

IRL-North PDT Meeting #7
October 9, 2003

To: Attendees

From: ADA Engineering, Inc. & HDR Engineering, Inc. (ADA/HDR)

Subject: United States Army Corps of Engineers (USACE) and St Johns River Water Management District (SJRWMD) Indian River Lagoon (IRL) North Restoration Feasibility Study
Project Delivery Team (PDT) Meeting Summary – October 9, 2003

Attendees: See attached sign-in sheet

Handouts: Meeting Agenda
Article-“Spiffing Up the Spoil Islands”, Florida Sportsman, October 2003
IRL-North Feasibility Study Problems and Opportunities – Potential Management Measures

The seventh Project Delivery Team (PDT) meeting for the Indian River Lagoon-North (IRL-N) Feasibility Study was held at the St Johns River Water Management District (SJRWMD) Field Office in Palm Bay, Florida on October 9, 2003. The meeting began at approximately 10:05 am. Due to an accident on I-95, several attendees arrived after the meeting started.

WELCOME, INTRODUCTION, AGENDA, AND FACA REMINDER

Debbie Peterson, Planning Technical Leader for the United States Army Corps of Engineers (Corps) welcomed the PDT members. She requested that all attendees introduce themselves and the agency they are representing. As an icebreaker, Debbie requested that each individual tell what the following statement means to them: “It is better to let the fox guard the hen house than to give the dog the keys to the truck”.

Debbie provided an overview of the agenda (Attached) and used a Microsoft PowerPoint presentation to highlight the key points. The agenda included the following items:

- Team Member Roles (Federal Advisory Committee Act -FACA)
- Six Step Corps Planning Process
- Shoreline Performance Measures Sub-team Update
- C-54 Management Measures and Modeling Sub-teams
- Causeway Modeling
- Hydrologic Simulation Program – FORTRAN (HSPF) Modeling.
- Public Comment / Presentation on Geographical Information System (GIS) Mapping to Identify Land Acquisition and Restoration Strategies to Benefit IRL-N

- Problems and Opportunities
- Breakout Groups
- Breakout Group Reports
- Public Comment
- Next Steps
- Adjourn

Debbie indicated that breakout groups may or may not be utilized, depending on what happens in the Problems and Opportunities segment of the meeting.

TEAM MEMBER ROLES (FACA)

Debbie reviewed Federal Advisory Committee Act (FACA) requirements. This is similar to a Federal version of the Florida Sunshine Law.

- Definition of PDT: consists of federal, state, local and tribal government representatives.
- Time for public comments will be provided throughout the meeting.
- Public may fill out speaker registrations cards to provide comments.
- Public should be seated separate from the PDT.

SIX STEP CORPS PLANNING PROCESS

Using Microsoft PowerPoint slides, Debbie reviewed the Corps Six Step Planning Process shown below.

Six Step Corps Planning Process:

- Specify Problems and Opportunities (Deals with performance measure work underway, which is mostly complete except for shorelines.)
- Inventory and Forecast Conditions (Where future without project conditions are forecast. These are the base conditions against which alternatives are compared.)
- Formulate Alternative Plans (Some studies have as many 19 alternatives). This many alternatives can become very cumbersome.)
- Evaluate Effects of Alternative Plans (Use models like Causeway model for the evaluations.)
- Compare Alternative Plans
- Select a Recommended Plan

Debbie explained that the IRL-N PDT is beginning the second year of the study and wrapping up on the Problems and Opportunities phase (Step 1). Next, the team will begin to forecast without project conditions. In the third year, alternative plans will be evaluated, and in the 4th year, the evaluation results of alternative plans will be compared. The write-ups documenting the studies that have been completed will be done in the 5th year.

SHORELINE PERFORMANCE MEASURES SUB-TEAM UPDATE

Debbie provided the PDT an update on the Preliminary Shoreline Performance Measures Sub-team meeting that occurred earlier this morning. A handout of preliminary shoreline performance measures was provided to the PDT. Debbie explained that they do not have recent data for this topic so they are using 1980's spoil island management data and ground-truthing it. This work will likely be completed by the end of the calendar year.

A PDT member asked if the data was just spoil islands. Debbie explained that at this time the focus was on spoil islands but the team continues to use the name "shoreline performance measures" because there may be a need to look at other shoreline issues in the future. Debbie further explained that when the mainland and barrier island shorelines were developed, this removed some natural shoreline habitat from the system. Also, the Corps sidecast the spoil islands during dredging of the Intracoastal Waterway, which brings a federal interest into this issue. The team can capitalize on the fact that the spoil islands are in the IRL system, and spoil island shoreline restoration could replace some of the shoreline that was lost from the system due to development.

A PDT member suggested that if the performance measures were focused on the spoil islands, then perhaps the performance measure should be renamed Spoil Island performance measures. The concern of using shoreline in the name was that some members of the public might get a false impression that the project would restore shorelines all over. Debbie explained that the team had discussed this topic when the name for the performance measures was chosen. A PDT member suggested that we might need an outreach effort to clarify transitional shorelines and set guidelines. After some discussion it was decided the issue would be revisited at a future PDT meeting, if necessary.

Part of the shoreline issues relate to a sediment management strategy. Mitch Granat (Corps) will discuss this more at the C-54 Management Measures Sub-team meeting later today. Because the sediment management strategy has not been presented to the PDT yet, it may be useful to do a presentation on this topic at the next PDT meeting.

The Shoreline Performance Measure Sub-team also discussed some historic aerial photography that was available from SJRWMD. The Sub-team will likely receive a presentation at a future Sub-team meeting, and if it is pertinent, include the presentation on a future full PDT meeting agenda. Finally, this team will go out to Merritt Island and Mosquito Lagoon soon to ascertain the magnitude of groundtruthing work to be done there, since this area has the least amount of spoil island data available.

C-54 MANAGEMENT MEASURES AND MODELING SUB-TEAMS

Debbie informed the PDT that The St Johns River Water Management District has recently completed the HSPF Modeling, so the project can now move forward toward developing management measures. The C-54 is what ties the IRL-N project into Comprehensive Everglades Restoration Plan (CERP). The C-54 along with some of the

local Water Control District canals in that area are some of the biggest contributors of stormwater, including all elements carried in the stormwater. It is now time for the C-54 Management Measures Sub-team to convene and the first meeting will immediately follow this PDT meeting.

Team members are:

- Steve Bratos
- Terry Hull
- Mitch Granat
- Getachew Belaineh
- Joel Steward
- Dale Smith
- Greg Graves
- Bob Ulevich
- Troy Rice
- Ralph Brown
- Dean Luethje
- Bob Day
- Jim Adamski

A PDT member suggested a name change for this sub-team to Sebastian River Watershed Management Measures to better reflect the local environment. It was decided to change the name to the Sebastian River Watershed (C-54) Management Measures Sub-team.

Debbie reminded the PDT of the importance of putting reality checks on study components and issues from time to time. Debbie reminded the PDT that one of the good things about working with the Corps is it brings money for large-scale projects to the table. One of the challenges is that because the money comes from Congress, it is necessary to champion the projects up to Corps headquarters and make a good pitch to convince the Federal government to spend the money in an ever-changing political environment. It is important to color the projects so that the Federal interest is obvious.

Debbie informed the PDT it is time to convene the Modeling Sub-team. This team includes people such as Mitch Granat, Getachew Belaineh, Joel Steward and others. One of the first things that this group will do is convene the Model Evaluation Group (MEG). The MEG is totally separate and removed from any interest in the IRL-N Feasibility Study. This kind of group has been used on the Florida Bay and Florida Keys Feasibility Study and will probably be used on other projects in the future. Using a separate group for modeling evaluation brings an unbiased expertise to this evaluation process. Modeling issues are often paramount to successful completion of the studies. Debbie will send out an email to the PDT to confirm who wants to be on the Sub-team. Current Sub-team members are:

- Steve Bratos
- Terry Hull

- Mitch Granat
- Getachew Belaineh
- Joel Steward
- Dale Smith
- Greg Graves

CAUSEWAY MODELING

Debbie introduced Getachew Belaineh of the St Johns River Water Management District and he began the presentation of the Causeway Modeling results. Debbie reminded the PDT that part of the alternative plan evaluation process is to look at anything from the obscene to the realistic and hopefully end up somewhere in the middle. Examples of the obscene would be to move everyone out of the watershed. In this spirit, the Causeway Modeling looked at an initial screening of the extreme scenario of removing entire causeways. Debbie explained that Mitch Granat later will present some more detailed fine scale modeling that may be needed based on the results of the Causeway Modeling.

Getachew introduced the Causeway Modeling topic and explained that Tim Cera and David Christian of the St Johns River Water Management District will make the presentations. It was explained to the PDT that an electronic version of the report could be e-mailed to anyone that wants it. Tim Cera gave an electronic presentation of information on tidal forces and water levels relative to the causeway modeling (Attached). The following information is based on the electronic presentation along with additional comments captured during the presentation:

Organized water level and wind observations

- Wind impact on storm water
- What are impacts of tides
- Meteorological information
- Sea level rise

Data + context = information

Vertical datum's should use National Geodetic Vertical Datum (NGVD) 1988 not NAVD 1929

Water level change causes

- Tide
- Meteorological
- Climatological
- Geologic

Reviewed Sebastian Inlet

Lunar component of tide much stronger than sun due to moon's close proximity to the earth

Large Scale Systems Affect IRL. Mayport, Welaka, Trident Pier stations (SJRMD) low frequency water level track on a 2-8 Day pattern (Ed Smith in his papers)

- Trident Pier 92% of water level changes by tide
- Sebastian 72% by tide
- Melbourne Causeway 4.4% by tide

Super-elevation (tidal pumping)

- Low level in lagoon 15-20 centimeters (cm) higher than ocean level.
- Cause is large wetted cross section on incoming tide and small cross-section on outgoing tide.

Water level animation

- Ponce Inlet gauge
- Mosquito lagoon
- Sebastian inlet – large changes
- Indian River
- First one hour time intervals
- Second – removing the tide and looking at 6-hour intervals
- Looking at data not a model
- Seasonal (fall) sea level rise is evident in the area

Sea level rise

- Post-Glacial rebound
- Other causes (i.e. man made) may have accelerated in past 100 years
- Mayport 2.4mm/year
- Alaska-12mm/year – crust still rebounding

Summary

- Low frequency changes in ocean are primary reason for water level changes IRL-N.
- Super elevation (not storm runoff)
- Sea level rise (2.5-3.6 mm/year)

Questions

- Could modeling be done for water quality? Monthly grab samples for water quality. There are four episodic events with multiple stations from UF.

- When gates open to drain shore water what happens? Within two tide cycles the water is flushed from system. Lagoon capacity is very large.
- What is contribution to ground water if canals are shut? Ground water flow is very slow.
- Loading of nitrogen was significant and something to be considered.

David Christian of the St Johns River Water Management District then presented the second half of the Causeway Modeling results. This presentation focused on the Effects of Causeway Removals in the IRL-N to improve water quality and sea grass coverage. The information below is based on the electronic presentation along with additional comments captured during the presentation.

Focus of the study included:

- Look at causeway removal, partial removal, and even causeway additions that will be presented later.
- Will causeway removal affect sea grass?
- Environmental variables
 - Salinity
 - Velocity & flow
 - Total Suspended Solids (TSS)
 - Percent Light on Bottom (PILB)

CH3D-IMS model. Run for 1998 because the data are available and the year had significant variability in precipitation.

- Wet el Nino
- Dry la Nina

Study Area was Ponce Inlet to St Lucie Inlet

Looked at 16 causeways with four salinity cells, 2 north, 2 south of each causeway

- Look at 50% flow reduction for Turkey Creek
- Made runs taking out each causeway in turn.
- Concentrate on 6,7,8 Pineda, Eau Gaullie, Melbourne and removed together and then 8 partially (eastern segment).
- Why not seawater salinity? There is rain and resident time in Banana River is almost 2 years.
- Removing all causeways still doesn't raise the salinity to 20 parts per thousand (ppt) for the entire year. The 20 ppt is the magic number for sea grass growth.

Surface velocity was next item viewed. Velocity changes due to causeway removal were an increase along banks and a decrease in the channel.

- Looking at flows with all causeways removed (6-7% annual change)
- TSS, PILB changes with causeway removal causes about a 10% increase in PILB
- Partial causeway removal a 5% change in PILB and TSS
- Flushing model
- Divide in four zones with a tracer in each zone
- 15% flushing change in North zone and 0% in all others

Other studies have come to similar conclusions that removing causeways may not have that great of impact on salinity, TSS, velocity, etc.

- Evink (1990) –no change removing causeways
- Smith (1989)
- Nelson et al (1992) – no change in seagrass
- Powell et al (1997) <4% change with removal of causeways

Causeway removal

- Slight increase in salinity

Conclusion: Removing causeways will have no effect on sea grass in lagoon.

Questions/Comments/Observations from PDT on Model Results

- Could we calculate storage requirements from salinity model graph? Possibly.
- Debbie reminded the PDT that there are 4 problem areas for the IRL-N area: storm water runoff in the Sebastian Watershed area; causeway impacts; wetlands restoration; and spoil islands.
- Comment- glad to see that there will be an analysis of small areas and relief structures.
- What assumptions on sediment and re-suspension?
- What are effects of bridges in fine scale re-circulation?
- Will there be a study of the “Halo” effect on each causeway? Later report.
- Debbie requested a copy of studies on CD to add to the website.
- Biomass and litter collection in small pockets are still issues.
- Comment – public opinion of the causeways is the problem. We need to work at changing public perception if these results presented today remain valid and defensible.
- Florida Department of Transportation (FDOT) and Corps Regulatory are very interested in these results.
- In a normal year are we shooting for 20 ppt as a target? We need to define the ppt that it requires. At times we need to flush an estuary with fresh water. Will

- probably have a distribution around the 20 ppt target, but should meet the 20 ppt target a large percentage of the time. Important for study team to determine this.
- Give a range for ppt not just a single number.
 - Modeled adding a causeway at highest point of tidal flow and it had a damping effect on tidal flow, but not significant changes over time.
 - Modeled St. Lucie Causeway removal. The causeway removal removed the damping effects but no real changes in salinity,
 - Are there any studies that showed fish movement or biological components other than sea grass? We looked at flows in columns because of broadcast spawning organisms. Surface flow is more critical than net flow. No one has looked at this.
 - Is one year a long enough time period to look at? Yes for TSS and PILB.
 - There is no warm-up period for the model. There is a limitation on the sediment model – it doesn't change the type of sediment.
 - Over time a muck bottom changes to sand bottom, but model doesn't show an effect. Suggestion to take a longer view. We would need the board and the Corps to pay for more data collection.

FINITE ELEMENT MODELING

Mitch Granat (Corps) gave a presentation to the PDT on proposed finite element modeling to be conducted for the IRL-N project. (Attached). The information below is based on the electronic presentation along with additional comments captured during the presentation.

The primary study goal is to examine different alternatives for improving the ecologic health of the Indian River Lagoon. The Corps believes the causeway issue warrants a more finer scale look. The finite element modeling allows higher resolution and more flexibility to help make conclusions more defensible.

- IRL-N is a shallow linear lagoon with limited tidal exchange.
- Circulation is more wind-dominated.
- Low tidal and circulation energy means that small changes have big effect.
- IRL is susceptible to pollutant loads.
- Detailed fine-scale modeling needed to assess potential of improvements to circulation with carefully engineering causeway improvements.
- Causeway characteristics chart—7% to 40% openings on causeways.
- Will be looking at optimized culvert locations, channel improvements to optimize water quality, health, and cost effectiveness.
- Finite Element Modeling (FEM) Tasking
- Task 1-Data Collection and Review
- Task 2-Selection of Model. Pick FEM approach, but need specific model. Making geometric changes is what IRL is about.
- Task 3-Hydrodynamic Model Setup.
- Task 4-Hydrodynamic Model Validation. IRL-N proper and major rivers and tributaries.

- Task 5-Hydrodynamic Model Productions – 5 causeways chosen from Melbourne to 528 (528, 520, Pineda, Eau Gallie, Melbourne) and looking at 2 to 4 modifications for each causeway.
- Task 6-Flushing/Water Quality Assessments.
- Task 7-Sedimentation/Sediment Transport
- Task 8-Reporting – modeling presentations to PDT and include in Feasibility Report Engineering Appendix.

Questions/Comments/Observations to FEM Presentation

- Question how do you determine locations of causeway modifications? Debbie wants a report to the PDT when the modeling team starts looking at that part of the study.
- FDOT did a study for vulnerability of causeways due to storms. They have been looking at openings in Brevard County. Plan is to work closely with FDOT.
- Don't we need to look at pollution loading not just flushing rates? Is there a way to do that? This is not a water quality model but inferences can be made from this effect. Mitch indicated there is not a cheap way to look at this aspect.
- Debbie – will have to evaluate openings in relation to water quality and sea grass beds. That needs to be done. Important that the modeling be tied back to performance measures.
- Comment – if causeways are not a problem, why do we need a study to find out how to change the causeways? Possible that some benefits being masked in large scale model.
- How to get from FEM model results to biological effects? The model is for entire lagoon, but high resolution within 500' of causeway. There are localized effects near the causeways. This model is to look at small scale. (100' resolution to culvert size resolution - previous model discussed 800' resolution).
- Resolution issues – what is the resolution of FEM? Resolution is 10's of feet to 100's of feet (culvert size resolution). Distribution effects are large with causeway.
- How does this effect water temperature? Dissolved Oxygen (DO)? Not a considered parameter but conclusions could be drawn from other data.
- Debbie-There is no performance measure for DO so we would need to add it if of interest. We need a quantitative target.
- There is access to sea grass distribution from photos that could be used. From a NEPA perspective you will have to deal with fish transport issues. Transport of larval type need to be looked at to see if transport from grass beds to culvert openings is possible. Debbie – we will discuss in the Problems and Opportunities later today. We have preliminary performance measures, but we need good data to add a new performance measure.
- Comment -Public more interested in the benefits (e.g., better fishing) of sea grass not the area coverage of sea grass.
- What can be put in this model to compare to large model? The large-scale model shows no effect, how are we saying this small-scale model will have effects?
- Can a biological parameter be added to the model?

- Debbie – PDT should define what is a significant message. We need to model the same parameters in large and small-scale models so it can be defended in independent review.
- Comment-the biological component is not fully considered by any biological performance measure other than sea grass. We discussed larval transport as a measure, but the members of the PDT couldn't come up with a measure for this.
- Debbie- Florida Keys Tidal Restoration Project has a performance measure for larval transport. The Corps has done it and will be taken to headquarters in the spring. We can watch that and see what happens.
- Comment: Causeway removal not cost effective for the entire system, but the “pockets” need to be addressed. The relief bridges need to be maintained. If removal of causeway has just a localized effect it won't be sea grass, it will be additional biological organisms.

This portion of the meeting concluded with the idea that there needs to be an addressing of biological (other than sea grass) performance measure before we can address modifications of causeways. The biologic study needs to be done in place of another physical model. Additionally, many PDT members seem to intuitively believe that improved circulation around the causeways would help the lagoon, but it is important that any such alternatives be tied back to IRL-N performance measures and study goals.

PUBLIC COMMENT (MORNING SESSION)

There were no public comments presented during the morning public comment period at the meeting.

AFTERNOON SESSION

The afternoon session of the IRL-N PDT meeting began at approximately 2:50 PM. Debbie Peterson announced agenda changes. There will not be breakout sessions today and that the presentation from the Nature Conservancy will be postponed until a later meeting, due to time constraints and schedule conflicts.

HYDROLOGIC SIMULATION PROGRAM-FORTRAN (HSPF) MODELING

The St Johns River Water management District provided a presentation on the HSPF modeling results (Attached). Key points from this presentation are shown below.

- 54 drainage basins have been modeled. Calibrated model (HSPF) water quality and hydrology. Calibrated hydrology to gauges. Adjusted water quality parameters to produce literature values. 175 square miles.
- Sebastian Inlet – looked at land use categories urban (high, medium, low), wetlands, forestry, and agriculture. Calibrated for period from 1994 – 2000, which included Hurricanes Gordon and Erin, and El Nino over this period.

- Why study? Reduce fresh water flow to inlet and where can it be stored, treated, or removed from watershed. Looking at areas SJRMD owned or would like to buy.
- Question? Should we rely more on the storm water park in place of the canals? This is a 165-acre park. (Ralph Brown has information on City of Sebastian Stormwater Park)
- C-1 re-diversion project (100 square miles) is a similar project between Corps and SJRMD.
- Model looks at daily discharge and daily pollution flows.
- Question--Any thought toward making changes to canals to retain water?
- Project Management (PM) meeting from two other water authorities on this issue (St. Sebastian River, Fellsmere, and St. Johns Water Control District)
- Comment: Inter-basin transfer of water by stopping discharge before Highway 60.
- 50 billion gallons per year flow from Sebastian River. 30 billion gallons per year from Turkey Creek.
- Comment: model doesn't handle population growth well. The model has a representative of past (1943 photos), current (1995 land use maps), and future conditions used the county comprehensive growth plan. Plans show from 80-100% full build out – no clear date but near 2020. The PDT needs to look to 2050.
- Question? What is plan for central sewage? Most utilities have service areas that could be looked at for information.
- Comment. Potentially more at risk from storm water runoff than sewage.
- Comment. Comprehensive plan is the best guide to use to project growth out into the future.
- Comment-Nancy Higgs holding long-range planning meetings for the Barefoot Bay area and average density is 1 residence/acre.
- Greg Graves – Some studies have shown low density residential may have higher pollution load than high density due to number of pets and livestock.

PUBLIC COMMENT

There were no public comments presented during the afternoon public comment period at the meeting.

RECAP/NEXT STEPS/ADJOURN

Debbie expressed to the PDT that based on what she has heard today, there is a need for another sub team for choosing a biological performance measure. Debbie, Pete Milam, and Troy Rice will discuss this further and get back to the PDT. It also is clear that there are some differences of opinion on what are significant changes in the lagoon relative to the modeling results presented today. Debbie also reminded the PDT the importance of having the ability to demonstrate to targeted stakeholders the direct benefits of lagoon restoration to that stakeholder (e.g., more sea grass means better redfish or sea trout catches). A PDT member suggested that utilization of a fisheries expert group to look at some of these issues could add credibility to the study. This comment was well received and will be considered.

Debbie thanked the PDT for their attendance and participation in today's meeting. The next full PDT meeting will be held December 16, 2003 from 10:00 am – 4:00 pm at the SJRWMD Palm Bay Service Center. The meeting adjourned at approximately 3:45 PM.