**SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE**

**WORKING GROUP AND SCIENCE COORDINATING GROUP**

**JOINT PUBLIC WORKSHOP**

**APRIL 22, 2009**

***INSERT MAP/JPEG FROM WORKSHOP HERE***

**Robert Jones and Jeff Blair**
**Facilitation and Meeting Design**
**FCRC Consensus Center, Florida State University**

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# *Executive Summary*

Ken Haddad, Chair of the Science Coordinating Group and Dan Kimball, Chair of the Working Group welcomed participants to the Workshop. Following the participant introductions it was noted there were18 Scientists, 7 Scientist/Managers, 20 Managers, 3 Engineers and 1 "self described politician" participating in the workshop. The Chairs noted their hopes that this session could build upon the informal dialogue that was initiated at February, 2009 Task Force meeting at Loxahatchee National Wildlife Refuge regarding what has been learned over the past decade in terms of Everglades restoration science. They noted that the purpose of this workshop was to provide managers, scientists, engineers and the public with the opportunity to informally discuss new insights into the advances in our understanding of the South Florida Ecosystem and restoration in plain non-technical language.

Greg May, Executive Director of the SFERTF then introduced Bob Jones and Jeff Blair with the FCRC Consensus Center at Florida State University to facilitate the workshop discussion. The facilitators reviewed the workshop agenda and workshop guidelines and identified participants who were interested in presenting information and suggested an order of presentations.

The following participants provided presentations on key insights, and implications for the future of Everglades restoration: Tom Van Lent, Everglades Foundation, John Ogden, SFERTF, Ronnie Best, USGS, Lynn Wyngard, USGS, Paul Souza, FWS, Wayne Daltry, Lee County, Fred Sklar, SFWMD, Matt Harwell, NPS/LWR, Loral Larsen, USGS, Denis Duke, SFERTF, Robert Fennena NPS/ENP,

Below are the implications and issues highlighted from the 11 presentations. They are in order of the presentations, not in order of priority:

- Storage space needed for floodwaters. Water in storage will increase over time. "Can't store your way out of a flood," we must incorporate flow.
- How can we make storage a stable system that reproduces flow- during wet years deal with excesses.
- Storage is part of process of flow southward. Storage coupled with conveyance.
- What is the relationship between targets for restoration and the current economic situation and budgeting impacts?

- Need to review what is success in light of future issues such as climate change.
- We can get too locked into concept of "going backward in time."
- "Truly restored Everglades?"- combination of wet dry cycles gives rise to super colonies. When we set our targets, we should consider restoring natural functioning ecosystem.
- Perhaps the most fundamental hypotheses to test is: if we make this system wet, will we recover the previous abundance of animals?

- The good news is that once you get south of the EAA- 85% of remaining Everglades remains available to restore.
- We need to move away from a classical engineering approach to ecological engineering- use knowledge of nature to reformat how to use nature's ecological principles in designing engineering.

- Care must be taken to use paleo data in the right way. We learn it was wetter in 1850's, we must rush to make wetter now? Ecological functions should guide what the hydrologic functions.
- Target is an "intersect" point between the natural trend (pre-drainage) and restoration not the historic point in the past – can't go back to past because the system would have changed/evolved without any human intervention – shoot for restoration to natural trend.
- Sea level rise provides a moving/multiple targets.

- Climate change is the new issue- it has big and profound implications for restoration (e.g. climate cycles, salt water intrusion, sea level rise, shift in development to other places etc.)
- The development of a consensus "Transition" plan is critical to take us from today's broken system to the system we are working to achieve.

- Is there a political system/approach this is now capable of engaging with all the complex aspects of Everglades Restoration?

- New information and science on groundwater and tree islands- hydrology suggests we are0 not making the connection of how Everglades functions as a large reservoir- pulling the water in the wrong direction.
- The relationship between velocity of water and suspended sediment suggests that a baseline needs to flow around 2-3 centimeters per second to bring sediments into water column and even higher to place sediment on a tree island. for example.

- Restoration is more than just storage; dynamic storage is now a key concept that needs further development.
- Refine and develop an intermediate scale of models that can be used for ecology and planning.
- Ecosystem resilience is a concept that should be explored over next few years.

- Preserve and protect the parts of system we are not actively trying to restore. Don't forget the fringe areas.
- Greater, more robust interaction between scientists and managers in the translation of science will be needed.
- Focus on stakeholder issues and engagements to minimize unnecessary litigation. Adaptive management should identify four different tiers of engagement, so is not all or nothing.

- "Models guide thoughts, they do not do the thinking." We need to use models more smartly to help the decision-making process.
- Peer reviewed model show things are much wetter than envisioned in the Restudy. In light of this what should be our targets as we update the Programmatic Regulations. The regulations need to focus analysis on the system not on the parcel.

- Paleo data is showing how much wetter the Everglades used to be.
- We have to go into some of these efforts moving forward, sequencing projects correctly.

The participants discussed the utility of the Workshop format and Ken Haddad and Dan Kimball offered closing comments especially noting their appreciation of the willingness of scientists to present their insights in concise and plain language. Both Chairs committed to work with Greg May to evaluate what was learned and to determine what kinds of recommendations might be developed for the Task Force's consideration regarding next steps and assignments to the Working Group and Science Coordinating Group. They noted there may also be value in considering further workshops to get at some of the concerns regarding process, progress, making adaptive management work and the updating of the programmatic regulations.

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# ADVANCES IN UNDERSTANDING OF THE SOUTH FLORIDA ECOSYSTEM AND RESTORATION WORKSHOP SUMMARY

## I. INTRODUCTION AND CONTEXT

Ken Haddad, Chair of the Science Coordinating Group and Dan Kimball, Chair of the Working Group welcomed participants to the Workshop and asked each to provide a brief introduction and identify their role in restoration as a scientist and/or manager *(See Appendix #2 for the Workshop Participant List)*. Following the introductions it was noted there were18 Scientists, 7 Scientist/Managers, 20 Managers, 3 Engineers and 1 "self described politician" participating in the workshop.

Ken and Dan noted their hopes that this session could build upon the informal dialogue that was initiated at February, 2009 Task Force meeting at Loxahatchee National Wildlife Refuge regarding what has been learned over the past decade in terms of Everglades restoration science. They noted that the purpose of this workshop was to provide managers, scientists, engineers and the public with the opportunity to informally discuss new insights into the advances in our understanding of the South Florida Ecosystem and restoration in plain non-technical language.

They then reviewed the two questions sent out to participants in advance which were used to help frame the discussion:

1. What are the key new points from updated ecological science and thinking and what issues do they raise for the application and integration of science to future restoration efforts? What is different from previous thinking?

2. What are the key new points from updated hydrological science and thinking and what issues do they raise for the application and integration of science to future restoration efforts? What is different from previous thinking?

Greg May, Executive Director of the SFERTF then introduced Bob Jones and Jeff Blair with the FCRC Consensus Center at Florida State University to facilitate the workshop discussion. The facilitators reviewed the workshop agenda (*See Appendix #1)* some workshop guidelines and noted

they would be keeping and displaying a virtual set of workshop notes asking participants to make sure their comments and insights were being accurately documented. The facilitators then identified participants who were interested in presenting information and suggested an order of presentations.

The facilitators noted that the workshop was designed to begin to develop a shared understanding of current thinking as well as raise important issues that the participants will not be able to address fully during this workshop due to time constraints. These issues will be recognized and identified in the workshop summary for future discussions.

## II. PRESENTATIONS ON ECOLOGICAL AND HYDROLOGICAL SCIENCE

What follows are key points from participant presentations on new insights. For each presenter a set of presentation summary points are listed, followed by clarifying questions and concluding with implications and issues raised for future restoration efforts.

**A. Presenter:** Tom Van Lent

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Understanding the overland flow matching with landscapes (not directly reflected in restudy?) Process of flow is turning out to be very important.
- TVL "model of the Everglades"- how does the Everglades work from a basic systems level.
- "Everglades during wet years was a very wet place."
- Dry years- contributions from the peripheral wetlands to the Everglades flow.
- Historically replaced flow with an "impounded condition"
- Restudy solution: Lake O- wet years- reservoir underground- ASR.
- Water in storage will increase over time. "Can't store your way out of a flood"- must incorporate flow.
- How can we make storage a stable system that reproduces flow- during wet years deal with excesses.
- Needs large quantity of storage when the system is dry and wet.

**Clarifying Questions for Understanding and Discussion Points:**

- What was the frequency when it was "really wet"? Easier to move water through Everglades than to store it.
- "Flowing" vs. "ponding" system- can we get enough flow to bring back to previous state when species were doing better? Can restore flow when it is wet, but must restore flow when dry.
- Ponded areas are most changed part of the system.
- Need to focus on succession as an issue.
- Is there anyone evaluating whether we would have more frequent drought conditions if we didn't deal with storage before opening up the bottom part of the system?
- Can move water from the lake, unless you remove the dams. How do you deal with this incrementally is another question.

- Do we have a handle on what we lost in the dry years? NSM can tell us what flows would look like if wetlands were in place.

**Implications and Issues Raised for Future Restoration Efforts:**

- Storage space needed for flood waters.
- Storage is part of process of flow southward. Storage coupled with conveyance.
- What is the relationship between targets for restoration and the current economic situation and budgeting impacts?

**B. PRESENTER:** JOHN OGDEN

**Key Insights/New Points**: *(What is different from previous thinking?)*

- **How do we decide what is success?** Two lines of thought- ecological vs. hydrological approaches to the question.
- 1. Restore as much of the pre drainage hydrology as possibly and that will get us the Everglades-like ecology.
- 2. Unless RECOVER defines ecological characteristics of the Everglades, then no success. E.g. certain wading bird colonies, etc. and what hydrology does it take to get you there. Some think we know. Others wonder whether we know. Few hold the extreme view on either end, many are somewhere in the middle of the spectrum.
- Pull together for a more common vision- address what we don't know, use adaptive management as we learn.
- Need to know if we are trying to go back to "true restoration" of a pre-drainage before human impacts; or back to historic times with an already changed system e.g. reference the mid 20$^{th}$ century changes.
- New paleo science is telling us, southern marl prairies, in the 20-40's made contributions to the system, but contributions were not extensive in the paleo time. What components of the ecological system will we target for defining success.
- How do we maximize science input into decision making?
- Inadequate science is not a major hurdle for progress in restoration.
- Instead it is the poor job of integrating our current science understanding into decision making.
- Failure of RECOVER is it doesn't effectively feed science into decision making. Instead it spreads information out on different pathways to respective agencies, governments with no integrated collaborative decision making process to put it together.
- There are places around the country where this is has been solved. (e.g. Platt River restoration)

**Clarifying Questions for Understanding and Discussion Points:**

- On success question: How do system indicators help with defining success? Were the target indictors developed for a pre-drainage system or not? E.g. if we say we want super colonies,

was this a response to the drained system? Defining characteristics and system indicators may not relate to a pre-drained system.

- Need integrated definition of success involving ecological and hydrological. But system is so massively changed at all levels, if we succeed in restoring function in the next 10 years, will the ecological system respond? Its an open question.
- Integrating science into decision making: joint decision of both policy and science. Shouldn't be in "separate rooms."
- What does success mean "spatially" for restoring the system? Still haven't answered this.
- There may be models where restoration integrated decision making is working with scientists and managers integrated into a single decision making forum. Where are the places this is working? Platt River restoration agreement- "governance committee" All funding goes into one pot. They hire a consulting company to manage the process. Took commitment of political leaders to make it work. This is a qualitative and quantitative challenge for leadership in Florida.
- CERP directive was to "restore the Everglades"
- Is hydrology and ecology a true dichotomy or a spectrum? E.g. Kissimmee, back fill and restore hydro period and see what happens.
- How do you set an ecological target and get to specific set of actions for restoration?
- Need a fresh approach based on new science- with a more system wide approach.
- Indicators will serve one important purpose- let people and politicians know if things are getting worse.
- If we can restore flow to the right places in the right times and provide storage for wet or dry this will be the first level of success. If we do that then indicators tell us how we are doing going forward.
- Reference to a cartoon showing the "Science brain" (hypotheses, testing, etc.) vs. "policy brains" (identify problem, make decisions, collect info to support decision)
- In pre-drainage, water flowed over lake and south. Now drains out east and west to sea.
- What happens to water when stored? Depends on how you store it. Wetlands response will be different from more engineered facilities. A major system need is to have enough storage capacity when dry to allow for peat forming processes and other functions.
- Did we have the consensus on the broad perspective in CERP? Didn't focus enough on what it would take to get the whole system functioning first?
- Note that the abundance of animals in the system was tremendous in pre-drainage system. Perhaps this is one of the most fundamental hypotheses to test- if we make this system wet, will we recover the previous abundance of animals? This is in light of the tremendous declines across the board of animals in Everglades- anywhere from 50-90% declines.
- Even in severe drought times, we are still dumping water to tide.
- Can we achieve desired the Everglades restoration outcome without using water from Lake O?
- If we are bringing water from Lake O down, will we try to restore the Lake or simply build it to function as a "kidney system" How long would it take to restore the Lake?
- In Yellow Book, took a pass on water quality issues in Lake O.

**Implications and Issues Raised for Future Restoration Efforts:**

- Need to review what is success in light of future issues such as climate change.
- We can get too locked into concept of "going backward in time."
- "Truly restored Everglades?"- combination of wet dry cycles gives rise to super colonies. When we set our targets, we should consider restoring natural functioning ecosystem.
- Perhaps the most fundamental hypotheses to test is: if we make this system wet, will we recover the previous abundance of animals?

**C. PRESENTER:** RONNIE BEST, USGS

**Key Insights/New Points**: *(What is different from previous thinking?)*

- De-compartmentalization? When did the term come into play? Dec 9, 1997. Stu Appelbaum suggested that we were "adding more structures vs. removing in the Restudy Plan (at that time we were at the '3rd alternative (of seven)." To which Best replied, "to restore the natural part of the system, we need to…
- "De-compartmentalize the damn landscape"
- The Restudy process considered (relevant to the movement of water) QTD -Quantity, Timing, Distribution. Flow was implied, but was not explicit.
- Flow is not simply the movement of water, but movement of ecological components (biota, sediments, biogeochemistry) to complement the movement of water.
- In the slow-moving, shallow sheet-flow of a 'naturally functioning' Everglades, "Sheet-Flow" is "nature's" storage in the Everglades. (e.g. Tropical Storm Fay) – so, how do we "ecologically engineer" nature's storage in our restored Greater Everglades?
- Science Coordination Team developed a white paper on the concept of flow in Everglades restoration. Rock Salt is now a "deacon of the church of flow."
- ASR was the past conceptual solution for storage – at 333 wells? No. Now looking for other storage solutions – an example of Adaptive Management at work.
- Based on these fundamental principles of a naturally functioning ecosystem, we now know we historically had a much wetter system (paleological evidence on peat and coastal systems)
- Newer versions of NSM gives an idea of how much more water we are talking about.
- Remember that although we have lost about 50% of the historical Greater Everglades; much of that loss (about 35%) is in the Everglades Agricultural Area.

**Implications and Issues Raised for Future Restoration Efforts:**

- The good news is that once you get south of the EAA- 85% of remaining Everglades remains available to restore.
- We need to move away from a classical engineering approach to ecological engineering- use knowledge of nature to reformat how to use nature's ecological principles in designing engineering.

**D. PRESENTER:** LYNN WINGARD, USGS

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Paleo-ecology- 3 areas of research in southwest coastal are of ENP, Florida Bay and Biscayne Bay
- 3 phased process- 1) analysis of paleo assemblages in the cores; 2) linear regression models of modern water data – linear regression equations predict the salinity at different stations in Florida Bay based on stage and flow at stations in ENP; 3) combine phase 1 and 2 – plug paleo-derived salinity estimates into the equations to predict stage and flow in the historic Everglades
- -1900 is the time of reference for the paleo calculations – this is assumed to be prior to most of the alteration of the Everglades and is easy to determine this time-line in the cores (lead-210 decay and introduction of exotic Australian pine pollen)
- Linear regression models- based on station data now. Predicts salinity levels. Uses equations
- Outcome is derived by linking phase 1 & 2 derive flow, stage and salinity of historical Everglades and Florida Bay as outcomes.
- Stage deficit- 2.5 meters- average stage today is 2.5 m lower than ~1900 at Craighead Pond
- Flow for TS bridge- deficit- ~4 cubic meters per second. Shark R. Slough= ~2.5 cubic meters per second
- Tested modern proxy data set used to estimate paleo-salinity values and can accurately predict the current salinity about 80% of the time.
- Emerging science- RECOVER using data
- Deb Willard-focusing on tree islands, marl prairies, and ridges and slough environments - she has a current pollen data set and uses these data to determine how wet the various environments were in the past
- Her data on tree islands- Tree Islands are a long term feature but the northern tree islands are currently drowned.
- Marl prairie's relatively recent. Ridge and sloughs migrating.
- Everything shows there is less water in the system over the last century.
- Looking at ecological shifts through the assemblages over time.
- Climate change have any role in the ecological shift? Trying to get better handle on climate change and sea level rise.

**Clarifying Questions for Understanding and Discussion Points:**

- Is the depth based on NSM? Yes. What are the errors in that model in terms of stage? NSM version 4.6.2 is used as the starting point – NSM uses real climate data in a daily format. Took the salinity estimates derived for Florida Bay from NSM then dropped values down by 8.5ppt salinity to adjust to paleo-salinity estimates from cores. Linear regression model based on current observed data. Paleo-salinity is based on current observations of living animals and average salinity as well.
- Southern part of 3A- was the only part of system that is wetter since around 1960 than was previously, the rest is drier.
- Climatology- its role. experience of Everglades has been a historically wet cycle. Modelers should take extreme enough view of dry cycles in their models.

- What are we basing "wetter" on? Stage, volume, duration? Southern end too wet, northern too dry? A. It is based on what kinds of plants are found- referenced both depth and stage.
- Differentiate between flowing wet system vs. an impounded wet system? Y: Bio geo chemistry are very different in the two system.
- We expected but have not found a succession to other wet types of species. May have more to do with impoundment and flow and less to do with the "wetness"
- It is the combination of the hydrology and ecology. Assemblages we see today may not have a natural analogue in the past.
- Paleo data is important work that is providing new insights into the system.
- Volume of water- flow and depth (storage). Doubling volume and implications for depth and flow.

**Implications and Issues Raised for Future Restoration Efforts:**

- Care must be taken to use paleo data in the right way. We learn it was wetter in 1850's, we must rush to make wetter now? Ecological functions should guide what the hydrologic functions.
- Target is an "intersect" point between the natural trend (pre-drainage) and restoration not the historic point in the past – can't go back to past because the system would have changed/evolved without any human intervention – shoot for restoration to natural trend.
- Sea level rise provides a moving/multiple targets.

**E. PRESENTER:** PAUL SOUZA, FWS

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Transition plan: Last 4-5 years underscored the importance of clarity about the "transition" from today's broken system to the system we are working towards.
- The Pettigrew Commission- in the 90's, coming together to reach consensus.
- 2000s- "rubber meets the road" phase. Inflexibilities have emerged. E.g. FWS single species management. Tree islands. Water quality. Flood control. Water supply. Habitat changes.
- How are we going to look at all of these "parameters" and build in flexibility. System will get wetter, we have to find a way to take measured risks.
- E.g. C111 Spread canal, makes wetter- care and monitoring needs to be undertaken to deal effectively with transition- 20 year period during which habitat will be changing.
- Climate change is new. More than other issue, it is big and profound.
- Climatic cycles- are the assumptions we are making today going to stand up in 2050 or 2100. Have to be able to work "scale-ably"
- Sea level rise- endanger cape sable seaside sparrow habitat, keys, impact on Miami Dade. Development pressures may shift to other places (Lake Wales ridge, etc.).
- Salt water intrusion. Why is restoration more important than ever in the face of climate change.
- Haven't lined this up.
- Expectation of less rainfall may affect storage capacity. It is timely on both of these issues.

**Clarifying Questions for Understanding and Discussion Points:**

- Transition plan- what kind of flexibility should we include that we have not historically included in our restoration thoughts and plans? Should we spend more time on thinking this through? Does the transition concept apply to other factors?
- From bird species perspective- Everglades restoration is greatest hope for recovery of birds, but there are transition questions. What is end outcome we collectively wish? How can we get there?
- The ecosystem should not have to handle all the risk.

**Implications and Issues Raised for Future Restoration Efforts:**

- Climate change is the new issue- it has big and profound implications for restoration (e.g. climate cycles, salt water intrusion, sea level rise, shift in development to other places etc.)
- The development of a consensus "Transition" plan is critical to take us from today's broken system to the system we are working to achieve.

**F. PRESENTER:** WAYNE DALTRY

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Is there a political system/approach this is now capable of engaging with all the complex aspects of Everglades Restoration?

**G. PRESENTER:** FRED SKLAR

**Key Insights/New Points**: *(What is different from previous thinking?)*

- We have to decide where to go from here based on the science.
- We have been dealing with the immediate, urgent with little long term thinking (budget cutting vs. climate change)
- What is the new science since the Yellow Book?
- Wildlife situation- we know now about recession rates needed to keep the fish alive in the sloughs. Dry season hydrology. (rehabilitation vs. restoration). ("designer ecosystems")
- Exotics- we have learned that lygodium (Japanese climbing fern) is taking over the world. Water quality issue plus finding this in 3B
- Understanding of Tree islands is far better now.
- Coastal communities- understanding of submerged aquatic vegetation. Adults can stand higher salinity, the seeds cannot.
- Water and soil quality-
- Hydrologic connectivity- inflow water in ways different than today.
- Regulation schedules- hydro-period
- Basic principles- the curve showing the ability of plants to take up Ph and remove it.
- Ph level to do recovery of system may be somewhere around 5?
- Key transition period question- can we get to a restored system at 10 ppb?

- "Maximum power" bell curve – if you want a successful system that evolves overtime, don't build up bio mass, focus on the flow (entergetics) not storage.
- "Everglades life expectancy has dropped because it is no longer flowing."
- Example of an emerging science understanding involves the relationship between velocity of water and suspended sediment. It appears that it needs to flow around 2-3 centimeters per second to bring sediments into water column. It may need to be higher to place sediment on a tree island, for example. This is a baseline (not a bottom line) number.
- This could be the base flow for Everglades delivered on a continuous basis to restore the ridge and slough environment.
- New info/science on groundwater and tree islands- hydrology. Tails of tree islands shifting from south to east indicating a groundwater connection. Seepage management plans for barriers and water supply wells. Not making the connection of how Everglades functions as a large reservoir- pulling the water in the wrong direction.

**Clarifying Questions for Understanding and Discussion Points:**

- Yellow book- says if there is no demand for water in the areas where water is being taken, it could be worse for the system than the do nothing alternative? Demand forecast for 2050- Was considered in CERP- that is why consumption piece was critical to success. "If you take off the demand up front and demand doesn't materialize, you cheat the environment."
- SFWMD- capped demands. (Denis Duke will return to this in his presentation)
- Can you achieve the results periodically vs. consistently?
- Decomposition and sediments (depth), and the movement and redirection (velocity)
- Reference to a "river" of grass may be misleading.

**Implications and Issues Raised for Future Restoration Efforts:**

- New information and science on groundwater and tree islands- hydrology suggests we are0 not making the connection of how Everglades functions as a large reservoir- pulling the water in the wrong direction.
- The relationship between velocity of water and suspended sediment suggests that a baseline needs to flow around 2-3 centimeters per second to bring sediments into water column and even higher to place sediment on a tree island. for example.

**H. PRESENTER:** MATT HARWELL, A.R.M. LOXAHATCHEE NATIONAL WILDLIFE REFUGE

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Ecological 1:Ecological models not used as primary component in Yellow Book. There is an intermediate scale of models that can be used for ecology and planning – they are neither too simple, nor too complex.
- Ecological 2: Indicator concept tells you "what" is going on. We (RECOVER) are also exploring the "why" it is going on, including ties to intermediate - scale ecological models, ability to manage adaptive management decisions, etc.
- Ecological 3: Shifting baselines/soft targets. Concept of ecosystem resilience should be explored and more attention likely to be paid to it over next few years.

- Hydrologic 1: It is more than just storage; dynamic storage is now a key concept. E.g., TS Fay raised Lake Okeechobee extensively, but last week's 1" rainfall bought only 3-4 days of reduced wildland fire threat.
- Hydrologic 2:There is some flexibility within the water regulation schedules- not just lines on paper but with the narrative rules in the schedules.
- Big Picture 1: Preserve and protect the parts of system we are not actively trying to restore is an important point. Don't forget the fringe areas.
- Big Picture 2: Translation of info from scientists to managers. No longer putting science report on CD and FedEx-ing to manager. New development  greater interaction in the translation of  science.
- Big Picture 3: Stakeholder engagement and its role in ecosystem restoration. How to focus on stakeholder issues to minimize unnecessary litigation. AM process to identify four different tiers of engagement, so is not all or none.

**Clarifying Questions for Understanding and Discussion Points:**

- Do intermediate-scale ecological models exist? Yes but not formally used in the process at the same level of relevance as hydro (2x2). Still some in development. In the effort to streamline the planning process as part of the revisions to the Pro Regs, need to be careful not to lose the ecological components (perhaps this is brought forward with Interim Goals?). Example of most complicated- Everglades Landscape Model. Simplest- water -only based Habitat Suitability Index model.
- Ecosystem resilience- if hydrology put back, most will be all right? Degraded ecosystems have lower resilience. Restoration builds back up the resilience.  May be able to achieve/enhance ecosystem resilience while still not total restoration (or still in progress).

**Implications and Issues Raised for Future Restoration Efforts:**

- Restoration is more than just storage; dynamic storage is now a key concept that needs further development.
- Refine and develop an intermediate scale of models that can be used for ecology and planning.
- Ecosystem resilience is a concept that should be explored over next few years.
- Preserve and protect the parts of system we are not actively trying to restore. Don't forget the fringe areas.
- Greater, more robust interaction between scientists and managers in the translation of science will be needed.
- Focus on stakeholder issues and engagements to minimize unnecessary litigation. Adaptive management should identify four different tiers of engagement, so is not all or nothing.

**I. PRESENTER:** LORAL LARSEN, USGS

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Higher flow velocity are needed to keep ridges from moving outward into sloughs over time.
- Understanding of what controls flow velocity and discharge

- Velocity is highly sensitive to water surface slope but not sensitive to depth (higher water levels).
- Impoundment by levees and WCAs are higher now than historically.
- Slope is important
- The type of vegetative community is important as well.
- "Spike rush" in sloughs in the transition.

**Clarifying Questions for Understanding:**

- 14 ft per second- what kind of sediment entrapment? Not familiar with that velocity. Focusing on 3A (Wayne calls it the "Lava effect" in SW.
- Restoring ridge slough system- does this support the need for physical changes to start the restoration process? Remains a question to be addressed.
- Measure flows in hurricane conditions? Modeling this in relation to where bio mass goes and effects on ridge and slough topography. Pulse flow is important and other research.

**J. PRESENTER:** DENNIS DUKE

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Implementing CERP- We did restudy plan using a model version (2 x2) with assumptions that produced the plan and the resulting projected changes.
- CERP – We first updated the model with longer periods for hydrology and 2000 data, land use, population projects and topographical changes.
- The new Topography- reflected ever changing subsidence. That shifted the water flow throughout the system, shifting from west to east, which also changed the effects of the Plan.
- Managers are confronted with what are the trade offs in management decisions? E.g. impact of estuary vs. the Everglades? Managers need science to make better decisions.
- Caloosahatchee basin- Another significant change from the 1999 report. Based on new run off estimates, it is a new demand on the system. It is now a water user instead of a water exporter.
- Increase in population in updated projections We worked on capping the demands. SFWMD ultimately did that in 2002. They are now denying permits for withdrawals from Regional system based on these caps.
- The revised System wide modeling showed the Restoration plan does not perform as well as the existing system - Something doesn't connect- we put things back and have them do worse.
- All resulted in the paper to the Task Force to look at the overall Vision for Restoration Got lost in the details, E.g., the de-compartmentalization. pdt has been working 6 years trying to get first plan out the door. They are stuck. They expect it may take another 3-4 years to get the plan.
- Focusing too much on the details. Need to look at transition. Take a larger view such as the DOI Vision. Mike Sole- shouldn't be just a DOI vision but a shared vision.
- 4.6.2 NSM- peer reviewed model show things much wetter than envisioned in the restudy.

- The question is - What should be our targets? It is important to take this into account as the Programmatic Regulations are updated.
- Bottom line - More water needs to be getting south- all the evidence suggests this.
- The Plan has been shifting in response to the modeling changes and better data.

**Clarifying Questions for Understanding and Discussion Points:**

- We are going to go through the development of a new models, NSM and a RSM. These will be out there producing angst again when new version of models are used in projection modes.
- Monitoring system plan- opportunity overlaps- science will jump in again after the update.
- Models are helpful but not sufficient as targets. Need to focus again on the targets.
- Adaptive management mandated by CERP. This will be essential to update the plan as we go.
- Adaptive management is new concept for traditional Corps project. Challenge is developing an approach for using adaptive management to provide more understanding of challenges and benefits. Managing uncertainty changes how you look at your vision- near term and long term. The way to use this vision is affected by changes in models and how you treat the models as well. The 2x2 predicts performance of the plan. We know we will be changing that over time. Think about how to using monitoring and adaptive management at the same time. It is the process for "making up the difference" . The way you apply models in restoration decision-making will change.
- Should we be using these models to guide restoration? We need to do a better job of up-scaling or we will be spending too much time in the weeds. Models will always be changing- keep in mind their limitations and challenges and correct applications. Use an incremental approach, work in phases e.g. in the Miami canal with the ultimate goal in mind. Models good for the overall look, but careful down in the detailed area. If we get stalemated for several years over a model, that should be an indication something is wrong.
- "Models guide thoughts, not do the thinking." We use models to help decision process.
- Issues in programmatic regulations- how policy makers make decisions. Based on "parcel" analysis not a system analysis. Prompts the use of a small detailed scale. To make this happen in practice, address changing the programmatic reg end that drives toward details. Policy makers look at a parcel by parcel approach in the permitting context. Have to help them change the question they are asking. Use detail modeling where you need detail.
- Basic ways to tell story- focus on the bigger picture of water budgets. Need to do more of that. Model should support what our basic knowledge is.

**Implications and Issues Raised for Future Restoration Efforts:**

- "Models guide thoughts, they do not do the thinking." We need to use models more smartly to help the decision-making process.
- Peer reviewed model show things are much wetter than envisioned in the Restudy. In light of this what should be our targets as we update the Programmatic Regulations. The regulations need to focus analysis on the system not on the parcel.

**K. PRESENTER:** ROBERT FENNENA ENP

**Key Insights/New Points**: *(What is different from previous thinking?)*

- Paleo data is showing how much wetter the Everglades used to be.
- Developing his version of the NSM model.
- We have to go into some of these efforts moving forward, sequencing project correctly.

## III. WRAP UP AND CLOSING COMMENTS

The participants discussed the utility of the Workshop format noting:

- Format good, hearing new information not having access.
- Suggest- greater notice to those with subject expertise to participate.
- Need to capture accurately the comments and presentation points. Seek help from presenters in reviewing the workshop summary.

They were also invited to complete written evaluations *(See Appendix # 3)*

Ken Haddad and Dan Kimball offered closing comments especially noting their appreciation of the willingness of scientists to present their insights in concise and plain language. They each indicated that they learned a lot and listened carefully. The format was chosen to help bring out informal discussion and they both suggested it accomplished that and thanked the facilitators for keeping the discussion going, open and inclusive. While it was a shame to spend Earth Day in a hotel, the workshop was a productive session with the participant insights highlighting that there have been changes in hydrological and ecological thinking as well as topographic conditions that need to be taken into account and inform efforts moving forward. Both Chairs noted there may be value to considering further workshops to get at some of the concerns regarding process, progress, making adaptive management work and the updating of the programmatic regulations.

Climate change and related science will be an important issue to incorporate into restoration plans going forward. To answer the question what will the Everglades look like in 2050 or 2100 we need to address such matters as the likely reduction in precipitation (10-30%) and sea level changes and the various issues that these profound changes raise. In the future, the Chairs suggested that such workshops should make an effort to invite and involve scientists and engineers working for private sector interests. Both Dan and Ken committed to work with Greg May to evaluate what was learned and to determine what kinds of recommendations might be developed for the Task Force's consideration regarding next steps and assignments to the Working Group and Science Coordinating Group.

**SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE**

**WORKING GROUP AND SCIENCE COORDINATING GROUP**

**JOINT PUBLIC WORKSHOP**

**APRIL 22, 2009**

**Crowne Plaza—1601 Belvedere Road—West Palm Beach, FL—561.689.6400**

## *Workshop Objectives*

- ✓ To Review Workshop Purpose and Objectives
- ✓ To Review Workshop Participation Guidelines
- ✓ To Identify and Discuss Key New Insights for Updated Ecological Science and Issues Regarding Application and Integration of Science to Future Restoration Efforts
- ✓ To Identify and Discuss Key New Insights for Updated Hydrological Science and Issues Regarding Application and Integration of Science to Future Restoration Efforts
- ✓ To Develop a Shared Understanding of Current Thinking and Related Issues
- ✓ To Identify Needed Next Steps

## *Workshop Agenda*

### *Wednesday, April 22, 2009*

**1:00** **Welcome, Opening Remarks and Overview of Workshop Purpose**

**1:10** **Workshop Objectives and Agenda Review, and Participation Guidelines**

**1:20** **Participant Introductions** – *Name, Organization, Role (scientist, manager, other, etc)*
*(18 Scientists; 7 Scientist/Managers; 3 Engineers; 20 Managers; 1 Politician)*

**1:30** **Identifications and Discussion of Key New Points and Related Issues for:**

- Updated Ecological Science and Thinking Regarding Application and Integration of Science to Future Restoration
- Updated Hydrological Science and Thinking Regarding Application and Integration of Science to Future Restoration

***3:30*** ***Break***

**3:45** **Identification of Key New Points and Related Issues for Future Restoration Discussion—*Continued***

**5:45** **Workshop Summary, Evaluation, Closing Comments and Next Steps**

***6:00*** ***Adjourn***

# List of Participants

1. Bill Reck - USDA
2. Joe Frank - BIA
3. Dennis Duke - DOI
4. Todd Hopkins - FWS
5. Chad Kennedy - DEP
6. John Baldwin - FAU
7. Laurel Larsen - USGS
8. Jim Vearil - Army
9. Robert Fenema - NPS
10. Sheri Coven - DCA
11. Greg Knecht - DEP
12. Tom Van Lent - Everglades Foundation
13. Jennifer Grimm - FIU
14. Ronnie Best - USGS
15. Bob Johnson - NPS
16. Eric Hughes - EPA
17. John Ogden - Audubon
18. Dave Tipple - Army
19. Stephanie Romanach - USGS
20. Susan Kaynor - NPS
21. Lynn Wingard - USGS
22. Joe Walsh - FWC
23. Lorraine Heisler – FWS
24. Ken Haddad – FWC
25. Calvin Arnold – USDA
26. Kahlil Kettering – National Parks Conservation Assoc.
27. Matt Harwell – FWS
28. Garth Redfield – SFWMD
29. Greg May – DOI
30. Susan Gray – SFWMD
31. Fred Sklar – SFWMD
32. Mark Lewis – Biscayne National Park
33. Lisa Beever – SW Florida Regional Planning Council
34. Kelly Keefe – Army
35. Joni Warner – SFWMD
36. Carrie Beeler – DOI
37. Sandy Soto – DOI
38. Jose Cabaleiro – OED
39. Allyn Childress – OED
40. Marian Heitzman – SFWMD
41. Gene Duncan

**SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE**
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# WORKSHOP EVALUATION SUMMARY

**Agree** ☺ 😐 ☹ **Disagree**

*CIRCLE ONE*

**WERE THE WORKSHOP OBJECTIVES MET?**

| | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| ✓ To Review Workshop Purpose and Objectives | 3 | 0 | 1 | 0 | 0=**4.50** |
| ✓ To Review Workshop Participation Guidelines | 2 | 1 | 1 | 0 | 0=**4.25** |
| ✓ To Identify and Discuss Key New Insights for Updated Ecological Science and Issues Regarding Application and Integration of Science to Future Restoration Efforts | 2 | 1 | 1 | 0 | 0=**4.25** |
| ✓ To Identify and Discuss Key New Insights for Updated Hydrological Science and Issues Regarding Application and Integration of Science to Future Restoration Efforts | 2 | 1 | 1 | 0 | 0=**4.25** |
| ✓ To Develop a Shared Understanding of Current Thinking and Related Issues | 1 | 2 | 0 | 0 | 0=**4.33** |
| ✓ To Identify Needed Next Steps | 0 | 0 | 3 | 1 | 0=**2.75** |
| WORKSHOP ORGANIZATION? | | | | | |
| ♦ Agenda packet was helpful | 0 | 3 | 0 | 0 | 1=**3.25** |
| ♦ Facilitators guided participant efforts effectively | 3 | 0 | 0 | 1 | 0=**4.25** |
| ♦ Participation was balanced | 1 | 2 | 0 | 1 | 0=**3.75** |

**What Did You Like Best About the Workshop?**

- Opportunity to see colleagues from other agencies and organizations.
- Allow informal and free exchange of information and discussion
- The open dialogue and interaction between participants.
- Good set of questions to set the stage. Well-facilitated participants generally focused on topic.

**What Could be Improved for Future Workshops?**

- Notion that flip charts would force scientists to simplify is flawed, makes it more difficult to communicate concepts. Suggest you allow them to make a few, but limit number or type
- More advance information on workshop: its intent, purpose and topics.

- Perhaps give a more general idea ahead of subject matter so appropriate people can attend and perhaps have an overhead or computer white board to draw on so whole room can see what was on flip charts.

**Additional Comments:**

- I personally did not hear much science. I have not heard before, but there is better attendance than usual, so that may help get important points across.
- Very good format for sharing information and allowing/encouraging interactive participation. May not be so good for working specific problems/issues for taskforce to develop recommendations.
- Not so sure the flip chart approach was as effective as anticipated. We have may have missed the opportunity to use a diversity of approaches. Nonetheless, I found the workshop to be productive and effective.