuring change in this water quality regime that doesn't seem to be changing over time. The activity of the benthic system locks up the nutrients out of the water column. These data are pretty important toward over the years driving the nutrient reduction and have been the basis for all of the billions of dollars going toward wastewater improvements in wastewater in the Keys.

All of the permanent monitoring sites are baseline sites for impacts for oil spill impact. If the worst case scenario happens and large amounts of oil reach the keys, the seagrasses themselves would probably live. They usually only die when oil tankers go aground and dump right on top of the grassbeds themselves. However, the animals that live in seagrass beds are susceptible to oil. Oil could make them empty seagrass beds.

In summary, there are changes consistent with more nutrient availability in the system and these changes are subtle. Independent indicators show the same trends, so that gives confidence in the interpretation of the data.

Dr. Briceño pointed out that it is difficult to know whether we are looking at cycles in the system and picking up one point in the cycle when there is really no change over time--just fluctuations in the cycle. This is one of the problems we are facing when interpreting data and looking at nutrient criteria/classification. We may be looking at an increasing point or a declining point in the cycle and it is a problem if we restrict our view to a slice of time. There are cycles that may not be detectable without a long time period. He mentioned that there is a climate signal that might affect things. He can't really say that there is a trend toward increasing or declining nutrients. The goal is to distinguish between the natural and anthropogenic signals and the climate signal may be making more of an impact than the anthropogenic signal.

Dr. Fourqurean thinks that there is something else going on as well. The quarterly sampling of water quality is a noisy whereas seagrass plants are sampling the water column constantly. Dr. Boyer asked if there were any nearshore/offshore gradient effect, which would be expected if the impacts were anthropogenic. At this time, the analyses are incomplete.

Mr. Harvey confirmed with Dr. Fourqurean his earlier statement that the maintaining the status quo of current

conditions in the sanctuary is not adequate to maintain the resource at its present state and asked what he thought was the best way to use his data when developing water quality criteria for the sanctuary. Dr. Fourqurean thinks it is important now to move ahead with further analyses of data. He suggests looking at only those sites that have shown no changes, which are also sites that have water quality monitoring data. There might be some common factors between the sites that could be helpful. Looking only at those sites might be better than considering the sanctuary as a whole for developing water quality criteria.

Drs. Fourqurean and Boyer wrote a paper that showed took 3-4 years for nitrogen/phosphorus patterns in the water column to match the seagrass trends. It took years to average out the variability.

Within a sampling site there are lots of different individuals, so seagrass genetics is probably not playing a big role in the results they are getting.

Ms. Walters noted that the focus has been point source issues predominantly up until this time. There is much more to be done in terms of water quality, including dealing with stormwater inputs. And that is dealing with sources of inputs in the Keys only and we know that there are a lot of influences from outside the area, too. In Key West when they implemented the wastewater project, but they still had problems at the beaches, so they made adjustments. There are still adjustments to be made. It's about moving through the best management practices to factor out what is coming from the Keys and what is originating elsewhere. There are many pieces to the puzzle. Since the seagrass trends are Keys-wide, it speaks to her intuitively as a nonpoint source. Dr. Fourqurean commented that they don't see the same trends in Florida Bay and the bay is not changing. The WQPP sets the background for more focused studies. As an example, Dr. Boyer is examining water quality changes and the benthic community. As part of the Keys carrying study, they collected data in the first kilometer of shoreline and that could be done again to see changes over time.

Dr. Causey mentioned a recent paper by van Woesik about water quality, coral reefs and climate change. Maintaining high water quality can help mitigate against climate change impacts on coral reefs. This paper uses CREMP and water quality monitoring data from this program. This study gives managers hope that maintaining high water could benefit corals as they face threats from climate change. There have been four factors working against corals: climate change, land-based sources of pollution, degradation and overfishing. This is a management use of the data. This group can take a whole lot of pride in helping move things forward in this county in terms of wastewater.

Dr. Fourqurean added that climate change is not so bad for seagrass plants since they evolved during a time when there was a lot more carbon in the ocean. Dr. Causey added that hotspots for ocean acidification are located where freshwater enters coastal environments and dissolved carbon enters the water. In areas where there are healthy seagrass communities, they are not seeing as much acidification because they have a tremendous ability to remove carbon from the water. Dr. Fourqurean added that in Florida Bay, the grasses are so efficient at absorbing seagrass, they drive the water column pH up and calcium carbonate precipitates from the water column.

One of Dr. Fourqurean's students is conducting a study to determine how ocean acidification affects seagrass beds.

#### **X. Use of Monitoring Data, Mr. Steven Blackburn, Mr. Richard Harvey**

Mr. Blackburn reviewed the draft document, *Fifteen Years of Water Quality Monitoring in the Florida Keys*, which he compiled and sent for review to the committee. Copies of the document were provided and sent out in advance via email. The reason for drafting the paper pertains to funding levels. The program costs \$1.1 million and doesn't require a match. EPA did receive four special study proposals when they sent the RFP out last month, so they will have some tough decisions to make.

Mr. Blackburn explained that the paper includes the purpose of the WQPP and describes how data collected from the monitoring program are being used to support future resource and program decisions. It also includes a brief history and the goals of the WQPP. He is requesting that people read it and provide comments. In drafting the paper, he wrestled with how technical it should be, but decided to keep it fairly brief. It's about 25 pages right now and is fully documented with websites, etc. Each of the three monitoring programs is summarized in less than one page.

After the basic monitoring programs were described, the programs in which these data were being used were described in no certain order. These include: water quality standards—EPA and DEP; No-discharge Zone in sanctuary, Coral Reef Task Force, CREMP, Reasonable Assurance Document, algal blooms and episodic events, etc. EPA receives funds based on effectiveness so that is included as a factor that determines how the funds are allocated. This information will be put into a national report and provided to OMB and others.

Mr. Blackburn found references about Monroe County's beach monitoring program, but these data are not being used. He doesn't know if things can be tweaked to provide information for this program or not. Beach monitoring was included as an item in case anyone has a comment or idea. Mr. Edwards added that Monroe County is doing their comprehensive plan revisions and looking at the Area of Critical State Concern. He encouraged Mr. Blackburn to contact Rich Jones, Monroe County, about this topic. Other programs using the data include: DEP B-Map, Dry Tortugas monitoring, Sanctuary plan and zoning and Water Quality Improvement Program (which was used to leverage 100 million in funding).

CERP was also listed in the document as using the data, but Mr. Blackburn is not sure if it should be there. Mr. Harvey noted that South Florida Geographic Initiative funds have been used to deal with Everglades issues, remap studies and STA optimization, but the CERP boundary never came down this far. The Florida Keys Carrying Capacity study was funded under the Farm Bill before CERP was in place. The Florida Keys/Florida Bay Feasibility study is a component that is missing today. It was started, but then dropped. The South Florida Task Force itself works outside CERP. Dr. Causey added that the tidal pass demonstration project was completed and emphasized that although CERP is outside of the keys boundary, CERP is the centerpiece of south Florida restoration and not everything is about the greater Everglades.

Mr. Bob Johnson stated that there is clearly a need to manage the system to move more water to the south and now a decade of science shows that there was more water in the southern system than originally thought. With adaptive management, CERP will evolve and they will be talking about new restoration targets in the future to accommodate this new information. He anticipates that the needs of estuaries will come back into the process. Mr. Iglehart stated that it important to keep CERP in the document because monitoring is part of the process as the restoration takes place and Bob agreed, especially if the feasibility study is revived. Dr. Boyer affirmed that monitoring data was used in the original feasibility study because they tried to develop a water quality model (Army Corps of Engineer study). The MARES project will be a link that will help connect the coastal environment.

Ms. Sandy Walters asked if the language provided in the document about the WQPP is somewhat restrictive and should be expanded to include long-term adaptive management and revise the purpose of the program. She would like to see the kind of long-term monitoring that has been taking place in California to assure that the protections are effective. It was explained that this language was provided in the legislation that established the sanctuary and WQPP.

Mr. Harvey added that people might think that everything has already been done, so why spend more money. He asked if things like monitoring can be done a little differently. Otherwise, there may not be funds for special studies. He would like to see other agencies contribute to funding the program as some have done in the past. Fish and Wildlife has been contributing recently.

Mr. Iglehart emphasized that it is critical to get this document in shape because people leave the program and it will help things to continue into the future and document the validity of the programs. The program should be institutionalized and become long-term. People agreed.

Ms. Walters thinks that more bulleted lists would be helpful in addition to the text. This will help communicate to decision-makers and others who are extremely busy. She also referred to the matrix that describes how an agency uses the data. The matrix could be filled out using "high, medium and low", not just yes and no.

At this time, to Mr. Blackburn's knowledge, there is no one advocating an increase in WQPP funding, but they are aware of the monitoring program, especially in light of the oil spill. He noted that there used to be more money from other agencies for this program. He still plans to use this paper to fight for funds. Mr. Harvey added that if certain court rulings require additional Everglades assessments, that might leave even less money for this program in the

future. From what Mr. Blackburn could tell, the initial Everglades restoration started with the Florida Keys National Marine Sanctuary and then morphed up to Everglades, so that the geographic area was broadened. Dr. Causey agreed that the restoration started down here and then moved to South Florida.

Mr. Blackburn also pointed out that the language about the WQPP in the document is the original language in the legislation and can't be changed. Mr. Harvey pointed out that there are increasing demands on a shrinking resource and EPA is also helping to support the Southeast Florida Coral Reef Initiative.

Dr. Causey added that in the past they have taken the water quality program results inside the beltway, people have been very impressed and willing to provide funds. He thinks that we should invite some staffers down here to hear more about the program at the Keys conference. The book also summarizes what has been learned from the WQPP. Dr. Boyer added that FIU took a different approach. The president of the university met with one of the deputy directors in EPA about the monitoring program. He thinks that we should go up to a higher level. If people could be identified, then they might be able to take a different approach.

There is an acting regional administrator for EPA (Stan Nyberg) right now. Mr. Blackburn added that he was very impressed with what is known in light of the oil spill. Mr. Blackburn is still looking for input and wants people to add to the matrix and fill it out. Mr. Harvey asked if anyone thought that the seagrass and water quality monitoring programs should be modified to more effectively characterize the response of the system to the wastewater improvements. Dr. Boyer added that a hierarchical approach is needed.

Mr. Harvey explained that EPA has done what was needed in terms of corrective actions, so now how successful those actions needs to be documented. Dr. Causey stated that this was discussed a little at the last meeting. The idea was to bring the management committee together and they would bring the Technical Advisory Committee (TAC) together. He thinks that the TAC, along with the management committee, should be tasked with taking a strong look at what is being done now and what could be adjusted for the future. Mr. Harvey wants consideration of what questions will need to be addressed in the future. With existing information and outstanding questions, we might consider asking for more money.

Mr. Bergh discussed the document briefly. Some steps have been done that are described in the document. Although corrective actions are starting to be implemented, it has not been demonstrated that they have worked. This description of a hierarchical approach goes beyond looking at the offshore waters, which the water quality program does very well. In the document, it mentions that there is monitoring in canals and beaches and although that might be happening, it is not unified into one entity and the committee doesn't hear reports on them. There are certainly a lot of problems with the canals and that is important, too. It's all part of the guiding legislation. He thinks that the seagrass monitoring approach, which looks at both fixed and randomized sites, is a good way to look at benthic resources. Between what the CREMP team does at fixed sites and the broad scale surveys done by TNC and the NURC studies, they have a good idea of what is going on with the benthos. But, the budget is shrinking and it is scary to think that we would have to cut back. He thinks an education campaign is really needed. A team of representatives from the Keys went to EPA and NOAA in 2002 at headquarters and that was very successful. Something like this "road-show" should be considered again. Mr. Bergh wanted to make sure that there was a leader to drive the bus for this effort.

Dr. Causey pointed out that TNC has a great group of folks in the Washington DC area, including people who have had past experience with the south Florida Task Force and the Coral Reef Task Force. Dr. Kruczynski made the suggestion that people from Washington could be invited to the upcoming Florida Keys science conference. Mr. John Hunt added that this is still a science workshop and will be very focused on science. While it may be appropriate for some staff to attend, it would not be recommended for others because of its technical nature. Debate is part of the scientific process and that might not send the right message. To reach the high level policy-makers and others, it will still be necessary to go to Washington with the carefully planned education effort. The science conference will not serve this purpose. Mr. Harvey mentioned that there might be some EPA scientists that should be invited and other agencies should also invite appropriate people. There is good news now from the CREMP program results. Mr. Iglehart added that we need to define the message first. A commitment needs to be made toward coming up with a message and adopting it. This could be done at the next meeting.

Dr Kruczynski stated that the message they took to DC before was that the reef was dying and that there was an

antiquated wastewater system in the Keys. They pointed to the data that showed the reef is dying and explained that a lot of money will be needed to fix the problem. At that time, wastewater was thought to be getting all the way out to the reef. Now we know that there are other things affecting the resources. We have addressed the nearshore health issues at beaches. It is likely that someone will ask whether putting more money toward this program will fix the reef, even though it may not. Mr. Iglehart pointed out that the only way to understand the reef better is by studying it, so that is the best hope. The focus could also be seagrass instead of the reef. Mr. Harvey noted that we can now say that we have a better understanding of the reef and chlorophyll factors have much more of an influence than once thought. Now, we are seeing signs in the seagrass of widespread eutrophication, which could be accelerated to make a drastic change. Dr. Kruczynski added that without this long-term monitoring, they would not know this information.

Dr. Boyer stated that other programs have a tie to land because the land is influencing the water. In contrast in the Keys, the connection of the population to the land mass is very tenuous. But, in reality it is tied back to the land since it is what is coming from the Gulf of Mexico that affecting this system. The problem is that with this program we can't quantify what is coming in from elsewhere. Currents and water masses can be classified as has been done with other science. With such information, we might be able to say that the Keys are influenced by a water mass from elsewhere for a certain percentage of time and by other factors at other times. This could be compared with a baseline that exists without any major outside influences. That might be useful information for managers and could offer a plan to go forward. A new approach is needed.

Mr. Bergh stated that he keeps bringing up sea level rise because it is one of the clear and present threats to environmental quality. It will mobilize sediments and nutrients and cause all kinds of changes in water quality. He hopes the wave of environmental awareness that has been prevailing in society lately is not wearing down. Money is needed to focus on the changes that will be taking place down here and that money probably needs to come from more than one agency—Fish and Wildlife, NOAA, EPA, and state agencies (DEP, WMD, etc.). Up to this time, we have mostly asked for money for the coral reef and water quality and we should consider asking for more money for other things, including addressing the changes that we will be facing down here with our refuges, parks, etc.

Mr. Edwards mentioned that he has been thinking about whether the WQPP can morph to address the next big threat, which is climate change, not just nutrients. Clearly, there is a need to document successes, but with such a great data set, there is also the opportunity to study the impacts of climate change. Is it possible for the WQPP to change its focus from nutrients to meet the next big threat, climate change? The outcome of climate change won't even be good for seagrass, which thrive on carbon dioxide.

Ms. Walters stated that there is a need for the program to be institutionalized. She was reminded about something that Bruce Popham mentioned some time back. At his marina, he assessed the cost of meeting the environmental regulations. He charges a voluntary environmental fee that no one refuses to pay once they know how the money is used. She proposed considering a voluntary fee that is accompanied by educational materials to show how long term monitoring is being used to protect this resource. While this money will not cover all of the costs of the program, it may help. There are visitors from everywhere around the world and they may be willing to help pay for protection. Ms. Pat Bradley added that in Bonaire, they have reasonable park fees that cover all expenses and the government doesn't need to pay for parks.

In terms of next steps, Dr. Causey suggested working with the management committee or charging the management committee to convene the TAC. Before the next meeting in six months, the management committee needs to get together to decide the next steps and then take that information to the TAC and get their feedback.

The first priority is to get information to Mr. Blackburn within the next two months, by September 1<sup>st</sup>. Then, the management committee could meet in September and the TAC could meet in November. Meeting results could be provided to the WQSC before the end of the year and then the morning of the next meeting when there was a quorum, they could be discussed. It was suggested to have a 1.5 day meeting in January. Mr. Iglehart stated that he didn't think the wastewater updates were needed for the next meeting as that information could be provided in an email.

Mr. Hunt spoke as a management committee member. The direction to the management committee is not clear to him and is very vague. Is the management committee charged with seeking reasonable justifications for continuing



monitoring for the future or are with developing a first cut for new direction for the future? He feels that they haven't gotten a response from the management committee in the past because the direction hasn't been very clear and hasn't been across the consensus of the steering committee. He also feels that the steering committee needs to put this type of discussion and visioning first at the top of the agenda and as a priority item because many steering committee members are not present by the afternoon such discussions usually take place. He is speaking on behalf of himself and not the entire committee. There was low attendance today even before the afternoon.

Mr. Bergh noted that many members of the steering committee are interested primarily in wastewater or in monitoring science. There seems to be two camps that are not that well connected. The monitoring led to the wastewater improvements and continued monitoring might mean more changes. Dr. Causey thinks it would be a mistake to drop the wastewater updates from the meeting, but they could be moved to another time slot. The wastewater folks need to hear the results of research so that they can see how important the changes are to the system. Mr. Bergh didn't feel that the results of the science were effectively reaching the people focused on wastewater for the most part. Ms. Walters added that this was understandable since they are mission-oriented and involved specifically in constructing projects. Essentially, they have a very different mind-set than those who do science. Maybe the information link needs to be made between the two camps. Mr. Hunt is not suggesting dropping the updates entirely.

Dr. Kruczynski stated that when they left this meeting in January they had a direction from the steering committee to assemble the paper as to why the monitoring was important and then go to the TAC before this meeting for feedback as to ways to revise the monitoring plan. People were supposed to send descriptions of the ways the data were being used to Mr. Blackburn. This was not done because when the information came back to Steve, it wasn't what EPA wanted. He posed the question to Mr. Harvey as to what was exactly expected by EPA. Even though the data are not being used on a day to day basis, they are important for nutrient criteria, CERP impacts, etc. They have improved wastewater, etc and data are being used.

Mr. Harvey asked as to whether the current program will be satisfactory in measuring the effectiveness of the wastewater program and other changes that might occur in the future. He wants to know if there is a way to get equivalent information with challenging funding. Mr. Iglehart noted that the original intent was to collect the information as to how the data were currently being used and that would be the basis for the next discussion as to what was needed in the future as managers. They didn't get there because they didn't get past the first step. Mr. Harvey wants to know the data needs of managers and how effective are the current programs in satisfying those needs. Maybe there is a need for an expanded range of parameters or during different time frames. The mission was not really well understood by the management committee. Mr. Bergh pointed out that with the matrix, they can get started, but it needs to have some refinement as to "does serve my purpose highly, not so much, etc." so that there is some qualification.

Mr. Hunt added that for the management committee to be effective it will require multi-day face to face meetings to hash things out and that means people may have to come here to work out the details. This will not be effectively done quickly or through email. Mr. Harvey stated that agencies need to fill out the matrix and then come prepared to discuss their data needs and how well the current program addressing those needed. Ms. Bradley noted that this is somewhat of a different direction and is clear now. Hopefully, that was effectively captured and can be acted upon.

Ms. Morkill wanted to circle back around to the point that some folks think this program is done. If you read the original goals and measures in the white paper, there is a great deal that has not been addressed as Mr. Bergh also pointed out. Stormwater has not been fixed and if monitoring is not continued, they can't evaluate progress toward achieving or maintaining wastewater because that will take multiple years. It sounds as if we are trying to defend a program that some people have determined is completed when we should be saying that it is not completed. It may be that the monitoring needs to be changed. We should be asking what is needed to achieve these other bullet statements in the document. She thinks that we should articulate that we have not achieved the stated purpose yet and we could also bring in new threats.

Mr. Johnson added that he thinks they can show very good progress on determining sources of pollution sanctuary-wide. The questions as to whether the things being implemented are working well enough provides the basis for continued monitoring. Mr. Harvey asked whether the current monitoring should be modified in light of the current limited funding. He feels that they will always need to sample seagrass, water quality, etc, but questions as to

whether they need to sample so many stations quarterly. Ms. Morkill sees deciding what to fund with less money as a totally different process, different from going through the matrix and justifying why it is being done. Mr. Harvey wants to know whether the current monitoring program will measure the effectiveness of the wastewater program. It will take a while (fifteen years or so) to measure its effectiveness.

As another step in the process, Mr. Harvey wants everyone to fill out the matrix. Management committee representatives need to be prepared to discuss how well the program meets their data needs.

Mr. Hunt noted that he doesn't necessarily think that the programs are fine as they are now for the future. The programs have done a great job thus far, but they were designed for a specific purpose, which is to understand change over time over this vast ecosystem. The elements of the program that have been successful could be retained in the new regime. But, if the program isn't modified to some degree, it will not be effective in measuring changes at some of the scales related to management actions in the Keys, which is information that needs to be detected in a monitoring program. It strikes him that reexamining things and suggesting changes is part of the charge in addition to documenting the ways the data are being used.

Mr. Harvey stated that it is possible that the committee may recommend continuing the long-term programs exactly as they are for the integrity of the trends analysis process and then recommend seeking additional funds to meet critical management needs not being addressed through this prioritization.

Dr. Kruczynski added that one of the reasons that they funded the Little Venice project and designed it a certain way was to do it only once. The idea was that if you improve wastewater, you should show improvements to the canal water quality. But, they found out that was very naïve especially in that time frame and as a justification for spending millions of dollars for improvements. It will take fifteen years to implement the wastewater plan and may take longer to flush the system of residual materials.

Mr. Iglehart stated that they should look at giving this assignment to the management committee as it was articulated a few minutes ago—to review monitoring taking place and make recommendations about current monitoring, if needed. In addition, they should recommend, if needed, for additional monitoring that needs to be done to satisfy the original criteria and what is the priority for these. At the next meeting, the steering committee can focus on developing its priorities. Dr. Kruczynski, chair of the management committee, pointed out that for the most part members of the management committee members are present and have heard the discussion (Billy, John, Steven, Gus, etc).

Mr. Rios added that prioritizing the needs will require making decisions and there is a range of agencies with different interests. Before we can really come together as a management committee and make recommendations, we need to consider our priorities. Mr. Hunt noted that this will be part of the discussion and part of the recommendations to the steering committee, which they can accept, reject or modify. Mr. Rios read aloud the purpose of the WQPP, "to recommend priority corrective actions and compliance schedules addressing point and nonpoint sources of pollution to restore and maintain the chemical, physical, and biological integrity of the Sanctuary..."

Obviously, storm water and wastewater (examples of point and nonpoint sources of pollution) need to still be a priority for the future.

Ms. Walters pointed out that a thorough read of the legislative language has been good and that the word "maintain" is very important as it pertains to maintaining the integrity of the sanctuary. She works with a person who managed groups of volunteers trained to collect water quality data in the L.A. basin. They were trained better than the agency staff in some cases and became integrated completely into the TMDL program in California. Special skills are needed on the part of the coordinator to manage skilled volunteers. Here in the Keys, we haven't moved in to stormwater improvements yet, but monitoring will be associated with that effort. We might have a mechanism to have that kind of monitoring be volunteer-based. We see from the oil spill that the Keys has huge numbers of people willing to help and want to be involved in protecting the environment. This is non-expensive potential way of collecting focused data as we moved toward better BMPs.

Mr. Iglehart discussed his vision of the schedule for the next meeting. If we are not going to meet in October, but plan to wait another six months, we could have a day and half meeting with the first day beginning in the afternoon.

At that time, we can hear the wastewater updates. The next day we can focus on the issues we have been discussing. Even though the wastewater people may not attend the second day, the steering committee still needs to have those discussions. Mr. Bergh stated that one day should be enough if we keep the presentations brief because we may lose people otherwise. Mr. Iglehart explained that his idea for 1.5 days allows people to get together and start talking about what will be more thoroughly discussed the next day. Dr. Causey noted that we used to do a half day workshop to kick off the meeting. He would like everyone to hear that cleaning up the water will make a difference. As a group, each of us needs to take articles like this one and send them out to remind people that the data from the monitoring program is being used by other scientists, independently, to come up with conclusions.

Mr. Harvey thinks it would be good for the wastewater management component of the steering committee to hear that we want to implement a monitoring program to see the effectiveness of their systems at protecting the resource. If they are effective, that is great, but if they are not, then there may be something else that needs to be done. We see widespread signs of eutrophication and if we maintain the status quo, we will continue to see that eutrophication. It won't get better and they need to hear that information.

Mr. Blackburn stated that he identified 30 different scientific papers in which the data are used and that doesn't include special studies. There is a lot of research. Chris Anderson will help him identify some more papers. He will send out a restatement of his request for information on this topic for the document. People should provide a brief narrative and a website, if available. If you just send a website, he can summarize the information.

#### **XI. Public Comments**

Jon called for public comments, but there weren't any.

#### **XII. Closing Remarks / Propose Date for Next Steering Committee Meeting, Steering Committee Co-Chairs and Others**

The meeting was adjourned.