

# SCG Modeling Workshop

April 23 2009

## Meeting Objectives:

Greg Knecht opened the meeting at 8:34 AM. He explained he would be facilitating the discussion today. He noted that when discussing models, things could get tense and he asked that everyone keep an open mind. He said that he was interested in discussing the interface between models.

Greg May reiterated the outstanding GAO recommendation concerning the modeling and the Task Force request for the SCG to review the issue with the IMC. He reviewed several handouts and explained the purpose of the workshop which was to discuss the current state of modeling and the Interagency Modeling Center (IMC). He noted that physical models or pilot projects could determine empirical data in the absence of fully functional models. He explained that communicating their findings in plain language and identifying key issues related to models for the TF would be helpful.

Greg Knecht reviewed the discussion that occurred the day before at the joint workshop. He explained that we have tools that we feel comfortable with regarding the output, but when it is time to apply them there seems to be a breakdown. He asked if we have the necessary tools for all project pieces and can we determine what restoration benefits exist or are needed? He asked if we have the tools to look at both scales.

## Modeling Discussion:

Bob Doren pointed out that the natural system got all the water before anthropogenic changes and now the natural system gets all the water not being used by humans. Bob asked if there is a need to figure out how much water is needed. Ken Ammon explained that 50 percent of the Everglades is gone but in the north there is 100 percent of historical water and we have to be careful with distribution.

Greg Knecht thought that the total amount of water and where it used to go could be tallied and then rescaled to the available land, but then we would get into regulatory situations. Agnes McLean said that we continue to push the 2 x 2 model to its limits regarding scale and gave an example of Acme Basin B. Paul Souza said that he has experienced the same problems with species management. He stated that the inflexibility comes in when the rubber meets the road and instead of moving forward another model run is requested and it takes additional time and resources. This could be a management question, *“how do we impose limits on ourselves”*.

Ronnie Best explained that models are only one of the tools to guide our thoughts; the models can not do our thinking. He added that models are expert opinions coupled with data and good models are quantifiable, reviewable and repeatable. Ronnie informed the group that HIS models gives us a range of 0-1 which only helps determine if one alternative is better than another. He said that the model sets an expectation, not a definitive number. He explained that assessment models evaluate the performance of projects.

Greg May asked about the likelihood that the different types of models would coalesce. Carol Mitchell explained that there are very good tools and whenever we get modeling results for a project and then get results from different models; we then are comparing apple and oranges. She didn't think that the models and interfaces were really a problem and that where improvements were needed, they were largely being addressed. She said that the models for the coastal areas needed the most work. She added that there is a need to distinguish between the hypothetical way the models are supposed to work and the reality. Bob Doren thought the problem relates to the fact that there is no conceptual consensus on how much water is actually needed.

Susan Markley said there have been a number of unmet priority needs identified over time. She said that one was physical models linked to water quality models. She added that some physical models were ok, but were not the right kind to support linkages to go to water quality and be interactive. She noted that efforts were started and stalled to address the concerns. She thought it would help to get a sense of the order of magnitude. She said she would also agree to the PDTs measuring or comparing for small scale concerns. She believed it was important to go back to a system that values critical thinking processes and that brings experts to the table.

Gene Duncan said he had been watching the process for 21 years and from his observations it seemed like there is always another model which equals another set back. He added that scientists won't get a perfect answer and we will always have more models. He thought that managers use inaccurate science to make decisions and the target is always moving. He added that the target is then further complicated when we throw over the regulatory framework. He believes that agencies use models to advance their own agenda and in some cases it becomes "paralysis by analysis". He believes that CERP should be turned over to engineers. He said that if CERP is abandoning the 10 ppb limit for Phosphorous for flow, then he will actively campaign against it. Gene said the system is broken, agencies agreed on a plan and then walked away.

Matt Harwell said he tried to pull out the thematic comments and determine whether they were modeling-based, or process-based.

Matt said that the modeling-based issues were as follows:

- Research and Development vs. production (who/where)

- Need for Strategic Applications (multi-scale; same components) (tied to the hurricane forecasting tools)

He explained that the process-based themes were as follows:

- Process in using ecological or WQ models in the planning vs. assessment process (and that there were crossover models)
- Tools Acceptance and the historical legacy (MRT --> IMC)
- Information Communication

He added that he was trying to help anchor the discussion and give some structure to the discussion on "what do we want?"

Some people explained that since the Everglades are now 50% their original land mass they would not need as much water. Joan Browder reminded the group that the estuaries are not half their size so they need just as much water as they received historically.

Ronnie Best advocated that whatever the best science that is available should be used. He added that modeling scales need to be at all levels and the NSM has an error of  $\pm 6$  inches which is too big for use in the Everglades.

Frank from EPJV noted that these modeling issues are the sticking point for many PIRs. He elaborated by saying that typically planning efforts fall back on modeling results but are then resistance to the cost and time requirements for modeling. Todd noted that the FWS staff have been thinking more about going back to monitoring and then hopefully modify operations as needed rather than relying on models solely.

Bob said that the models work at a dichotomy and the need for project level information when restoration is on the large scale. He added that part of the issue is that PIRs need to justify the NAI.

Greg Knecht thought that the goal is the problem and that stakeholders need to know that they won't be negatively impacted by project. Bob Doren said that is different from the goals before of trying to figure out the benefits versus ensuring that there are no impacts.

Bruce Sharfstein noted that the scale of the 2 x 2 models is great for certain things, but there is a need for something at an ecological scale that has to link up to 2x2 model.

Bill Reck said that justifying projects for the Corps requires measurements with a micrometer. He likened it to marking something with chalk to cut it with a chainsaw. He said that the managers just want to know the chainsaw level. He added that the arguing is over the micrometer. He believes that the problem is that stakeholders push their agendas in the PIR

process and therefore the problem is process. Bill acknowledged that to a certain point he agreed with Gene Duncan. He believes that the projects should be built flexible so necessary changes can be made. He added that we are trying to build it perfectly.

Greg May said - while valid concerns - that these are process questions which are being addressed by a review of the PIR process and the Programmatic Regulations. He hopes they will be addressed.

Agnes said that there is no common or shared vision. She pointed out that we are close to a shared vision for Lake Okeechobee and the Northern Estuaries, but there is no agreement for the northern Everglades. She referenced the DOI Vision document as an attempt to create the shared vision and said that Secretary Sole agreed that we need that vision.

Bob Johnson said that ENP has all types of models at different scales, yet they are not moving forward. He believes that the bigger issue is process and added that models may be a speed bump but there are much bigger bumps out there.

Greg May agreed that there are some big issues not related to modeling. He reiterated that GAO and the NAS in 2006 and 2008 addressed modeling in their reports and that the NAS will address it again in 2010. He believes that we are much further along on hydrologic and ecological models now than when the GAO report addressed the issue. Bob Johnson asked, "What do the managers need to move forward?" Stu Appelbaum said that the inability to take risks is holding us back, as is the lack of consensus at political and scientific levels. He believes that there needs to be agreement to accept a certain amount of risk.

Greg May explained that the CISRERP would be discussing modeling in June and asked what the group's message would be.

Bob Johnson noted that they were critical of our inability to make decisions. He said that there is a lack of a model to show what will happen if they don't make progress and make the Everglades wetter.

Ronnie Best believes that we can get through the risks using adaptive management.

Dennis Duke said that we don't have good connection between model work and indicators and targets. He said for example if target is x amount of oysters in estuary is there a model that tells how to get that x amount. Matt Harwell and Bob Doren said that information is available. Dennis asked about the right water distribution for Decomp. Bob Doren said we won't have what is "right" because of land changes. He said that we can't panic when a hurricane comes and dump water needed for the area. He believes that everyone understands that idea conceptually. There is enough science to know what we have to do; the problem is the managers

don't want to take the risks. Dennis explained that you got to prove it to Corps and translate the science in a way that it can be given to Congress as proof.

Ken Ammon said that even if we fix the process it doesn't solve everything, for example disagreements among agencies. Ken said models just move us in the right directions and we do not know specific numbers.

Don DeAngelis said that models do only an ok job of predicting hurricanes and that species predictions are even more complex. He gave an example of wading birds going away for 6 months out of the year. He added that we define a performance measure that will give ecological benefits and then we do something small like fill in Miami Canal. That alone will not change the ecology. He finished by saying the Performance Measures look bad only because we will not see enough of a change.

Susan Markley explained that if a PDT has to justify projects by specific components for example, where to place a plug, it is not going to happen. She added that using salinity to measure oyster habitat is a better way to justify projects. Dennis said that it is not the exact number of sparrows but by saying, "if these conditions are right then the habitat is conducive to sparrows". Susan said she was troubled by the discussions that somehow the scientists are in agreement with modifying results to make a case and this may undermine the trust in the quality of science. She said she would like to reinforce the notion that we have a good understanding of what needs to be done and she thinks that we could get more trust in decision making using critical thinking processes of the collective group. She finished by saying that scientific judgment is better than modeling results.

Susan Gray thought that Susan Markley summarized the issues well. She said that it is not the science and the entire system is variable. Lynn Wynngard believed that trust issues come in when scientific opinion is removed from the modeling results.

Bob Doren said he heard Dennis Duke say that if the Corps was told how much water you need to put out that could be done today, but the problem is that nobody wants to do what the science is saying. Ken Ammon asked about the tradeoff discussions related to delivering water and the potential impacts. Bob Doren said we can make those tradeoffs but that is not a science discussion.

Dennis Duke explained that there is a large entity that loves to pick apart projects in Congress and the managers have to get up and defend the projects. Dennis Duke explained that if we tell Ken Ammon that we want to send some big volumes south, the cost of cleaning the water to 10 ppb is big. Dennis said that we need to know what we are shooting for ecologically and tie it back to the hydrology; we need these numbers to drive commonality into the models. Lynn Wynngard said that we have flow to drive the commonality.

Matt Harwell's drawing explained that scientists have been using 4-6 data sets looking at hydro pattern restoration related to data runs and modeling runs to help un-paralyze us. Agnes McLean said they have been looking at ways to get us out of the modeling bottle neck.

Carol Mitchell asked about the framework and what was needed. Dennis Duke explained that DOI shopped the vision paper around in order to stimulate restoration and to move efforts forward. He added that the Decomp Phase 1 advocated throwing out the model because you can't say removing a canal is bad and the Tamiami Trail is an impediment to flow.

Greg May recognized the work the scientific community in south Florida as phenomenal. He added that he thought the science was way out in front of the policy and management. Bob Doren added that there are still scientific questions; they are just not what we are talking about here.

Bob Johnson said that Decomp is a good project to look at for lots of reasons; it involves the micro and macro scale and is whole system dependent. He added that we could use it as a case study.

#### **IMC Discussion:**

Ken announced that Joni is the contact person for the District. He said that he had representation from several agencies on the IMC, but not from DOI. He said that the District sent the Corps some people with skill sets/code proficiencies because the Corps can't find those skill sets. There is such a demand for modelers that most of the modelers are learning as they go. He explained that the modeling center is more of a review group (regional perspective) and does more than coordinate with and help the PDTs. He informed the group that the ground water modeling is now primarily in Jacksonville and is separate and apart from the other modeling center. He said that having a lot of the modelers located in B2 at the SFWMD has worked well. He told the group that there is not a flaw in the concept but it needs to be expanded. He added that the modelers are not working 100 percent of time on CERP since the process is slow so they cross over and are reassigned to work on other things to maximize efficiency.

Greg May asked about the IMC's relationship with RECOVER and evaluation and assessment. Agnes McLean explained that the work that the IMC did with RECOVER was great and the only complaint was that management put the EAA as a priority which was not the fault of IMC.

Greg May asked what the IMC does for RECOVER and Agnes McLean explained that RECOVER does system-wide modeling, while the regional modeling is done at the IMC.

Bob Doren said that they do a lot of hydrologic modeling and the IMC has been doing a lot of model runs. He added that the models runs need to be more comparable.

Bruce Sharfstein said that there is a larger issue related to many small modeling efforts in many shops. He explained that a cohesive way to calibrate and to do production for use is lacking. He said that there have been some attempts to do this but it has not been unified.

Matt Harwell thinks that one of RECOVER's former primary functions was interactive model refinement and review. This created a limitation because this function has not been picked up since the change in RECOVER 5 years ago. Matt added that the question is how you want the ecologic models to fit into the mix and will they be on an equal playing field or a 3<sup>rd</sup> tier check.

Ronnie Best said that there is a need to couple the use of ecologic modeling and there is a gap of getting models in the hands of users. He thought JEM could help with these issues. Eric Slain explained that the Time model links between 2x2 at a scale that couples ground water and saltwater with the ecologic. He clarified that the IMC is production run unit that run models. He said that the IMC won't work as a place to coordinate models as it stands today.

Dan Kimball explained that it was the Park's goal to have someone at the IMC from DOI, but when there is someone lined up, they get hired away by the Corps and others. He explained that he is faced with needing a critical mass of modelers at ENP. Dan suggested setting up a Board of Directors to help with the modeling/IMC concerns and getting a committee together to address integrating modeling. Ken Ammon said that he doesn't want to start another committee or group to integrate hydrologic and ecologic modeling. Ken believed that expanding the IMC would be a good solution for integrating models, and he agreed that setting up a Board of Directors should be discussed further.

Bob Johnson said that there is an advantage to having modelers next to data collectors. He asked if it was possible to think about different locations for the IMC or even to have more than one location. He thought that it would help aid the end practitioner and explained that the agencies are different in that the Park Service receives funding to work on projects that affect the Park only.

Carol Mitchell described what is happening now is that ecologic models are being handled in JEM, as part of RECOVER and at the IMC. She noted that we use ecologic models on lots of stuff but right now there is a movement to formalize the ecologic model development in JEM and it is receiving IMC support.

Ken Ammon stated that there are all sorts of models being developed or already developed and asked why they were not being used. He said that there is a need to understand models and the model's proficiencies and what the needs are without going through a bunch of different entities.

Frank Marshall believed that the IMC works well and gave an example of the coordination that tied seagrass with salinity models. Carol Mitchell agreed although she thought something is missing at the IMC. Ronnie Best explained that he believes that it is important to get personnel

at the IMC. He added that it should be personnel for research and development and not production runs. He added that it has to be a planned integration.

Agnes McLean noted that the original ATLSS models stopped after the Restudy and the 2 x 2 because there was no funding to update hydrology of the ATLSS models.

Matt Harwell said there is a need to talk about whether ecologic models have or can be integrated into current hydrologic modes and have the Corps get ecologic concerns up to tier 1. Stu Appelbaum said it is a question of whether or not there is a strong link and a high confidence level.

Carol Mitchell said there could not be a single forum. Matt Harwell agreed that it would be a case by case basis and said that the NAS seems to be curious about this topic. Agnes McLean said there is no standard benefit analysis, that each project is different.

Greg Knecht thought that ecologic model use was ad hoc for use per project and so are the confidence intervals/confidence levels.

Todd Hopkins thought that the issue goes back to scale and function. He said that the analysis was broken into pieces for big picture scale and now the purpose is mixed into this.

Dennis Duke explained that initially the Corps had zero interest in exotics until Bob Doren produced the chart of the predicted area they would spread/invade. He said that was exactly what they needed to put in front of Secretary Woodley who then said go ahead with a PIR. Dennis explained that was exactly the kind of scientific information and format the Corps needs to go forward on justifying projects.

Bob explained that those doing indicator work need to access hydrologic models. He said some have started making their own links. He asked what is the solution without getting the SCG in the weeds. He thought that the SCG could be helpful in taking a good project, such as DECOMP for example, and linking the hydrologic and ecologic together with regression models.

### **Summary:**

Greg May asked for feedback on whether or not the SCG should use this forum in the future. He asked the group if the discussion and format was helpful. Many in the group raised their hands to confirm that it was helpful. Ken Ammon agreed that it had been helpful and thought that the follow up will determine how valuable it will be.