Southeast Florida Coral Reef Initiative (SEFCRI)
Land Based Sources of Pollution (LBSP)
Technical Advisory Committee (TAC)
Meeting #18
Report of Proceedings
May 9 - 10, 2013
National Coral Reef Institute
Nova Southeastern University Oceanographic Center
8000 North Ocean Drive, Dania Beach, Florida

MEETING ATTENDANCE

LBSP TAC Committee

Name	Affiliation	Day 1	Day 2
Joseph Boyer	Southeast Environmental Research Center – (FIU)	x	x
Richard Dodge	Nova Southeastern University, Oceanographic Center (NSU OC)	x	x
Phillip Dustan	College of Charleston	x	x
John Fauth	University of Central Florida (UCF)	x	x
Dale Griffin	United States Geological Survey (USGS)	call in	call in
Piero Gardinali	Florida International University (FIU)	x	x
Vladimir Kosmynin	Florida Department of Environmental		call in
Judy Lang	Atlantic and Gulf Rapid Reef Assessment (AGRRA)	x	x
Brian Lapointe	Harbor Branch Oceanographic Institution	x	x
Erin Lipp	University of Georgia		
Margaret Miller	NOAA NMFS	x	x
Valerie Paul	Smithsonian Marine Station at Fort Pierce		
Esther Peters	George Mason University	call in	call in
Gene Shinn	University of South Florida (USF)	x	x
Alexander Soloviev	Nova Southeastern University, Oceanographic Center (NSU OC)		
Peter Swart	University of Miami, RSMAS		

LBSP TAC Organizational Committee

Name	Affiliation	Day 1	Day 2
Ken Banks	Broward County EPGMD	x	x
Nancy Craig	Broward County EPGMD	x	x
James Byrne	The Nature Conservancy (TNC)		x
Richard Harvey	Environmental Protection Agency		

Cheryl Miller	Coastal-Eco Group	x	x
Joanna Walczak	FDEP Coral Reef Conservation Program	x	x
Jamie Monty	FDEP CRCP	x	x
Katharine Tzadik	FDEP CRCP	x	x
Wendy Wood-Derrer	Nova Southeastern University, Oceanographic		

Additional Presenters and Observers

Name	**Affiliation**	**Day 1**	**Day 2**
Lauren Waters	FDEP CRCP	x	x
Jeff Beal	Florida Fish and Wildlife Conservation	x	x
Kurtis Gregg	NOAA NMFS	x	x
Karen Bohnsack	FDEP CRCP	x	x
Dan Clark	Cry of the Water	x	
Stephanie Clark	Cry of the Water	x	
Doug Seba	Academy of Marine Sciences	x	x
Kevin Carter	South Florida Water Management District	x	
Jack Stamatas	NOAA AOML	x	x
Brian Walker	NSUOC NCRI	x	x
Tanya Tweeton	Sierra Club	x	
Terri Jordan-Sellers	Army Corps of Engineers		call in
Mauricio López Padierna	NSUOC NCRI	x	x
Josh Solomon	UCF	x	x
Jessica Hearns	UCF	x	x

MEETING SUMMARY - DAY ONE: THURSDAY, MAY 9TH 2012 (MORNING)

Meeting Guidelines

Katharine Tzadik, Land Based Sources of Pollution (LBSP) coordinator for FDEP-CRCP, welcomed all in attendance to the 17th LBSP Technical Advisory Committee (TAC) meeting, reviewed meeting participation guidelines for TAC members and observers, which included the facilitator role, guidelines for discussion, consensus rules, comment card procedures, and the use of meeting evaluation forms. Katharine then reviewed the day's agenda.

Katharine Tzadik mentioned changes to the SEFCRI Charter and other recent changes that are part of the transition to a stakeholder driven process. One of the objectives of the meeting is to wrap up some of the Local Action Strategy Projects (LAS) that were begun in 2004.

The focus of this meeting is to evaluate these projects, determine if they met the original objectives and if there are any data gaps or new questions that have arisen.

-*(Joe Boyer) Can you talk about the Broward numeric nutrient criteria?*
-*(Katharine Tzadik)* A meeting was held on April 15 to inform the public of the decisions made on the numeric nutrient criteria for coastal waters and estuaries.
-*(Kevin Carter)* The Department had previously passed rules on other estuaries in the State (Biscayne, Florida Bay and Charlotte Harbor). Now there is an effort to update the remaining estuaries and coastal waters. They will be using the EPA's methods of remote sensing using chlorophyll.
-*(Katharine Tzadik)* Broward County published a letter with comments on the new proposals, which I would like you to look at.
-*(Kevin Carter)* The rules next meeting will be in June, so if you have any feedback I'm sure they would receive it.
-*(Phil Dustan) What will be the frequency of monitoring?*
-*(Kevin Carter)* I believe it will be annual average, that's what they do for inland waters.
-*(Joe Boyer) There may be issues with color and bottom reflection if you're using satellite images to detect chlorophyll.*
-*(Phil Dustan) There are very powerful tools depending on how they are used, especially if you include spatial analysis.*
-*(Joe Boyer) They have proposed zones. The biggest problem we saw was the data was very limited from groundtruthing. We suggested they use all the monitoring data we have produced. Their regression models were not good. It's being done because it's cheap, but there doesn't seem to be an actual plan on how to use this data later on.*
-*(Kevin Carter)* The Department of Environmental Protection just passed an implementation for inland waters, including estuaries.
-*(Katharine Tzadik)* This data will only be used in the interim, while better protocols are developed.

-*(Phil Dustan)* There is a lot of information from MODIS, there's so much more to look at rather than just chlorophyll.

Southeast Florida Coral Reef Initiative (SEFCRI) Updates - *Katharine Tzadik, FDEP CRCP*

SEFCRI Team:

- Recommitment from team members
  - Charter revision: mission statement modified.
  - Finalized member list. Covers 9 areas:
    - Fishing, Diving, Private Business, NGO, Academia, State/Local/Federal Agencies and Other.
  - SEFCRI team divided in 4 areas: eliminated "navigators" and made them vice chairs. 9 of them now. Just started a few months ago.
  - Clearly defined roles and participation guidelines for SEFCRI Team Members, project team members, project advisors (including members of a TAC) and alternates.
  - Annual SEFCRI meetings hopefully will be able to overlap TAC and SEFCRI meetings one day.
  - Focus teams were combined. Not getting rid of focus areas to allow for better interaction across team.
  - SEFCRI has requested that TAC expand from just LBSP.
- Stakeholder driven process
  - We want to come up with management actions for the future.
  - No more MOIP. Launching "Our Florida Reefs, Your Voice, Our Future."
- 4 step community process
  1. Community meetings (Process).
  2. Community working groups.
  3. Community meetings (Recommendations).
  4. Support the implementation.
- Community meetings
  - Several dates in June in throughout the four county area to try to start getting people involved.
- SEFRCI TAC
  - Main request is to expand focus from only LBSP. e.g. "Our Reefs" process.
  - More actionable items from TAC.
  - Vice chairs have chosen what areas of expertise will be covered.
  - Decided that SEFCRI team members can be on TAC.
  - Membership will be limited to 10-20 people.
  - How do we populate a new TAC?
    - Starting from scratch.
    - We encourage current TAC to reapply.
- TAC member requirements (similar to SEFCRI)
  - Attending over 50% of meetings.
  - Respond to majority of SEFCRI TAC correspondence.
  - Advise SEFCRI Team on new LAS projects.

- Act as a scientific advisory body providing technical assistance during the OFR Stakeholder Working Groups meetings.
- Review outcomes from the SEFCRI OFR Stakeholder Working Groups to ensure recommendations address regional coral reef resource issues and adhere to pre-defined criteria; evaluate recommendations for their scientific merit.
- Assess data from SEFCRI LAS projects and outside collaborations.
- Characterize the condition of the coral reef ecosystem.
- Identify data gaps and ways to address them, including available funding.
- Provide recommendations to the SEFCRI Team on scientific needs. Communicate with the SEFCRI Team on new methods and technologies, and other relevant information.

Questions and comments

-*(Joe Boyer) Glad to see that community meetings come first.*

-*(Jamie Monty)* I invite you all to come in June because that is when the meetings will be held.

-*(Katharine Tzadik)* We have been giving presentations and putting the word out there.

-*(Judy Lang)* How are you putting the word out?

-*(Jamie Monty)* We hired a communications contractor, so we're doing web, radio, email, etc. We will be launching the campaign May 15th. For now it's just SEFCRI and TAC, but we want to include dive clubs, fishing clubs, dive shops.

-*(Judy Lang)* How do we get people on the list? Contact Christopher?

-*(Joe Boyer)* Have you talked to Mary Ted in the Keys? Their meetings didn't have a very high attendance. How are you going to do it?

-*(Jamie Monty)* Joanna is heavily involved in both the DEP Coral Program and the program in the Keys. Our staff attended the meeting in the Sanctuary to try and see what they have been doing.

-*(Joe Boyer)* Seems you have better penetration in the community.

-*(Jamie Monty)* We have looked at what other places have done and learned a lot from other projects. We're trying to really convince people to participate and let the public know that they have a voice in making the recommendations.

-*(John Fauth)* Have you looked at holding meetings at places further up the watershed i.e. Orlando? They are still part of the watershed, just not the four county area and these people could benefit from the information.

-*(Jamie Monty)* We haven't put too much thought into it. I don't think it will necessarily be worth it, but we will listen to recommendations.

-*(Katharine Tzadik)* If this comes up in the recommendations from our meetings, we will definitely consider it.

-*(Brian Lapointe)* There might be a good opportunity when DEMA meets in Orlando.

-*(Phil Dustan)* There's a big Marine Aquarium Council (MAC) meeting in Miami in June or July. This is a meeting for aquarists and hobbyists, which is a large area of interest down here.

-*(Josh (student))* The Marine Aquarium Conference of North America is meeting in Miami in September.

-(*Katharine Tzadik)* Hopefully some of you can attend our meetings.

-*(Joe Boyer) How often are the stakeholder meetings going to take place?*
-*(Jamie Monty)* There will be multiple groups, although we are still trying to determine that. We are trying to define how many groups we will have. We have to educate about our decision support tools. We are planning a year long process, with potentially a meeting once a month for a year. But, studies say you can only hold member's attention for 6 months, so it will depend on the groups. We think the longest will be up to a year. All TAC members will not have to go to all meetings, but they might be called upon if their expertise is required.
-*(Katharine Tzadik)* Also TAC should provide guidance on the feasibility of the recommendations so that they are viable.
-*(Judy Lang)* What happens when recommendations are found lacking?
-*(Jamie Monty*) It's an iterative process so we would go back and forth in order to help refine the recommendations so that they become actionable. There will be three main bodies involved: the actual working groups that come up with recommendations, the TAC who reviews them and the process planning team that will see if these recommendations are an action or enforceable.
-*(Joe Boyer) So the TAC doesn't feedback to group?*
-*(Jamie Monty)* Yes, or it can go through SEFCRI project leaders, there's flexibility for both to happen.
-*(Phil Dustan)* There's a huge disconnect between scientists and people. I like the idea of bringing them together. Are you going to support travel? It would be an important question to deal with if you expect our commitment to the TAC.
-*(Jamie Monty)* I understand, we can work on it if necessary, but it would be on a case by case basis.
-*(Phil Dustan)* One of the big problems at government level is that scientists have not been allowed to sit in on the Coral Reef Task Force, they've been relegated to the educational group. So the process has been highly politicized and the scientists didn't have a chance to review some of the recommendations. This kind of setup seems to alleviate that.
-*(Jamie Monty*) Yes that's one of our goals. SEFCRI has tried to include every stakeholder group.
-*(Margaret Miller) [Regarding the TAC formation process] You are going to put out a list of the areas of expertise that have been deemed necessary and then people can apply to them?*
-*(Ken Banks)* Applicants should not be restricted to one area. If you have several areas of expertise list all.
-*(Judy Lang)* There could just be an "other areas of expertise" option.
-*(Katharine Tzadik)* Application has not been finalized, but you will be able to write in other options.
-*(Brian Lapointe) When is it coming out?*
-*(Katharine Tzadik)* Soon. End of May hopefully.
-*(Dana Wusinich-Mendez) Who are the Vice chairs?*
-*(Lauren Waters)* Cheryll Miller (Private Business), Ken Banks (Local Agency Representative), Dave Gilliam (Academic), Frank Schmidt (Fishing), Jeff Trode (Diving), James Byrne (NGO), Erin McDevitt (State), Jocelyn Karaszia (Federal), Becky Hope (Citizens at large).

SEFCRI Local Action Strategy (LAS) Overview – *Lauren Waters, FDEP CRCP*

- **Three Breakout Sessions**
  - 1. Review and prioritize recommendations.
  - 2. Suggest Future non-LBSP LAS.
  - 3. Synthesis and Clarification of recommendations.
- **PAST of LAS**
  - Developed in 2004 focused on 4 key threats to Florida Reefs.
  - 140 projects. Took approx. 8 years to complete most of them, some are ongoing.
  - TAC is an LBSP LAS.
- **Present**
  - FDOU Project 26: Organize and hold public workshops to obtain input and goals. This is a priority for SEFCRI and CRCP.
- **Future**
  - Lessons learned
    - Fewer projects (to allow for more flexibility) some projects lose relevance when they get extended too long.
    - Shorter time periods (helps with management).
    - Projects must have well defined and tangible outcomes. This is what led to much merging and splitting of projects.
    - Be more explicit with goals and expected outcomes.
      - e.g. MICCI deliverables were future recommendations. Other projects were more research driven; there were not as many recommendations, just data.
  - **Things to consider for future LAS**
    - Fit priorities within 1 or more guidance documents.
    - Address needs of Our Florida Reefs process.
    - Ability to incorporate Our Florida Reef process outcomes.
  - **Goals**
    - 1. To prioritize completed project recommendations
    - 2. Provide new recommendations to SEFCRI team for the next LAS
    - 3. Clarify both the prioritized recommendations and the new recommendations

Questions and comments

-*(Phil Dustan) How many of those projects actually collected scientific data? Which ones really generated knowledge?*

-*(Lauren Waters)* There's a summary in the booklet.

-*(Margaret Miller)* They were a minority. It's a management program. So it wasn't necessarily a goal.

-*(Ken Banks)* It's commendable there's any science. The funding was never intended for it.

-*(Jamie Monty) I wouldn't downplay the role of outreach.*

-*(Phil Dustan) It's important to know what's actually going on so we can address the issues and change attitudes accordingly.*

-*(Judy Lang)* It's also important to learn about the permitting processes.

SEFCRI Local Action Strategy (LAS) Break Out Group Report 1

Group 1 (Richard Dodge, Gene Shinn, Nancy Craig and Phil Dustan)

- **MICCI** (Maritime Industry & Coastal Construction)
  - Ecosystem based monitoring
  - Numerical models for nutrients and sediment loading
  - Identify stress thresholds
  - Improved permitting
  - Demonstrate success of restoration before you start
  - Long term monitoring
  - Define/Quantify effectiveness of mitigation
  - Hypothesis driven mitigation
- **AA** (Awareness & Appreciation)
  - Target kids
  - Use modern advertising techniques
  - Hire professionals
- **FDOU** (Fishing, Diving & Other Uses)
  - Establish an MPA Southeast Florida
  - Emphasize land-sea link
  - Climate change
  - Eliminate local stressors i.e. don't make it worse
- **LBSP**
  - Additional research needed
  - Review and apply numerical models
  - Specific pollutant load targets like TMDL
  - Improve waste and storm water treatment
  - Education

Group 2 (Judy Lang, Margaret Miller, John Fauth, Jack Stamates)

- **MICCI**
  - Interagency development of SOP's for hypothesis, design and baseline planning
  - Hire people to review project reports
  - Appropriate targets and timelines
  - Demonstrated project review, including mitigation
  - Data standardization and integration
  - Make data available, including non-permit required databases.
  - Integrated ecosystem assessment models

-*(Jack Stamates)* Chris Kelble at his lab has been doing a lot of work on integrated ecosystem assessment models. These could possibly be used as SOP's.
-*(Judy Lang)* John also suggested a way to bring in data from various databases without having to redesign them.

- **FDOU**
  - Fishing size limits must allow sustainability
  - Mooring balls for dive boats

- Outreach education not just to recreational anglers, but other users; and address multiple stressors
- Encourage sustainable tourism
- Increase efficiency of boats used in diving industry
- Increasing mass transport, e.g. metro rail to ports

o **AA**
- Better targeted messaging; use professionals
- Include underrepresented communities (not just Hispanics)
- Teach about watershed concept. eg. Chesapeake watershed or others are well labeled, brings it into consciousness. Constantly remind people that the land is connected to the ocean.

o **LBSP**
- not discussed

Group 3 (Joe Boyer, Ken Banks, Brian Lapointe, Piero Gardinali)

o **AA**
- Broad approach, including multiple target audiences
- Important to address kids
- Include Caribbean and Latin communities

o **FDOU**
- Combine with AA as part of education campaign
- There's overlap with several groups so we can consolidate

o **MICCI and LBSP**
- Not discussed

Questions and comments Breakout Session 1:

-*(Phil Dustan)* We need a slogan or a unifying theme, in the Bahamas they had "Imagine the Bahamas without grouper." Could be used in Florida. "Don't be the one to take the last fish." (Hire professionals to come up with new slogans).

-*(Katharine Tzadik)* We have been working on this; one example is "What's missing in Our Florida reefs? You"

-*(Cheryl Miller)* We saw several good recommendations for MICC, but we couldn't really come up with how to make it a project.

- *(Jamie Monty)* It's important for you to mention these things even if we can't exemplify them. Because then we can take it to the proper authorities and discuss it.

SEFCRI Local Action Strategy (LAS) Break Out Group Report 2 – Lauren Waters

Lauren explains that the purpose of the breakout session is to actually make some recommendations identified in the previous session into projects, or new recommendations that could add to the project list.

Group 1 (Richard Dodge, Gene Shinn, Phil Dustan, Nancy Craig)

o **Groundwater seepage:** It's been talked about for 10 years. Original idea was to dig wells, the USGS can do it. They have put wells in about 90 feet of water. The idea is to track the water coming from land into the ocean. Microbes are a good indicator in the Keys. It's almost certain that it's going on, it just has not necessarily been proven or measured.

- **Political will and education of the masses**
- **MPA:** we already have the State Park, extend it from 400 ft to 2 miles to include the third reef. It's already a no anchor zone. Continue to allow fishing from the piers. Implement for 5 years see how it works, if it's successful continue.
- **Mitigation:** Study the different mitigation methods to see which the most effective methods are. The mitigation method should replicate the services and functions of the originally injured habitat.
- **Tracers and indices.** Find better tracers for stressors. Microfibers are a new indicator being developed in the UK recently. Specifically, fleece which is found in washing machines.

-(Phil Dustan) We have found the microfibers in the gills of oysters in Charleston. They are easy to see, we have found them in plankton. They are made up of fine PET fibers used to make fleece. Cotton garments don't produce these. PET is also used in bottles and they break down in the ocean, but they are different because they are generated by oceanic break down. You can see them with fluorescence microscopy.
-*(Margaret Miller) Can you distinguish them from other plastic particles?*
-*(Phil Dustan)* We are developing methods to track these in the lab. They are also a substrate for pollutants and bacteria.
-*(Brian Lapointe)* How about septic tanks?
-*(Phil Dustan)* They don't seem to leave septic tanks.
-*(Richard Dodge)* We are proposing a pilot project to see if we can find them and then maybe implement a larger scale effort later.
-*(Phil Dustan)* We could put a plankton net around outfalls and measure it there.

- **Mapping**. It is important because no one would have known we have reefs here in Broward. DEP is increasing minimum mapping units for inshore environments; we propose to increase it offshore also so we can continue to gain further knowledge about the reefs here.
- **Reef valuation.** The numbers we have are 13 years old now. We think we should take a look at that again to update those numbers.

-*(Joe Boyer) I thought that was being done.*
-*(Jamie Monty)* It was planned, unfortunately it didn't get funded.

- **Education and outreach.** We must get everybody involved.

-*(Gene Shinn*) That's a tricky subject because large corporations can always outspend us.

Group 2 (Judy Lang, Margaret Miller, John Fauth, Students, Jack Stamates)

- **MICCI**
    - Synthesize previous mitigation studies to document their effectiveness. Data is widely available. Determine which might be the best methods and clearly define success criteria.
    - Research is needed to determine mitigation success. A literature review would not suffice. A gap filling project to finish would be necessary.
    - Request research to determine a comprehensive method to look at water quality since we know the NTU standard is not good enough.

-*(Margaret Miller)* We need to show which functions we're trying to replace and criteria on how to show if this was achieved.

-*(Jack Stamatas)* NTU standards are often combined with mixing radius or other data. The concepts of up current and down current can be confusing in the area because of the stratified water column.

- **FDOU**
    - There is a deficiency on quantifying the impact of spear fishing as well as other fishing activities and multiple stressors.
    - Marine spatial zoning including no take zones.

- *(Phil Dustan)* How about lionfish? Maybe study the population effect of spearfishing on the lionfish.

-*(Katharine Tzadik)* USF is doing a study that may address those questions.

- **AA**
    - Embrace social media to reach the young
    - TV, radio, pamphlets not being effective
    - Consult with professionals
    - Culturally effective educational outreach strategies
    - The Hispanic population needs to be talked to face to face; current efforts don't address that
    - The majority of the population isn't getting the message either
    - Be positive, we're all in it together
    - Try not to get everybody too discouraged
    - Don't blame it on some other group; everybody needs to work together
    - Remember the people affecting the reefs upstream; have signage "you're entering such and such watershed"

-*(Jack Stamatas) Is there a suggested lesson plan for teachers?*

-*(Lauren Waters)* Yes we have that. Christopher does teacher training for it and he is in charge of it.

-*(Katharine Tzadik)* He also has handouts for each grade.

-*(Jamie Monty)* The courses are linked to Sunshine Standards so they can incorporate it into their classes.

-*(Judy Lang) Are they offered inland too?*

-*(Lauren Waters)* When we have offered the courses they max out every time. It's mainly focused on coastal counties right now.

Group 3 (Joe Boyer, Ken Banks, Brian Lapointe, Cheryl Miller)

- **MICCI plus LBSP.** Management need for reevaluating the state turbidity targets.
    - Lots of work required to get through all steps to get to this.
    - Different standards depending where you are?
    - How are NTU's related to sedimentation?

-*(Phil Dustan) This is part of the optical qualities of the water. Should we be looking at something else?*

-*(Joe Boyer)* NTU's are a proxy for matter.

-*(Gene Shinn)* Hasn't anybody done this before?

-*(Cheryl Miller)* Not since the 80's; we refer to the same papers all the time.

-*(Joe Boyer) Is there seasonality, what are the sensitivity ranges?*

-*(Jack Stamates)* It would be good to include colorimetric standards or mixing ratios in addition to NTU's.
-*(Joe Boyer)* There are differences depending on what causes the turbidity. A siliciclastic turbidity is different from a carbonate one.

- **MICCI and LBSP project 2**
    - Natural variability of environment
    - Sedimentation and community structure
    - Look at design issues.
    - Improve monitoring designs.

TAC Inlet and Outfall Field Work Discussion – *Karen Bohnsack/Katharine Tzadik, FDEP CRCP*

Katharine Tzadik introduces the project and the motivation for it.

1. *(Katharine Tzadik)* This is the result from the previous TAC meeting when it was suggested to start a project to look at pollution from the inlets and outfalls. We have some funding, so we need to work on something quickly. We don't have resources for diving, but we do have funding for test kits and other parts of the project. Ken Banks has offered the Broward County boat for one or two days. You have an outline in your handouts. We would like to make some specific decisions today, especially on sampling design. Dale Griffin (teleconference) can talk about sample analysis. Karen will talk about goals. John Fauth will talk about the sampling design.
2. *(Karen Bohnsack)* We want to discuss the project and start defining things. We have a proposal, but we need to flesh it out. We have it separated into various categories. John and Dale will give an overview of what they've come up with so far.
3. (*John Fauth* describes the project objectives and sampling method) The question we are addressing is: the impacts of the port and outfalls and look at the extent of the impact. We have previously only looked at close and far from the port, but we have not looked at what's in the middle. I have produced some models using placeholder data for an exponential decay model. We thought of at least 6 sites with 3 replicates increasingly further away from source. (0, 25, 50, 100, 500, 1500 m). This comes from what Jack and others have told us about dilution rates that would be back to background levels at 1 km on the surface.
    -*(Jack Stamates)* Yes, that would be at the surface.
4. *(John Fauth)* We suggest sampling further out so that we can make sure we are past the "dilution" point. The current sampling effort has been done with many sites close to the source and many sites far from the source, a second option would be to distribute an even number of sites along the gradient, but the best method seems to be a hybrid with more points near and far, with a few in between.
    -*(Gene Shinn)* Can you see the plume at 1500m?
    -*(Jack Stamates)* Depends on the day. We have done dye studies recently and it is very variable. The winds and the waves and the currents all have an effect.

5. *(John Fauth)* We will try to collect data from corals and sponges to see if they are bioaccumulating. This should eliminate the issues with where the plume goes, we should be able to see the average effect.
6. *(Brian Lapointe)* What depths are you talking about?
   -*(John Fauth)* 15-17 m along the 3rd reef.
   -*(Brian Lapointe)* Our study of macro algae in north Broward outfall seemed to show that the plume always goes to the surface then starts moving south. We saw the strongest effect in the shallower reefs.
   -*(John Fauth)* We've seen a signal in the 3rd reef, but not at the 2nd. So data seems to indicate that there's something going on outside too.
   -*(Brian Lapointe)* Have you looked at shallow reefs too?
   -*(John Fauth)* Only the 2nd reef; historically they have done better.
7. *(Phil Dustan)* You have a lot of points why not put more samples between 250 and 1000m. Data is too sparse.
   -*(John Fauth)* Since we don't know the pattern, it's hard to choose the sites.
   -*(Phil Dustan)* You should try to get more samples in the middle; there should be more variability in there. Further out you have a lower probability of detecting it.
   -*(Dale Griffin)* We want to take as many samples as possible near the source to show the effect. If we spread points out, we might reduce the probability of catching the signal. Instead of taking out sites, maybe increase by including a 10m sample or something.
   -*(John Fauth)* 0 m is not on the outfall it's the closest on the reef.
   -*(Gene Shinn)* When you're close it goes straight to the surface right? Because it's fresh water
   -*(Brian Lapointe)* I've seen a stratified water column when it might stay at the bottom.
   -*(Joe Boyer)* Maybe you shouldn't concentrate on water. We could do a grid around the source and concentrate on the tissue. Organisms can be sampled at any time. A grid might be a better approach instead of a transect.
   -(Katharine Tzadik, Ken Banks) The bottleneck is the boat.
8. *(Judy Lang*) What's the goal?
   -*(John Fauth)* What's the zone of influence of the source on coral tissue and sponge tissue?
   -*(Nancy Craig)* Too broad. What exactly are you trying to answer?
   -*(Ken Banks)* It's a recon project first. We are trying to see if we can detect a signal.
9. *(Gene Shinn)* Are you including fish?
   -*(John Fauth)* It depends on the expertise available. Dale uses human enteric viruses, which have been proven to be reliable.
   -*(Gene Shinn)* I couldn't see a difference in fish composition at the Miami outfall during my observations.
10. *(Jack Stamates)* Microbial indicators are also present at the inlet not just at the outfalls.
    -*(Dale Griffin)* They are produced at both sites, but you can definitely tell where they're coming from. There are clear concentration gradients away from each source. There are other sources and other indicators like birds on the beach, etc.

but what we see from our indicators is pretty clear. We did, water and sediment pore water.
-*(John Fauth)* You also did tissue?
-*(Dale Griffin)* We did sponge tissue and coral mucus.

11. *(Katharine Tzadik)* Dale, could you describe the samples and what we're testing?
-*Dale Griffin* describes the tests he would like to carry out on water samples and extracts from sponge tissue. AMES test assays based on genetically modified bacteria setup in a 96 well plate. This gives a good number of replicates. Two tests: one looks at toxicity and the other at genotoxicity. If there's funding he would like do mutagenicity.
-*(Katharine Tzadik)* The goal is to assess the toxicity around these two sources in reef environments? And if there's a threat to reef organisms from this toxicity?
-*(Dale Griffin)* Yes the primary goals are first level responders, not macroscale organisms. Can we detect any degree of toxicity emanating from these two sources? There might be other effects that you might not detect visually.
-*(Joe Boyer)* The AMES test is designed for fresh water right? Would this be an issue?
-*(Dale Griffin)* It uses modified *Salmonella* and *E. coli*. We have seen these in the Keys and the Marquesas.
-*(Joe Boyer)* Didn't they suggest Vibrio?
-*(Dale Griffin)* They were saying that those organisms die off quickly so that made them good indicators, but we have shown it's not true. So they might not be that great indicators. I don't think the AMES test should be a problem in seawater.
12. (Katharine Tzadik) Any questions?
13. *(Judy Lang)* There seems to be two questions? 1) Is there an effect? 2) What is the extent of the effect? Wouldn't we need a very large sample size to look at extent?
-*(John Fauth)* I have done a power analysis using a skeleton test. If we have a signal-to-noise ratio greater than 4, we should be able to detect the signal. These values are using 18 sites.
-*(Phil Dustan)* So you want to be 1500m away as your end point?
-*(John Fauth)* Yes, because that's the opinion that the effect goes to background level at 1000m. Sample size I think is correct. What we need to decide is where to put the sample sites or if we should do a grid and to think about if 1500m is far enough or should we extend that?
-*(Judy Lang)* So you said that samples in the 2nd reef show less of a response? Where were Dale's samples collected from?
-*(Dale Griffin)* Yes they are close to the Port outside the inlet, PE2 on the second reef and then HWO3.
14. *(Gene Shinn)* What if you do see a gradient in microbes, but there's no physical or biological impact?
-*(Ken Banks)* I think if we could see it we would be studying it. I don't think we have seen anything obvious yet, that is why we are trying this.
-*(Dale Griffin)* Yes we're trying to assess an effect at a level of organism that tends to respond to any type of impact.
-*(Ken Banks)* By the time you're at a visible scale effect, it might be too late; you will be watching everything die at that point.

-*(Phil Dustan)* It is wasteland around the outfalls. Things are dead in that area.
-*(Gene Shinn)* I didn't see any effect at the Miami outfall. There's more fish there than anywhere else. The bottom didn't look different than other sites.
-*(Phil Dustan)* You couldn't see anything that was different on the bottom or anything?
-*(Ken Banks)* The cover is so patchy it's hard to determine if the variability is due to the outfall or just the natural variability in the area.
-*(Phil Dustan)* There were no large corals in the area. It's very loose substrate.
-*(John Fauth)* I always thought we would include other biological parameters not just microbe assays. Maybe we should look at richness rather than abundance, it seems to be a better indication of effect.
-*(Judy Lang)* Size distribution is another. If we are just doing species list, it would be good to include people who can identify sponges and octocorals.

15. (*Katharine Tzadik*) We haven't decided what type of transect (sampling method) we want to use.
-*(Jack Stamates)* Looking at data from our current meters at the outfall and at 7m depth, I have seen that when its north flow there is a distinct gradient, but when there's a south flow it seems to be more uniform across the coastline.
-*(Brian Lapointe)* What are your constraints for putting people 90 ft. or deeper?
-*(Ken Banks)* I wouldn't put other people in at those depths, we can put Broward county people in, but not others.
-*(John Fauth)* We had always talked about working on the reef not directly at the outfall.
16. *(Piero Gardinali)* Last year we ran pharmaceutical samples and there's a big difference between the outfall and the boil (water at the surface). Dilution is very quick.
    -*(John Fauth)* That's dilution, but we want to look at bioaccumulation.
    -*(Katharine Tzadik)* So the question is: Is there really bioaccumulation on the reef??
    -*(John Fauth*) Yes, and can we detect it?
    -*(Joe Boyer)* This is a fishing expedition, therefore a grid spatial statistics model should be able to detect the pattern better than a transect.
    -*(Brian Lapointe*): We have seen that with the isotope accumulation how they are accumulated through time.
    -*(Gene Shinn)*: Any fisherman should be able to tell you which way the plume goes.
    -*(Brian Lapointe)* The plume changes.
    -*(Jack Stamates)* At the surface there seems to be a lot of wind and wave effects. They seem to follow the direction of the reef tract, not just north-south.
17. *(Piero Gardinali)* What are we measuring for accumulation?
-*(Dale Griffin)* Corals and sponges do accumulate the organisms we're looking for. They accumulate on the coral mucus, and in sponges, as filter feeders, they also accumulate.
-*(John Fauth)* Are your data presence-absence?

-*(Dale Griffin)* No they're quantitative. It depends on method. PCR is not quantitative, but other studies can be done. We have done other indicator work where we can culture organisms and that is quantitative.

18. *(Joe Boyer)* What's the age of coral mucus? Wondering how long a period this would be integrating?
    -*(Dale Griffin)* Not sure, but it would be an interesting thing to see which ones attract the most organisms. Even if it's only a short period, effective accumulation from contact is still interesting.
    -*(Judy Lang)* Which one is better, coral or sponge?
    -*(Dale Griffin)* We haven't really compared. The tests show colorimetric changes so we can detect small changes in toxicity. We have done it with sponges and some of them produce their own pigments that interfere with tests.
    -*(Judy Lang)* I assume that different sponges will bioaccumulate differently.
    -*(Dale Griffin)* That's probably true, we would need to use lighter or tan sponges or look at something else. We want to use the same species at all sites.
    - *(Dale Griffin)* We have looked at charge accumulation in corals, so anything with a charge sticks. I assume that sponges would be better because they're actively filtering.
19. *(Katharine Tzadik)* So we're leaning more towards a grid method?
    -*(John Fauth)* It's the difference between a 1 dimensional study or a 2 dimensional representation.
    -*(Judy Lang)* That's why I was asking if one was better than the other, if we could drop one, then maybe we could do more samples.
    -*(Dale Griffin)* Remember that the goal is to demonstrate that there is an effect, if it is present. Therefore the more samples we can take close, the better.
    -*(Phil Dustan)* Haven't you already proven some of the effects with your previous studies with Erin?
    -*(Dale Griffin)* Yes, we have showed that at the mouth of the Port with a nice gradient. We also detected culturable organisms in the water at the boil. With PCR we found some of the viruses at HWO3.
    -*(Phil Dustan)* So we know they're there?
    -*(Dale Griffin)* Yes, we know they're there and associated to sewage. We might not be able to see the effects like Gene Shinn has mentioned, but I guarantee that it's not healthy to drink the water coming from those boils. This is important because we can correlate the presence of these organisms with health concerns.
    -*(Gene Shinn)* We could look at the fish and see if they're accumulating in them.
    -*(Esther Peters)* You have already demonstrated that these organisms are associated with the outfalls or waste water, and now you want to see if there are toxic compounds associated to this?
    -*(Dale Griffin)* Correct, we are not trying to identify what's there. We want to detect toxicity.
    -*(Esther Peters)* I would concentrate on sponges because they're actively pumping. When I did the coral disease surveys for the EPA we had planned to do chemical contaminant analysis on sponges, but it fell through. We were using them as surrogates for coral tissue or semi-permeable membranes. They may be

taking up organisms/contaminants that might not be toxic to them, but they might be toxic to other organisms.
-*(Dale Griffin)* We will also look at the water column so we can show bioaccumulation if it's in the water, but not in sponges or vice versa.
-*(Esther Peters)* Everything is connected so even if it doesn't affect the organism it might have an effect on other organisms.
-(Dale Griffin) Yes.

20. *(Piero Gardinali)* What happens when you do a sponge extract at a pristine site and run an AMES test? If you detect toxicity how do you know it's not just the sponge?
-*(Dale Griffin)* Every test would come back positive and that points to a problem in the sample.
-*(Margaret Miller)* With sponges it's hard to get the same species consistently.
-*(Judy Lang)* You need to find sponges that don't have a lot of chemical defenses.
-*(John Fauth)* We also need something that is at all depths too. Running the numbers on a 3x6 assuming we are sampling all the reef lines and 6 points north and south with duplicates at each site we would have more power for the test.
21. *(John Fauth)* Can we get to that many sites in two days?
22. *(Jamie Monty)* Benthic samples?
-*(EstherPeters)* Maybe adding other benthic samples would be too much.
23. *(Brian Lapointe)* The grid would have to encompass both sources the outfall as well as the inlet. Unless you just want to focus on one outfall at a time?
-*(Katharine Tzadik)* That's probably the way to go because of logistics and budgeting.
-*(Ken Banks)* There might be interactions between the sources anyway.
-*(Esther Peters*) I would recommend asking Joe Lopez to send some samples to Dale so we can start looking at some sponge candidates.
-*(Katharine Tzadik)* Didn't Richard Dodge say that the inlet sometimes sucks in some of the outfall plume?
-*(Jack Stamates)* It's certainly possible. There's definitely an interaction. Which could really confound results if we put both sources in the grid.
24. *(Brian Lapointe)* So now what's the scale of the grid?
-*(Jack Stamates)* We rarely see tracers or dyes further than 1000m.
-*(Judy Lang)* That scale also keeps us away from the inlets.
-*(John Fauth)* Where do the six sites go?
-*(Ken Banks)* Do you want to go all the way into the nearshore? Would you be able to find something there?
-*(John Fauth)* 2 by 9 might be better. What are the distances between the sites? The other problem might be that with the grid we lose some of the close sites that Dale wanted. We would have each site in duplicate only.
25. *(Piero Gardinali)* Is there a reason for an even split of North vs South?
-*(Karen Bohnsack)* If we only do the outfall, does the budget allow for more sites?
-*(Katharine Tzadik)* That's true, we had planned for the outfall and the inlet.
26. *(John Fauth)* So what's the number of samples?
-*(Dale Griffin)* I had 12 locations for each site.

-*(Margaret Miller)* Are we getting some benthic data in addition? This might also affect where you put the sample points.
-(*Katharine Tzadik)* Yes, we were planning to do benthic sampling also.
-*(John Fauth)* We have adaptive sampling methods. It's better to have data than to worry too much about exactly where the sample is taken.
-*(Katharine Tzadik)* Margaret you mentioned that the benthic sampling might impact the sampling design?
-*(Margaret Miller)* Yes, what methods would we use? A photo transect, or quadrats? That might affect how you lay out the points.
-*(Judy Lang)* How good are the habitat maps for those areas?
-*(Ken Banks)* The maps just tell you where the hard bottom is, but nothing about the community. Then we have data from 25 sites throughout the County where we have some more biological data.
-*(Joe Boyer)* It doesn't have to be a regular grid. We could just go get some sponges to see what's there, and get some idea of distribution and abundance of the sponges so we can build off of that.
-*(Joe Boyer)* So how many samples do you need?
-*(John Fauth)* Seems like we have enough for 72 samples.
-*(Joe Boyer)* Let's map it and see what it looks like.
-*(Phil Dustan)* What do you envision for benthic studies, video transects?
-*(Joe Boyer)* None of that, just dive down find a sponge, take it. Then you can use that data to decide what to do next.
-*(Phil Dustan)* At least some photographs of the area?
-*(John Fauth)* There are some ecological assessments that we could do pretty quickly which would be worthwhile to get at the same time.

27. *(Phil Dustan)* Can we sample for heavy metals? I just looked it up. Can we look for microfibers, heavy metals?
-*(Piero Gardinali)* I can run pharmaceuticals and heavy metals in the lab. I can run them for free. We can provide bottles for the water samples.
-*(Dale Griffin)* How about the bioassays for sediment toxicology?
-*(Katharine Tzadik)* Edie Widder from ORCA in Ft. Pierce has developed an assay to link nutrients in the water column to the sediment in the Indian River Lagoon. It only tells you hotspots, presence/absence and it's pretty cheap. Valerie Paul has a post-doc student working on sponges so that might be another resource to tap.
-*(Dale Griffin)* If reagents are available and it's cheap and it has been used in an estuary it might be worthwhile to use it. It is a bioluminescent assay it seems. If they want to run it for us it would be even better.
-*(Margaret Miller)* Do you just need a small sediment sample or is it something more complicated?
-(Dale Griffin and Katharine Tzadik) Can't tell from description.
-*(Margaret Miller)* If it's just a surface scoop of sediment it should be straight forward but if it involves cores it becomes more complicated as far as time and effort.
-*(Joe Boyer)* This is a luciferase assay? This is looking at ATP?
-(*Phil Dustan)* Yeah we did this. It's hard to do.

-*(Katharine Tzadik)* It didn't sound like it was complicated and it seems to be a new test developed in Eddie's lab.

Summing up: Need to define the goal/purpose of the project.

The sample design: stratified random design in a grid.

Analysis: use an AMES type test and focus on sponge tissue. Also, look at sediment assays.

-*(Judy Lang)* We want more controls on the sponge, so we can really pick a good species.

-*(John Fauth*) That's very important. At large expanses you must have the same species.

-*(John Fauth)* If we can do 72 samples we can do each site in triplicate and then by reef type. So we would be back at our original sampling design.

-*(Jack Stamates)* At the Hollywood outfall southern flow happened 36% of the time and at 7m depth, inshore of the outfall it was over 50%.

Public Comment Day 1

Dan Clark

Two weeks ago Palm Beach DEP and the SFWMD held the Numerical Water Quality Standard meeting. They said they are setting standards for coastal waters and estuaries however; they are not doing canals because they are considered ditches. There are no numerical standard set for these. They argued that there is no estuary between the North and Key Biscayne because it's all manmade. They want to do chlorophyll a with remote sensing. Nancy said her numbers didn't match theirs. Tom Carsey from AOML said their numbers don't match either. They mentioned their satellites are calibrated for Gulf of Mexico and not Atlantic waters. Mark Perry has a team of volunteers doing water quality sampling in Fort Pierce. Maybe you could talk to him to get some ideas on how to do it here. They want to rewrite the Florida Water Resource Development Act. They don't want to be liable for burying reef. So what's to stop them from doing it? The politicians are tired of waiting for permits so they want restrictions abolished. It seems that they are going against what we're trying to do here.

- *(Phil Dustan) What's the resolution on the images? 4 km?*
  -(Dan Clark) Not sure.

Stephanie Clark

Commented on the fact that there are a lot of changes coming up and that they would like to have some more solid facts or projects to back them up against some of these changes. She is worried about the impacts of future projects especially with the staghorn thicket.

1. *(Nancy Craig)* Canals are covered in the Impaired Waters Rule, there will be criteria set for them. We have provided the State with data in the interim so that they can meet their deadlines. They are using different criteria from the EPA using biological endpoints. This happened because they didn't know that data existed for some of these places, but we have provided them with that data now.

Ken Banks
A few years ago Obama directed that the National Ocean Policy be developed to integrate policy throughout the waters of the United States using a spatial planning context. Part of goal is to develop an implementation plan, and to do this they formed two groups. One of them is the Governance Coordinating Committee. One of the appointees was the then County Commissioner and now Mayor, Kristin Jacobs. She submitted a proposal for a project that included a number of elected officials from the SEFCRI region. This was an attempt to address one of our main problems here, which is connecting with politicians. This is what the meeting being held next door is about; they are all elected officials who are being educated about the coastal environments and what our needs are. There have been 4 meeting so far. We started with coastal ocean characteristics and then Kevin Carter did pollution. Last month was about beaches, what's been done for beach erosion etc. This week was the northern estuaries. Next week there's more and when we have the reef meeting we want to bring in all the information from SEFCRI. At the end we want to come up with recommendations, which will hopefully be implemented in the form of policy. We need to educate them first.

Doug Seba
With regards to sampling in the outfall, back in the 80's there was a big push to get rid of the outfalls on the West coast. These are much larger than the ones we have here.
We saw that the plume is dependent on tides, winds, etc. and they seem to have a fire hose effect going from side to side. In the end we decided to use an inverted cone sampling design. Maybe a cone is the best sampling design. On the west coast, these things really had a large imprint. The outfalls were full of lipids and steroids and because of the lipids you could detect fecal coliforms for days. Eventually they were all shut down, and now they have sewage treatment. It might be something to look at.

Meeting Guidelines/Agenda Review/Overview of Day 2 Discussions – *Katharine Tzadik, FDEP CRCP*

Katharine Tzadik went over ground rules and reviewed the day's agenda.
White paper is still alive. Julio has switched priorities to the Our Florida Reefs program now. He is using personal communications to try and fine tune details. He now wants to integrate it into the OFR process. We are now producing 1 page pamphlets to hand out at meetings. The communications team is also working on it, but they still need a little more help. The community working groups will start in the fall so we want to have the paper ready by then.

TAC Inlet and Outfall Field Work Discussion (continued) – *Karen Bohnsack/Katharine Tzadik*, *FDEP CRCP*

Goal

- Is there a signal in the benthos? (stress/toxicity)
- Will we be able to identify the gradient?
  -*(Phil Dustan)* A signal of sewage or waste water?
  -*(Brian Lapointe)* We need to be more specific.

1. *(Jack Stamates)* Can we make some visual observations?
   -(*Ken Banks)* We can at least get a video pan of the areas.
   -(*Joe Boyer)* Evidence of waste water (signal)?
2. (*Margaret Miller*) Whatever we can detect. Do we not know what we're looking for a priori? Right now we're trying to figure out what we can actually detect.
3. (*Jack Stamates*) What are the tests we can do?
   -(*Katharine Tzadik)* Dale has said mutagenicity, toxicity and genotoxicity. I will follow up on Edie Widder's assay for sediment.
   -(*Brian Lapointe*) I will try to get the paper with the methods.
   -(*Katharine Tzadik*) Valerie Paul has a student who can help with picking the sponges.

- Sample design
- Concentrate on sponges
- Outfall only
- One species of sponge
- Sample grid design. (Stratified random design)

4. (*Katharine Tzadik)* We had 6 sample types which would be sampled in triplicate.
   -(*Phil Dustan)* Do you want a completely remote sample?
   -(*Multiple people*) Hard to find a control with the interactions with the inlets and so forth.
   -(*Brian Lapointe)* In our studies we have seen that there is a decrease around Jupiter.
   -(*Richard Dodge)* Where's the West Palm outfall?
   -(*Brian Lapointe)* It's been shut down April 2009.
   -(*Piero Gardinali)* Not convinced with the idea of evidence of waste water, I think we might see evidence of anthropogenic effects, but not necessarily waste water.

5. (*Katharine Tzadik)* John can you help with sampling design?
   -(*John Fauth)* I really like the idea of having a very remote sample, like Juno or something. This would help to see determine if the outfalls have no effect or if they have an effect all over our sample area.
   -(*Brian Walker)* How about south?
   -(*Margaret Miller)* The Keys? What's the species composition up north? Can we find the same species?
   -(*Richard Dodge and others)* Wouldn't you want to go south? Aren't all the outfalls going north?
   -(*Phil Dustan)* The further north you go the more aggregate number of people you have?
   -(*Brian Lapointe)* How about doing both?
   -(*Jack Stamates)* We are looking for a gradient right? So you should see a decrease as you move away from the source.
   -(*Margaret Miller)* It will depend on how well the sponges are aggregating the contaminant, if they are actually bioaccumulating.
6. Benthic sampling
   -(*Judy Lang)* How much time is going to be available for these dives? How many divers, boats, days?
   -(*Ken Banks)* How many resources do we have?
   -(*Margaret Miller)* What are the depths?
   -(*Jack Stamates)* Outfall is 27m
   -(*Ken Banks)* 3rd reef is 14-17m 2nd is 10-12m.
   -(*John Fauth)* Remember we have a total of 24 stations
   -(*Margaret Miller)* Do we have enough divers? How many divers are going to be doing work? We need one diver to collect sponges, one to collect water samples and one or two to do the benthic sampling.
   -(*Joe Boyer)* Why is the TAC designing this experiment? Shouldn't the TAC go out with an RFP and then select which project gets done?
   -(*Margaret Miller)* There is no money for it. That's why we are trying to do it ourselves.
   -(*Ken Banks)* How many boats do we have?
   -(*Katharine Tzadik)* Yours and the CRCP's.
   -(*Margaret Miller)* We might be able to get our boat up here. If we can get together with RVC fish counts we might be able to coordinate it.
   -(*Brian Walker)* We're in the process of designing the RVC 300/350 sites for the year. If we only want to clip sponges we might be able to incorporate that into the program.
   -(*Ken Banks)* That goes away from the grid.
   -(*Margaret Miller)* We might not be able to do the analysis on more sponges though.
   -(*Phil Dustan)* Has anybody looked at one of these sponges to see if it works?
   -(*Katharine Tzadik)* We are just fishing right now.
   -(*Margaret Miller)* We hope that we will have the opportunity to get something to Dale to test before the actual effort is launched.
   -(*Jack Stamatas)* Did he not do some of those sponges before?

-(*Margaret Miller)* He had done microbial characterization work but not these assays.
-(*Katharine Tzadik)* He worked with these assays in the Keys, with sponge tissue I believe.
-(*Ken Banks)* So we have 2 boats available and 2 buddy teams from Broward County.
-(*Phil Dustan)* When is this going to happen? I will do it if I'm here.
-(*Ken Banks)* July would be preferable so that we can do it before RVC and other project starts.
-(*Margaret Miller)* We might not be available in July. August might be better.
-(*Katharine Tzadik)* Yes, August is better, this allows for more time to plan and run the pilot assays.
-(*Judy Lang)* So will the pilot come out from the 72?
-(Katharine Tzadik) It has to.
-(*John Fauth)* We have enough power on the tests with what we have, we might be able to drop down sample numbers if necessary.
-(*Brian Walker)* Are you sampling on the same part of the reef on all three reefs?
-(*Margaret Miller)* Wherever the sponges are.
-(*Brian Walker)* Outer reef will be around 65-75ft.
-(*Ken Banks)* If you need samples we can take a half day and look for prospecting.
-(*Margaret Miller)* We need samples to give to Dale. Do we need permits?
-(*Ken Banks)* A fishing license will do.
-(*Margaret Miller)* You can take 20 invertebrates per license?
-(*Ken Banks)* Xestospongia muta might be a good candidate, they're easy to find.
-(*Margaret Miller)* If dive time is the limiting factor then we are probably stuck with photographic methods. If we have more time we can target certain groups. Smaller size corals or something.
-(*Joanna Walczak)* FRRP has a very quick protocol.
-(*Judy Lang)* A scenic view will be invaluable for communication and documentation.
-(*Phil Dustan)* We should do a panoramic shot of the sites.
-(*Brian Walker)* How about a drift dive along the reef line specifically to look at changes along the transect. We just see such high variability and percent cover is so low, it's really hard to detect the changes at smaller scales. Algae have a stronger signal.
-(*Brian Lapointe)* Can we add algae? Then they can collect samples of the predominant species, and I can identify them.
-(*Brian Walker)* I'm not sure you will be able to see benthic cover type data.
-(*John Fauth)* At least for species richness we have seen differences between 2nd and 3rd reef.
-(*Phil Dustan)* If you spend a whole dive counting species you can get a good idea of what's there.
-(*James Byrne)* We can always put strategic sites in the FRRP the protocol which are close to the outfalls or the grid.

-(*John Fauth)* You really need to reduce variation as much as possible (as few days as possible, as tight as possible).
-(*Phil Dustan)* John and I have already done this. Species would be found in three groups: where there are adults and recruits; just recruits, and; just adults. That would be simple to do, to see which species are reproducing in that area and which ones might be on the way out.
-(*Margaret Miller)* A belt transect with larger transects for large corals and a small quad for recruits.
-(*Phil Dustan)* We've already done that for HWO3. Since corals are so rare it might help to just do roving dives so that you can get a better idea of species composition.
-(*Margaret Miller)* Yeah we would only get a subset of species but you would get densities. Can we put some FRRP sites along that gradient?
-(*Ken Banks)* The County also does FRRP so we can go back later to do the benthic studies.
-(*Margaret Miller)* If we join with FRRP then we can concentrate on small corals.
-(*Brian Walker)* Is there already a gradient in the FRRP data?
-(*Ken Banks)* The outer reef is under sampled by FRRP.
-(*Judy Lang)* We know that adult cover is low, so we need recruitment data.
-(*Margaret Miller)* To get bottom cover we need photo transects.
-(*Nancy Craig)* This is starting to get way too large.
-(*Katharine Tzadik)* How does this play into keeping the sampling in the shortest period of time? We do FRRP in September.
-(*Joanna Walczak)* It starts in August though.
-(*Judy Lang)* Photo quadrats for cover, but we need something to get more information on the morphology.

7. (*Katharine Tzadik)* In summary: 3 phases (pilot; 1st stage (include benthic sampling); 2nd stage (inlet))
    1. Get some sponge samples to Dale to see if we can use them and figure out which species. (age and location of sample on the sponge)
8. *(Josh Voss)* If you're looking at bioaccumulation the age of the sponges might be relevant.
    -(*Judy Lang)* Generally you would probably sample at the top of the sponge?
    -(*Richard Dodge)* Then you won't see the bioaccumulation.
    -(*Margaret Miller and Brian Walker)* So we need to put some money into determining the proper species and parts of the sponge.
    -(*Ken Banks)* Aren't they closing the outfalls?
    -(*Joanna Walczak)* It had been suggested but now they want evidence of damage to proceed with that.
9. (*Dale Griffin)* If we are going to do a pilot I would suggest doing other things rather than just sponges.
    -(*Joanna Walczak)* Palythoa might be a candidate but it's not prevalent in the third reef.
    -(*Dale Griffin)* Samples from the effluent would be used for validation, coral mucus, sediment extract, sponge extract and algae extract. If it's a pilot we might have a better chance of finding our indicator that way.

-(*Piero Gardinali*) What's the 0 or negative control?
-(*Dale Griffin)* We can look at the data to find some sites.
-(*Katharine Tzadik)* We also talked about possibly Juno or the Keys?
-(*Margaret Miller)* It's going to be hard to find a negative control in the region. Have you used this on sponges before?
-(*Dale Griffin)* No, we used it on waste water.
-(*Margaret Miller)* Then the idea of sampling multiple organisms makes more sense. Try to choose the best one.
-(*Dale Griffin*) I agree, we would test against Port water, effluent from waste water plant. I think for negative control we can do it in Broward.
-(*Judy Lang*) Before any of that, maybe we should do it at treatment plant and outfall to see if it actually works
-(*Margaret Miller)* Yes, at least the outfall. The treatment plant wouldn't necessarily help.
-(*Cheryl Miller*) If you do want to sample Juno we have a boat up there.
-(*Brian Walker*) If you're collecting around the outfall why not collect negative controls at the same time.
-(*Ken Banks*) What other samples are we collecting?
-(*Katharine Tzadik)* Sponge, port surface water, sediment, coral mucus.

10. (*Judy Lang)* What coral?
-(John Fauth) Dale's done Porites astreoides in the past.
-(*Judy Lang)* Doesn't *astreoides* release those mucus films? Those may be shed too quickly.
-(*Margaret Miller)* What species is most prevalent at both reef lines?
-(Multiple people) *Montastraea cavernosa* or *Siderastrea siderea*.
-(*Margaret Miller)* How do you sample?
-(*Dale Griffin)* 60cc syringes
-(*Brian Walker)* If you're using Juno you may not find *Montastraea cavernosa* up there. Can you find *Montastraea cavernosa* at 60ft up in Juno?
-(*Cheryl Miller)* Yes on the ledge.
11. (*Katharine Tzadik)* So this is really a first step, before we move on to other things.
-(*Brian Walker)* And look at FRRP data, since we already have that.
-(*Judy Lang)* Just remember that we are not getting a complete answer from a single site in FRRP data. It needs to be the combination of data for the area.
-(*Ken Banks*) Who's doing the analysis?
-(*James Byrne*) We have that information and it's already in GIS, so we it should be easy to do.
12. (*Piero Gardinali)* So we need to define this grid first so we can look at the other data and where to sample.
13. (*Cheryl Miller)* How soon do we have to get the pilot up?
-(*Katharine Tzadik)* We have some money that needs to be spent now. But we have another chunk of money that has more flexibility to spend.
-(*Margaret Miller)* What's Dale's time frame for running samples? Can you do this in June?

-(*Dale Griffin)* I can run tests in 72hrs. I will be out from the 8th until the 20th. So I will be available the last week of June. Valerie's ORCA bioluminescent assay should also be run.
-(*Gene Shinn)* Can the samples be frozen?
-(*Dale Griffin*) Sponges and mucus can be frozen.
-(*Margaret Miller)* Do you have collection protocols already?
-(*Dale Griffin)* We use sterile syringes and 50ml tubes. Whirlpack bags for algae maybe. I have all the equipment needed for collection. I can send it down in early June. Deep freeze samples at −70°.
Katharine Tzadik informs the group that this project has officially been submitted as an LAS.
Esther Peters emailed Joanna Walczak more information on coral mucus

Sediment Contaminant Discussion - *Lauren Waters/Katharine Tzadik***,** FDEP CRCP

- Handouts of MICCI report.
- This is a conversation that was requested by the TAC.
- Review recommendations for a completed project.

Terri Jordan-Sellers from the Army Corps of Engineers called in. She is the lead Biologist on navigation and shore protection projects in Broward County, as well as Port Everglades maintenance dredging and expansion.

MICCI project 4,21,24,24: The project was a combined LAS project looking at Local, state and federal permitting conditions.

- Phase 1: data mining and special permitting conditions.
- Phase 2: in depth analysis of legal issues brought up in phase 1.
- Conclusion: permitting processes needs to be simplified and standardization across agencies.
- Deliverables: template special conditions. E.g. cable, mitigation, dredging, etc.

The contractor recommended two special condition categories: beach fill/nourishment programs and dredging operations

We recently had reports of a large turbidity plume, as well as specific fish species (cowfish and pufferfish) missing fins, which happened at the same time as beach nourishment a few weeks ago.

-There were two projects going on at the time: 1) maintenance dredging 2) dredge material disposal (beach nourishments) 3) dredging at dania cutoff canal.

Today's discussion should be about what happened, not necessarily the projects, but the timing and how it happened, to see if there's something that can be done with regards to permitting.

-Hope to develop a consensus statement from today's discussion.

- **What were the concerns?**

- Physical
- Turbidity (a visible plume that was not above compliance according to samples)
- Sediment

- **What can we improve? How?**
  - Chemical
  - Increased organics
  - Increased pollutants/contaminants (hydrocarbons, fertilizers, general runoff)
  - Turbidity was in compliance with guidelines.

1. (*Terri Jordan-Sellers)* The background measurement is taken at the time of dredging upstream and downstream from the dredging activity. 29 NTU's is Florida State legislature not Army Corps of Engineers guidelines.
   -(*Kurtis Gregg)* I have written some of the permits and there's linear distance that needs to be considered in order to do the background measurements. It can be from 150 m to 500 m depending on the scale of the work being done.
   -(*Cheryl Miller)* The standard mixing zone that the State allows is 150 m, although there is variance to that rule, it can be expanded depending on the project.
2. (*Brian Lapointe)* Where is the sampling happening, in the intracoastal where the dredging is happening or in the ocean where the plume has come out?
   -(*Kurtis Gregg)* Depends on where the dredging is being done and the currents. If the dredging is being done in the intracoastal you wouldn't take background measurements in the ocean. For example, if you have a background turbidity of 10 NTU, then you have a compliance limit of 39 NTU. These measurements are taken between every couple of hours to once a day, depending on the permit.
   -(*Phil Dustan)* In this case when you have multiple projects happening at the same time could the background measurements be affected by the other activities?
   -(*Nancy Craig)* We have been monitoring the Dania cutoff canal dredging and they were in compliance throughout the project.
   -(*Kurtis Gregg)* Were they using turbidity booms?
   -(Nancy Craig) Yes
   -*(Brian Walker)* The turbidity went up when the hopper dredge was dredging in the channel.
   -(*Kurtis Gregg)* The activities were probably permitted separately. The permits are for 5 years so they can carry out their activities at any time. Permitting agencies don't prescribe the timing of the activities other than during turtle season. There may have been a synergy of events.
3. (*Jack Stamates)* The observations of the ADCP show that the system is strongly stratified so upstream and downstream depends on where you are in the water column.
4. (*Lauren Waters)* Typical monitoring is done at surface and mid depth. Sometimes a bottom sample is also taken.

5. (*Brian Lapointe)* We need to add a biological component. Specifically microbes that might do better in turbid waters and the physical transport of these.
6. (*Piero Gardinali)* Do we know what the turbidity of the system is without dredging?
   -(*Nancy Craig)* We have a station in the channel. On a bad day 4.
   -(*Piero Gardinali)* So what's the baseline for the 29 units?
   -(*Vladimir Kosmynin)* The 29 NTU's is in the Florida Statutes so we can't change it from project to project. We can't change that for now. The dredging in the canal and in the channel is not the only event, it happened during the pumping of sand onto the beach too. You can actually follow the plume from the dredge and follow it to the mouth of the Port. We should monitor that. It shouldn't be outside of the scope of the monitoring team.
7. (*Lauren Waters)* Should we add monitoring sites along the plume?
   -(*Vladimir Kosmynin)* Yes, you should follow the distance until the levels are in compliance.
   -(*Terri Jordan-Sellers)* You do have to stop dredging until turbidity returns to under 29 NTU's.
8. (*Vladimir Kosmynin) Our* task should be to review the guidelines we have right now and see how we can improve them.
   -(*John Fauth)* The limit is kind of weird, for most ecotoxicology studies there is a set threshold, so it's never compared to a background level, but to an overall level above which there is a risk. In this case there is a moving threshold because the environmental conditions may increase the background measurements. On any given day you can go 29 NTU's above the background regardless of what the conditions may be.
   -(*Margaret Miller)* Maybe it should be a risk threshold rather than an operational threshold.
   -(*Terri Jordan-Sellers)* The condition is that you must be able to measure it in real time. It can't be something that takes a week to get results back.
   -(*John Fauth)* What I'm saying should be simpler because then you have a set number and you don't have to even compare to a background value.
   -(*Kurtis Gregg)* However, it doesn't work in high variability environments
9. (*Vladimir Kosmynin)* We should check what's going on before dredging.
   -*(Terri Jordan-Sellers)* Who should do these measurements? The permit holder or State or Local?
10. (*Phil Dustan)* Are NTU's a linear function? I thought it was logarithmic at high concentrations. So you're using a linear scale on a logarithmic increase. This goes back to what John was saying you might be allowing a higher level of stress on the organisms if the background level is already high.
    -(*Jack Stamatas)* It is logarithmic.
11. (*Lauren Waters)* Should we then look at timing of the events, if there are certain events or weather happening in the area?
    -(*Margaret Miller)* If you have an absolute threshold rather than a relative, then it should eliminate that issue.
    -(*Terri Jordan-Sellers)* The reality of dredging is that we have other guidelines e.g. turtle season at John U. Lloyd State Park set dates for when things can be

done. You run into issues with risk of not completing the project because the contractor doesn't want to be out of compliance. The other issue too is that the maintenance dredging had to be done because the Coast Guard would have to restrict vessel traffic if the shoal became too big a risk.

12. (*Gene Shinn)* From observations of effects of hurricanes on reefs in the Keys, you will only see damage when the corals get buried, [corals] can take quite a bit of turbidity. It might depend on what kind of sediment is being stirred up also.
-(*Terri Jordan-Sellers)* There are two types of sediment in Port Everglades: inner channel finer materials, and upland sediment coming in runoff or from the Everglades. The material from the outer entrance channel on the northern jetty is mostly beach sand. The original proposal was not to put sand on John U. Lloyd, but Broward County asked for it. The Corps would have disposed of the dredging material offshore because that was the cheapest alternative, but the County paid the difference to put it on the beach.
-(*Terri Jordan-Sellers)* What happened is that there were two operations going on at similar times. One was beach material being moved to John U. Lloyd, and another, which was taken offshore. EPA sets the standards for that, there's a 3 year clearance process for disposal under the Ocean Dumping Regulations in the Marine Protection, Research and Sanctuaries Act (MAPRSA). There are 3 dump sites off of South Florida. There's toxicology testing for dumping this offshore, if it doesn't pass then it's dumped inland.
-(*Valdimir Kosmynin)* So all this material was tested?
-(*Terri Jordan-Sellers)* All the material from inside the Port was tested but the material in the entrance to the port was not because it was just sand.
-(*Lauren Waters)* There is testing on the material from the inside of the Port. But there's no testing on beach quality material in the entrance. It's just sorted by grain size and color.
-(*Terri Jordan-Sellers)* It is only tested on grain size, not biologically tested.
-(*Lauren Waters)* Should we then look at sand from the north of the Port more closely?
-(*Vladimir Kosmynin)* Something that we could look at is if, with the tidal flow or other processes, do toxic or chemical compounds accumulate in the sand at the entrance?

13. (Judy Lang) How often do they dredge at the entrance?
-(*Terri Jordan-Sellers)* The Port Everglades entrance channel had a very small shoaling rate. But, because the jetty is very short, the sand is now spilling over at an exponential rate. We had initially planned to do it once every 10 years, but now it's closer to once every 5. The inside of the Port has only been done once every 20 years. The area that was dredged this time is different from the area done last time, so it should be good for another 10-15 years, assuming there is no change in input.

-*(Gene Shinn) Would it be simpler to lengthen the jetty?*
-(*Ken Banks)* We are discussing a sand bypass.
-(*Vladimir Kosmynin)* That wouldn't solve the problem. There is a plan for sand bypass. Another option would be to deepen an area near the jetty allowing it to accumulate there and dredge it periodically.

14. *(Lauren Waters)* We would like a more general view, not just for this area so that we can make recommendations for regulations. What should we be testing for?
    -(*Joanna Walczak)* Hydrocarbons, contamination of the beach sand?
    -(*Ken Banks)* It needs to be tested before you dredge.
    -*(Piero Gardinali)* It shouldn't be a problem to test every 5 or 6 years. Because it's catalogued as sand it doesn't need to be tested for chemicals? There might be finer particles in there that can carry other contaminants.
    -*(Terri Jordan-Sellers)* Yes, under EPA guidelines that's correct.
    -(*Multiple people)* In order for it to be catalogued as beach quality sand it has to have less than 10% fines.
    -(*Terri Jordan-Sellers)* This was done as an exemption because you want to continue the "natural" transport from North side of the Port to the South.
    -*(Phil Dustan)* So, regardless of what happens the Coast Guard has to clear the channel, because it's a safety hazard? We should say something along the lines of the long-term has no price.
15. *(Lauren Waters)* We need to put it into the process so that our voice is heard.
    -*(Kurtis Gregg*) The applicants need to provide reasonable assurance that they are not going to affect the environmental resources. If there is a risk, they need to provide options that will avoid, reduce, or offset these risks, and it has to be incorporated in the project design. For example the 29 NTU's is in the Florida Statute, but it can be reduced on an as needed basis. But they need scientific evidence to do this.
16. (*Phil Dustan)* We don't know what the light requirements for corals are. We really need to know this right now. We can't just set the standard without having something to back it up with.

-*(Margaret Miller)* Where did the 29 NTU's number come from? Or is it just an arbitrary number.

-(*Kurtis Gregg)* That seems to be the consensus.
    -(*Terri Jordan-Sellers)* It's based on drinking water quality. Jim McAdams was on the team and he can expand on that.

17. *(Judy Lang)* What are Puerto Rico and Hawaii doing?
    -(*Cheryl Miller)* The Caribbean usually look to Florida for standards.
18. *(Brian Walker)* Remember we associated a fish kill with this. Not just the benthic community. There was a die off of a very specific group of fishes in this instance. They died on the reef and washed up on the beach. The concern is that nothing was done when the fish were showing up on the beach. It was reported to DEP and FWC, but we could never figure out what killed these fish.
    -(*Terri Jordan-Sellers)* Nobody told the Army Corps of Engineers during construction. We didn't hear about it until a week later.
19. (*Brian Walker)* So something that needs to be discussed is if there is a mechanism to respond to an event like this. Could the project have been stopped in response to the event or should we discuss developing this sort of mechanism? What have we learned from this incident?
    -(*Joanna Walczak)* We didn't contact the project right away because we didn't have information on what was actually happening at the time. We didn't want to stop a project without enough information.

-(*Margaret Miller)* So we should probably include other criteria rather than just turbidity, like a biological effect to consider as a mechanism to respond.
-*(Joanna Walczak)* Would that be a feasible concept for permitting conditions, to use biological criteria for this?
-(*Terri Jordan-Sellers)* It costs $60,000 a day to shut down a dredging operation. We do have shut-downs when there are sea turtles for example, but there will be a large pushback for something like this.
-(*Joanna Walczak)* Aside from the logistics. Is it possible to include biological criteria for permitting conditions? If it's not covered under a Federal protection law or something similar?
-(*Terri Jordan-Sellers)* Not unless you can tie it back to Coastal Zone Consistency. Where you would have to single out the Florida Policy by name and number. And in that case monitoring will have to be done by the permitted party. So then the report doesn't go to DEP.
-(*Joanna Walczak)* What I've found is that often even if we have sound science for what we see, it has to be able to be referenced to a rule, or law in order for it to be included in the permits.
-*(Cheryl Miller)* Could a monitoring effort be included? For example with blasting there is a monitoring condition for fish kills. Would it be feasible to include something that says if you find dead fish you need to collect them and figure out what happened?
-(*Terri Jordan-Sellers)* What would you be monitoring for? It can be done, but how will the permitted party determine the cause of the fish kill? We know blasting causes fish kills, so that's monitored, dredging doesn't kill fish, at least not in my experience. This has not been reported to us so far.
-(*Joanna Walczak)* Exactly, what I would like to happen is for us to come up with a response. What should we do when something like this happens?
-(*Ken Banks)* FWC wants live fish, they have strict requirements for this.
-(Ester Peters) You can put it in 10% neutral buffered formalin; they must have protocols at FWC.
-(*John Fauth)* You could flash freeze them. Then you can look at proteins.

-*(Terri Jordan-Sellers)* The initial response should be that the dredge should be shut down for a day or two and a decision made. And that we might have to test the dredged materials. Would this be done for all inlets, are we limiting this to the inlets in the SEFCRI region?

-(*Joanna Walczak*) I think this should apply to any inlet that might be maintained.

20. (*Lauren Waters)* Maybe we can get water or sediment samples?
-(*Piero Gardinali)* Yes, but not in the timeframe that is required. Why not sample the fines in the sand for toxicology or copepods? But it's not going to happen in that sort of time frame.
-(*John Fauth*) You also need a control sample anyway, away from the activities.
-(*Margaret Miller)* Then the sediments should probably be tested before the project happens, maybe that should be included in the permitting process.
-(*Kurtis Gregg)* There is some pre-permitting testing at the State level, to determine if there are heavy metals, etc.

-(*Margaret Miller*) But you said beach sand is not tested?
-(*Kurtis Gregg)* Usually it isn't because the sand is sorted and the materials that you would think hold the contaminants aren't there. Also, the testing is expensive so there needs to be reasonable scientific judgment to require it. For example because the activity is happening in a Port or an area with many bottom painted boats. You have to be able to link it to something that's reasonable to be asking for it.
-(*Margaret Miller*) If you do some of the screening before, then you have something to go on if something happens.
-(*Terri Jordan-Sellers)* We do have that screening information from the inside of the Port. The data on some of this does exist. We also have the data on the sand and the fines content of it, DEP requested it.
-(*Lauren Waters)* There is a mechanism for a permit issuer to actually require testing if they can link it to some causative agent.

21. (*Judy Lang)* We could also put in an LAS in the next few years to test the sediments in the entrance to the port.

-(Terri Jordan-Sellers) Maybe sand from an industrial port shouldn't be put on the beach?

Lauren Waters offers to synthesize all the discussion and attempt to come up with a consensus statement.

TAC Administrative Business

Katharine Tzadik, concluded the TAC discussion, announcing upcoming events, meetings, reports, public sessions, etc. which involved TAC members or would benefit from TAC participation. Examples include:

- New SEFCRI TAC application (end of May)
- Upcoming Our Florida Reefs Community Meetings

Public Comment – Day 2

No Public Comment

DAY TWO – ADJOURN