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IMPROVING THE USE OF SCIENCE IN DECISION MAKING
SFERTF WORKSHOP

Workshop Facilitation and Report by

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TABLE OF CONTENTS

IMPROVING THE USE OF SCIENCE IN DECISION-MAKING

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FEBRUARY 17, 2011

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IMPROVING THE USE OF SCIENCE IN DECISION MAKING

SFERTF Workshop, February 17, 2011
Naples, Florida

EXECUTIVE SUMMARY

Shannon Estenoz, Director Everglades Restoration Initiatives, Department of Interior, called the workshop to order and welcomed the over 75 participants. She noted that Mr. Shafroth, Acting Assistant Secretary DOI and Chair of the Task Force, was unable to participate in the workshop due to previously scheduled White House commitments related to the America's Great Outdoors initiative. At the last Task Force meeting in October, 2010 this workshop was proposed following the presentation of the CISRERP October, 2010 Report in recognition of the transition brought by the inauguration of Governor Scott in January 2011, and the appointment of new state leadership positions and by the need to maintain momentum. Ms. Estenoz thanked Tom Strickland for his excellent service and leadership as the Chair of the Task Force from June 2009 to February 16th 2010 and as the Assistant Secretary for Fish Wildlife and Parks, and also thanked Pete Silva for his service on the Task Force as the EPA representative and for his contributions to Everglades restoration. Finally she welcomed Kevin Powers as the Chair of the South Florida Water Management District's (SFWMD) Water Resources Advisory Committee and Eric Buermann as Chair of the SFWMD's Governing Board. Mr. Bauerman was then recognized for his leadership and contributions to Everglades restoration since April 2007.

Ms. Estenoz stated that the Workshop was intended to help improve and where possible accelerate the delivery of restoration benefits by improving the use of science in decision-making. She described the Workshop format as one that would offer members and the audience an opportunity to participate, and introduced Bob Jones and Jeff Blair from the FCRC Consensus Center as facilitators for the Workshop allowing members to focus on the substance of the discussions bringing together two communities of practice: scientists and decision makers.

Greg May, Task Force Executive Director, provided an overview presentation to help frame the Workshop discussions. He pointed out the NRC 2010 Report concluded that accelerated restoration progress is even more important given continued declines in the Everglades ecosystem. As restoration is implemented the changes to the system will require open mechanisms for integrating science into decision-making and robust stakeholder engagement. In order to accelerate restoration benefits by adapting plans, science must inform management decisions. Mr. May noted that the tools for informing decisions need to be developed and refined both at the system-wide planning level and at the project planning level, and this will require an ongoing conversation between decision-makers and scientists at both levels to ensure that decisions are informed by science.

Ms. Estenoz introduced the session on stakeholder engagement and analytic tools by noting that some have disagreed with the goals of the River of Grass planning process. However the presentation was designed to offer examples of the tools for stakeholder analysis that were used during the planning effort regarding restoration alternatives, communicating complex information, and for fully engaged open and transparent stakeholder engagement. Temperince Morgan, Director, Policy and Coordination

Department, SFWMD and Tom Van Lent, Senior Scientist, Everglades Foundation, jointly presented, "ROG Planning and Stakeholder Involvement" outlining how the River of Grass (ROG) planning process used a system-wide perspective which identified a vision and goals of restoration, and used simplified analytic modeling tools (e.g. EverViews) that allowed stakeholders to consider the restoration potential of different alternatives. The planning process led to the identification of new restoration flow targets and developed and evaluated alternatives that considered restoration land needs as well as configurations that could store, treat and deliver restoration flows. The process was fact driven, focused and facilitated, and offered an opportunity for stakeholder learning with open interactions among stakeholders and agency representatives. Following the presentation there was an extended discussion of the "ROG" stakeholder engagement that used analytic and communications tools to link science and collaborative planning, concluding with the following set of possible stakeholder engagement actions identified by Workshop participants:

1. Continue to use these tools for linking science and stakeholder involvement if the River of Grass effort is reopened.
2. Consider the use these tools for linking science and stakeholder involvement after analyzing their portability to other Everglades restoration settings.
3. Ensure decision-makers are informed frequently.
4. Provide education across disciplines.
5. Continue to promote and support the collection, analysis and consistent use of science to inform stakeholders.

Ms. Estenoz introduced Bob Doren, who staffed the Science Coordination Group and headed up the development of system-wide indicators for the Task Force, to provide an overview and current status of the System-wide Ecological Indicators and assessments. Mr. Doran noted that several years ago the Task Force agreed that the hundreds of performance measures did not lend themselves to communicating ecosystem status to decision-makers, managers and the public. To address the need to communicate effectively across disciplines, the Task Force charged the Science Coordination Group, with input from RECOVER scientists, to develop a subset of system-wide indicators and to produce a biannual document that clearly communicates both the justification for the indicators and their current status. Mr. Doren noted that the development of the indictor reporting framework took over four years and a collaboration of many Everglades scientists and managers.

Mr. May introduced Joel Trexler, a scientist with the Florida International University Department of Biological Sciences, who presented on aquatic animals as an example of an indicator. He noted the four species were selected as performance measures to represent different life histories, and the availability of food for wading birds related to the effects of marsh drying. He noted the criteria for establishing the red stoplights related to the number of years, standard errors above or below the limits of the objective interval based on comparisons with the established target and threshold quantitative values with data collected from a number of locations.

The Task Force members, science panel, and Workshop participants clarified that this communication tool provides an assessment tool that looks at operational issues to give a sense of the status of the ecosystem (in the past) and not as an evaluation tool used to predict the future effects of decisions. The discussion included the basis and criteria for how the system-wide indicators were chosen, whether value judgments are involved in the selection, and why for example tree islands, were not chosen as a system-wide indicator but were included as an indicator in the SSR report. This led to a discussion of the importance of noting the different scale and level of management and policy decisions made from a

project level to a system-wide level and the relevance of this tool to these different levels of decisions. At the conclusion of the session the following possible actions regarding the system-wide indicators were identified:

1. A give-and-take ongoing structured dialogue is needed among decision-makers, managers, scientists and stakeholders regarding what is the meaning of the stoplights and how they will be used. The Science Coordination Group should continue to refine and produce the stoplights report for the Task Force.
2. The Task Force should continue to invest in the gathering, monitoring and analysis of the system wide indicators. The Confidence level is based on robust data collection.
3. In using this indicator tool, it is important to clarify with decision-makers in consultation with scientists, whether and when the indicators may have predicative abilities, what they mean, and what specifically produced a particular signal color.

To initiate the final session of the Workshop, Ms. Estenoz noted that when Dr. Frank Davis presented the Report findings in October to the Task Force, he said that the science program is strong and that RECOVER is a good program and recommended that restoration would benefit from better and more transparent mechanisms for integrating science into decision-making.

Dr. Jayantha Obeysekera and Carol Wehle, SFWMD, described a recent meeting with scientists at MIT regarding the potential applicability of integrated multi-criteria decision-making tools in Everglades restoration relative to local and regional operational practices. These tools and this discipline seek to support decision-makers faced with making numerous and sometimes conflicting evaluations by highlighting these conflicts and developing a way to come to a consensus in a transparent alternatives evaluation process. Both noted this was an opportunity to bring academic scholars and technical experts, from outside Florida, who are developing cutting edge ecosystem research tools, to bear on Everglades restoration such as understanding how artificially created wetlands and stem density research can address water quality, quantity and timing. They suggested that traditional decision support tools used for simple optimization of a single objective established by a single decision-maker are inadequate to the task of adaptive management in Everglades restoration. The multi-objective decision tools can help inform decision makers about the relative impacts and "trade offs" that may be involved with potential decisions on multiple system-wide and sometimes conflicting objectives related to water quality, quantity and timing all in the face of uncertainties regarding the resulting cumulative impacts.

The discussion that followed explored a number of questions and issues including: the need for more frequent, regular and effective communication among scientists and managers/decision-makers; the role of science and decision-making in adaptive management; that models are there to guide our thoughts and not do our thinking; that decision makers also need tools that can shed light on what the likely results will be for various potential decisions on options in a multi-objective, multi-jurisdictional environment; the "decision-making process" needs as much clarity and rigor as the scientific process; and the need to reflect back to all stakeholders that their inputs were heard, evaluated and used where appropriate.

On behalf of the Task Force, Shannon Estenoz thanked all of the Workshop participants for their patience and active engagement in the process, as well as the scientists and managers who provided presentations. She suggested that this Workshop was a first step in reflecting on the challenge of linking science with management and enhancing stakeholder involvement in restoration. She summarized the next action steps including:

1. A concerted effort by the Task Force and its partners to continue to build a science framework that can practically link together the various agency modeling efforts at play in Everglades restoration;
2. Facilitating an ongoing conversation among decision-makers, managers, stakeholders and scientists to make the best use of these tools by asking the Science Coordination Group and Working Group to reflect on the Workshop results and to recommend to the Task Force how to further enhance the use of science to inform decision-making and management in Everglades restoration efforts, including how to organize a joint review and analysis of the 2012 biannual system-wide indicators report; and
3. The SFWMD will take the lead in convening an inter-agency team in coordination with the SCG and the Working Group to work on a multi-decision model and identifying the questions the model should answer.

Workshop participants were asked to complete a workshop evaluation survey, and were given directions to the Picayune Strand, Faca Union Canal Pumping Station groundbreaking being conducted the next morning.

The Workshop adjourned at 5:35 PM.

IMPROVING THE USE OF SCIENCE IN DECISION-MAKING

SFERTF Workshop, February 17, 2011
Naples, Florida

A. INTRODUCTION AND WORKSHOP OBJECTIVES

Shannon Estenoz, Director Everglades Restoration Initiatives, Department of Interior, called the workshop to order, welcomed the over 75 participants, and noted that until a new Assistant Secretary for Fish Wildlife and Parks is announced and confirmed by the Senate, Will Shafroth will serve as the Acting Assistant Secretary and as the Chair of the Task Force. She noted that Mr. Shafroth was unable to participate in the workshop due to previously scheduled White House commitments related to the America's Great Outdoors initiative.

She noted that at the October, 2010 Task Force meeting this (February 17, 2011) workshop was proposed in response to the presentation by Dr. Frank Davis, on the 2010 and third assessment report from the National Research Council's Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP). The Task Force Chair, Tom Strickland, noted that one of the key underpinnings of restoration is to base decisions on sound science. As part of that commitment, and consistent with the requirements of WRDA 2000, the Secretary of the Army, the Secretary of Interior and the Governor of Florida established an independent review panel through NRC. The Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP) was asked to prepare a report every two years, as an independent assessment of the progress on the Comprehensive Everglades Restoration Plan (CERP).

The CISRERP October, 2010 Report found that the science supporting Everglades restoration is strong, RECOVER is a sound program and the most recent Monitoring and Assessment Plan (MAP) 2009 Report represents a significant improvement over its predecessor. However, the Report noted that there has been a loss of momentum in developing and refining integrated hydrologic, ecological and biogeochemical models to examine different planning approaches, inform restoration decision-making and provide input for adaptive management. It also questioned whether the institutional structure is in place to link the science findings back to decision-making. The Committee also asked CERP to evaluate the effectiveness of the current stakeholder processes and how they can be enhanced.

Ms. Estenoz thanked Tom Strickland for his excellent service and leadership as the Chair of the Task Force from June 2009 to February 16th 2010 and as the Assistant Secretary for Fish Wildlife and Parks, noting that he was a terrific Chair, a great partner, and a champion for Everglades restoration. She also thanked Pete Silva for his service on the Task Force as the EPA representative and for his contributions to Everglades restoration. Finally she welcomed Kevin Powers as the Chair of the South Florida Water Management District's (SFWMD) Water Resources Advisory Committee and Eric Buermann as Chair of the SFWMD's Governing Board. Mr. Bauerman was then recognized for his leadership and contributions to Everglades restoration since April 2007 as a great partner and visionary, a real statesman and problem solver, and a key player in the District's

acquisition of 26,000 acres as part of the River of Grass effort, representing a real step forward for water quality improvements.

The February 2011 Workshop was planned in recognition of the transition brought by the inauguration of Governor Scott in January 2011 and the appointment of new state leadership positions, and by the need to maintain momentum. In addition, in January both Tom Strickland, Task Force Chair and Assistant Secretary for Fish Wildlife and Parks, and Pete Silva, Environmental Protection Agency, announced their intentions to resign in February. Ms Estenoz noted that the Workshop was intended to help improve and where possible accelerate the delivery of restoration benefits by improving the use of science in decision-making. (See Appendix # 5) She noted that the Workshop focused on Chapter 6 of the NRC Report, "*Use of Science in Decision Making,"* and that it included some short presentations, reserving time for discussion among the Task Force and other Workshop participants. In January 2011, DOI Secretary Salazar, and U.S. Army, Assistant Secretary Darcy, announced their intent to improve the planning process by taking advantage of what we've learned as well as new opportunities. She noted the desire to identify follow-on actions to help accelerate restoration benefits by improving the use of science in decision-making and stakeholder engagement

Ms. Estenoz described the Workshop format as one that would offer members and the audience an opportunity to participate, and introduced Bob Jones and Jeff Blair from the FCRC Consensus Center as facilitators for the Workshop allowing members to focus on the substance of the discussions bringing together two communities of practice: scientists and decision makers. Mr. Jones offered a set of guidelines which workshop participants agreed to utilize. (See Appendix # 4)

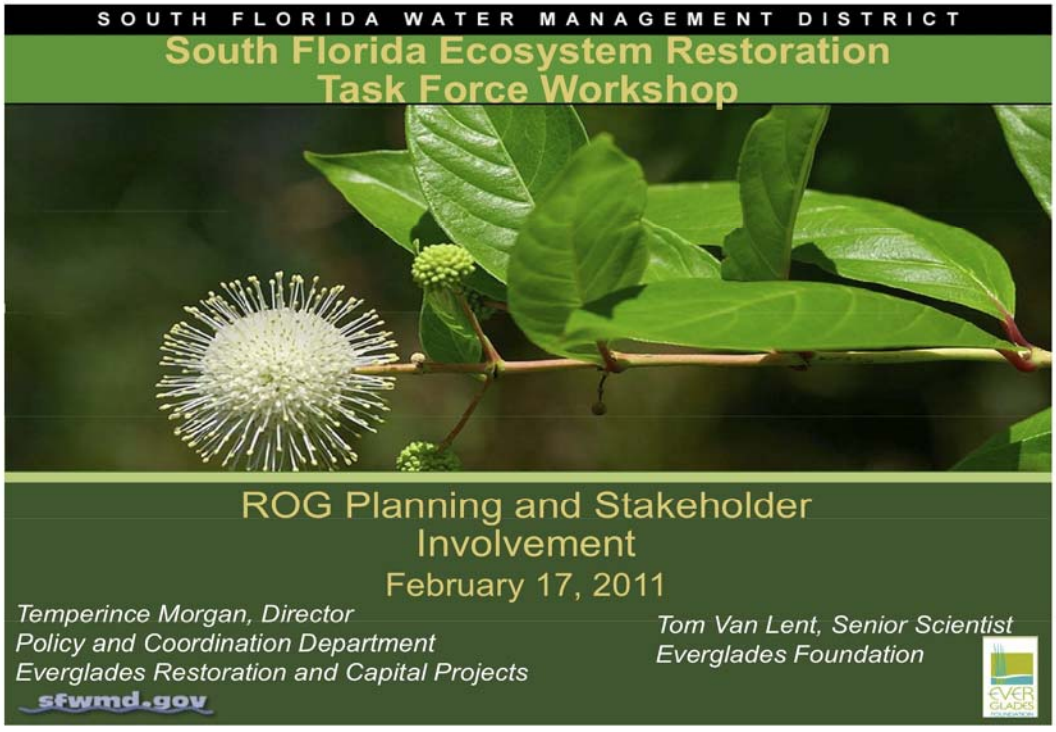
B. Workshop Overview and Framework

Greg May, Task Force Executive Director, provided an overview presentation to help frame the Workshop discussions. He pointed out the NRC 2010 Report concluded that accelerated restoration progress is even more important given the continued declines in the Everglades ecosystem. As restoration is implemented the changes to the system will require open mechanisms for integrating science into decision-making and robust stakeholder engagement. In order to accelerate restoration benefits by adapting plans, science must inform management decisions.

Mr. May suggested that the two processes are very different and linking them presents special communication challenges as well as a need for relevant science synthesis (of science, policy and resources) that can inform decision-making. This was called out in the NRC Report as follows, "Synthesis is 'the process of accumulating, interpreting, and articulating scientific results, thereby converting them to knowledge or information' (NRC, 2003b)... There is a critical need for science synthesis to minimize technical and scientific disagreements that lead to scientific uncertainties that impede restoration decision-making." Mr. May noted that the tools for informing decisions need to be developed and refined at both the system-wide planning level and at the project planning level. This will require an ongoing conversation between decision-makers and scientists at both levels to ensure that decisions are informed by science.

C. Stakeholder Engagement and Tools to Link Science and Collaborative Planning

Ms. Estenoz introduced the session on stakeholder engagement and analytic tools by noting that some have disagreed with the goals of the River of Grass planning process. However, the presentation was designed to offer examples of the tools for stakeholder analysis of restoration alternatives, communicating complex information, and for fully engaged open and transparent stakeholder engagement as was used during the ROG planning effort. She noted the following from the NRC report: "A successful stakeholder process should appropriately match the level of engagement to each interested party and provide adequate resources to maintain that process as long as needed."



Temperince Morgan, Director, Policy and Coordination Department, SFWMD, and Tom Van Lent, Senior Scientist, Everglades Foundation, jointly presented, "ROG Planning and Stakeholder Involvement (See the

presentation slides at http://www.sfrestore.org/tf/documents/handouts_tf_past_021711.html). They outlined how the ROG planning process used a system-wide perspective which identified a vision and goals of restoration, and used simplified analytic modeling tools (e.g. EverViews) that allowed stakeholders to consider the restoration potential of different alternatives. New and emerging science was considered through the convening of technical workshops that involved governmental and non-governmental scientists and hydrologists and that helped develop "bookend" scenarios identifying operational flow targets. The planning process led to the identification of new restoration flow targets, and developed and evaluated alternatives that considered restoration land needs as well as configurations that could store, treat and deliver restoration flows.

The process was fact driven, focused and facilitated, and offered an opportunity for stakeholder learning with open interactions among stakeholders and agency representatives. The presenters suggested that the scenarios generated were both innovative and broad ranging, with some participants bringing their own technical expertise, and that the process was faster because the focus was on reducing (not eliminating) risk and on the issues people care about. They urged the consideration of this approach for future federal and state efforts. Following the presentation there was a extended discussion of this example of stakeholder engagement that used analytic and communications tools to link science and collaborative planning, which is captured on the following table:

STAKEHOLDER ENGAGEMENT AND USING ANALYTIC AND COMMUNICATIONS TOOLS TO LINK SCIENCE AND COLLABORATIVE PLANNING

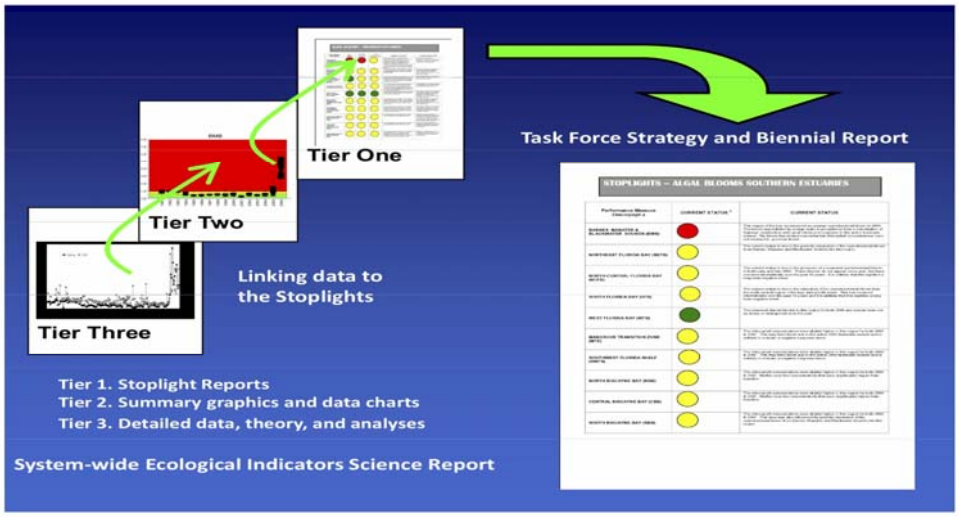
What Worked Well?	***What Were the Challenges?***	***Lessons Learned?***
Technical modeling tools were open, simple and quick to use by public stakeholders and were an effective way to communicate and exchange information and educate stakeholders and staff on science, management challenges and stakeholder perspectives.	Is the ROG collaborative planning approach portable to other restoration initiatives with multiple decision makers?	These new simplified modeling tools can help the planning (not design) phase of restoration processes but require support of high level decision makers, engagement by senior agency staff and support and investment
The flexibility to allow participants to self-select their groups to explore different aspects/issues/locations of Everglades restoration.	Concern that application of ROG interfered with previous consensus on CERP agreements that came from an earlier stakeholder engagement effort.	Explore whether and how to use these tools in the restoration context with multiple decision makers to link science with stakeholder engagement. Consider and address how to handle any legal constraints on their use.
High level of investment, support and involvement of SFWMD staff and frequent briefing governing board kept up to date on progress and results.	How was science prepared, communicated to and utilized by stakeholders in the ROG? How would it be linked in other broad restoration efforts going forward?	Focus on clarifying the decision-making process in restoration efforts and its links to both science and stakeholder engagement.
Didn't focus on everything and reach paralysis, instead focused on key choke points in the restoration effort.	How did ROG impact or inform acquisition or other "decisions"? How was the planning outcomes intended to be used by the Board?	When science is presented openly for consideration in stakeholder collaborative planning, it can build understanding and buy-in.

Possible Stakeholder Engagement Actions Identified by Workshop Participants:

1. Continue to use these tools for linking science and stakeholder involvement if the River of Grass effort is reopened.
2. Consider the use these tools for linking science and stakeholder involvement after analyzing their portability to other Everglades restoration settings.
3. Ensure decision-makers are informed frequently.
4. Provides education across disciplines.
5. Continue to promote and support the collection, analysis and consistent use of science to inform stakeholders.

D. Linking Science and Decision Making: System-Wide Ecological Indicator Stoplights

Ms. Estenoz introduced Bob Doren, who staffed the Science Coordination Group and headed up the development of system-wide indicators for the Task Force, would provide an overview and current status of the System-wide Ecological Indicators and assessments. Mr. Doran noted that several years ago the Task Force agreed that the hundreds of performance measures did not lend itself to communicating ecosystem status to decision makers, managers and the public. To address this need, the Task Force charged the Science Coordination Group, with input from RECOVER scientists, to develop a subset of system-wide indicators and a produce a biannual document that clearly communicates both the justification for the indicators and their current status (Doren et al., 2008). The National Research Council in its 2010 Report suggested the stoplight report with its 11 indicators responding to Everglades ecology should greatly improve communication to both the general public and decision makers. However, rather than assuming this to be the case, the NRC suggested that the Science Coordination Group staff should systematically solicit feedback from these audiences, assess the effectiveness of the current stoplight indicators, and continue to refine and improve them.



Mr. Doren noted that the development of the indictor reporting framework took over four years and was a collaboration of many Everglades scientists and managers. Some indicators respond quickly to environmental drivers (such as Periphyton) whereas some respond more slowly over a large spatial scale (e.g. crocodiles). He noted that both the SSR and that Indicators are now using this multi-tiered approach and are working towards converging on a consistent reporting format to enable an "apples to apples" comparison.

Mr. May introduced Joel Trexler, a scientist with the Florida International University Department of Biological Sciences, who presented on aquatic animals as an indicator example. He noted the four species were selected as performance measures to represent different life histories and availability of food for wading birds related to the effects of marsh drying.

Joel noted the criteria for establishing the red stoplights related to the number of years, standard errors above or below, the limits of the objective interval based on comparisons with the established target and threshold quantitative values with data collected from a number of locations.

Stoplight Annual Assessments

Performance Measure	2000	2001	2002	2003	2004	2005	Current status
Shark River Slough							
eastern mosquitofish	🟢	🟢	🟡	🔴	🔴	🟡	🟡
flagfish	🟢	🟢	🟢	🟡	🟢	🟢	🟢
bluefin killifish	🟢	🟡	🟡	🔴	🟡	🟡	🟡
total fish	🟢	🟢	🔴	🔴	🔴	🔴	🔴
Everglades crayfish	🟢	🟡	🟢	🟡	🔴	🟡	🟡
Non-native fishes	🟡	🟡	🟡	🟡	🟡	🟡	🟡
Taylor Slough							
eastern mosquitofish	🟢	🟢	🟢	🟡	🟡	🟡	🟡
flagfish	○	○	○	○	○	○	○
bluefin killifish	🟢	🟡	🔴	🔴	🔴	🔴	🔴
total fish	🟢	🟢	🟡	🟡	🔴	🔴	🔴
Everglades crayfish	🟢	🟢	🟢	🟡	🔴	🟡	🟡
Non-native fishes	🟡	🟡	🟡	🟡	🟡	🟡	🟡

The Task Force members, science panel and Workshop participants clarified that this communication tool provides an assessment tool that looks to the past at operational issues to give a sense of the status of the ecosystem and is not an evaluation tool used to predict the future effects of decisions. The discussion included the basis and criteria for how the system-wide indicators were chosen, whether value judgments are involved, and why for example tree islands, were not chosen as a system-wide indicator, but were included as an indicator in the SSR report. This led to a discussion of the importance of noting the different scale and level of management and policy decisions made from a project level to a system-wide level and the relevance of this tool to these different levels of decisions.

FEEDBACK ON THE SYSTEM-WIDE ECOLOGICAL INDICATOR STOPLIGHTS AS A COMMUNICATION TOOL

What Has Worked Well?	***What Have Been the Challenges?***	***Lessons Learned?***
Excellent communication tool providing understandable synthesis of hundreds of performance measures.	Scientists need more frequent engagement with both managers and decision makers regarding how they are using the indicators what information they need to inform decisions.	The stoplights are designed as a system-wide assessment tool, not an evaluation tool. They are designed to inform system-wide planning not project level design and operational issues.
The scientific basis for the tool has been tested and demonstrated openly and has resulted in a suite of peer reviewed science based indicators.	How do you decide which indictors actually matter for decision-makers and whether they can be helpful in determining the right course or sequence of restoration actions	Decision-makers and managers need to consider the stoplight indicators in the context of system-wide policy, resource and legal contexts and constraints.
The growing use of increasingly consistent indicators and performance measures by restoration scientists across the Everglades (e.g. Recover, etc).	How do we collectively address the costs involved in maintaining and refining the indicator stoplight tool?	This tool needs ongoing attention ("care and feeding")and investment for it to continue to inform system-wide analysis and decision-making.

At the conclusion of the presentations and after discussion of the stoplight indicator tool, a straw poll taken of the Workshop participants was taken regarding the helpfulness of the tool in the context of the Task Force's mission featuring the following two questions:

1. **The red-yellow-green "stoplight" assessment tool is helpful in communicating the current status of the ecosystem:**

Agree	***Disagree***	***Neutral***
33	**0**	**6**

2. **Over time the red-yellow-green "stoplight" assessment tool will be helpful in communicating the ecosystem response to restoration efforts.**

Agree	***Disagree***	***Neutral***

Workshop Participant Comments after Polling

- How far can science go in helping to inform decisions? How predictive are the stoplight indicators? What level of risk are managers willing to take?
- What happens if wrong decision is made, what are the acceptable levels of risk?
- There is a great value to decision-makers in receiving the consensus peer reviewed science synthesis.
- Need to make clearer the assumptions and value judgments involved in both developing and using the indicators.
- Managers need to add policy, resource and legal variables in analyzing the science synthesis indicators report(s).
- Managers and decision makers need to determine the level of risk they are willing to take and what information they need for management and decision-making and communicate that to the science community.

Possible Actions Regarding the System-Wide Indicators:

1. A give-and-take ongoing structured dialogue is needed among decision makers, managers, scientists and stakeholders regarding what is the meaning of the stoplights and how they will be used. The Science Coordination Group should continue to refine and produce the stoplights report for the Task Force.
2. The Task Force should continue to invest in the gathering, monitoring and analysis of the system-wide indicators. The Confidence level is based on the robust data collection.
3. In using this indicator tool, it is important to clarify with decision-makers in consultation with scientists whether and when the indicators may have predicative abilities, what they mean, and what has produced a particular signal color.

E. Identification and Consideration of Other Tools, Efforts or Engagement Approaches

To initiate the final session of the Workshop, Ms. Estenoz noted that when Dr. Frank Davis presented the Report findings in October to the Task Force, he said that the science program is strong and that RECOVER is a good program. He recommended that restoration would benefit from better and more transparent mechanisms for integrating science into decision-making. Based on conflicting feedback from various parties, he asked whether the institutional structure is there to link the science findings back to decision-making. He noted a loss of momentum in developing and refining integrated hydrologic, ecological and biogeochemical models to examine different planning approaches and inform restoration decision making, and provide input for adaptive management and the need for better systems planning support tools.

Dr. Jayantha Obeysekera and Carol Wehle, SFWMD, described a recent meeting with scientists at MIT regarding the potential applicability of integrated multi-criteria decision-making tools in Everglades restoration relative to local and regional operational practices. These tools and this discipline seek to support decision-makers faced with making numerous and sometimes conflicting evaluations, by highlighting these conflicts and developing a way to come to a consensus in a transparent alternatives evaluation process. Both noted the opportunity to bring academic scholars

and technical experts, from outside Florida, who are developing cutting edge ecosystem research tools to bear on Everglades restoration such as understanding how artificially created wetlands and stem density research can address water quality, quantity and timing. They suggested that traditional decision support tools for simple optimization of a single objective established by a single decision-maker are inadequate to the task of adaptive management in Everglades restoration. These tools can help inform decision-makers about the relative impacts and "trade offs" that may be involved with potential decisions on multiple system-wide and sometimes conflicting objectives related to water quality and water quantity and timing all in the face of uncertainties regarding the resulting cumulative impacts.

The discussion that followed explored the following questions and issues:

- More regular and effective communication among scientists and managers/decision-makers is needed. Decision-makers and managers need to communicate to scientists what is really needed.
- What do decision makers and managers need to communicate to scientists about what they need to make informed decisions?
- Managers need to engage in a dialogue with scientists and communicate what types of information they need, what resources are available and by when they are needed (i.e. time-frames should be identified). We need to review the different level of decisions that need to be made. Managers need scientists input for developing tools.
- Planning, policy and science has to be coordinated and communicated (we need to share knowledge at all levels).
- There is an ongoing need to build learning into adaptive management. It should be a process that allows for learning from mistakes or judgments and adjust accordingly.
- Adaptive management requires risk taking and monitoring, feedback and learning regarding the benefits and relative harm of decisions, whereas the traditional system strives to make the right decision every time.
- Adaptive management processes should include stakeholders in a meaningful way: open engagement is critical. The Forum/Process regarding public participation should be open and transparent in order to build trust, understanding, and buy-in for the results and ultimately for the decisions made.
- Models are there to guide our thoughts not do our thinking.
- Managers have data but not the tools to assess what the science means and how to interpret it.
- Decision makers also need tools that can shed light on what the likely results will be for various potential decisions on options.
- Additional modeling tools that focus on decision-making in a multi-objective, multi-jurisdictional environment are needed.
- Criteria need to be developed to help determine what a good or bad decision is, and what warning signs or tipping points should be considered to avoid harm.
- We need to clarify and bring more rigor to the "decision-making process" just as we have done for the scientific process.
- The ACOE should consider utilizing the kind and quality of stakeholder involvement in the ROG process ("getting more brains to the table early on") for the federal planning process.
- Once the dust has settled on the U.S. Sugar acquisition the WMD intends to restart the River of Grass planning process.

- There is a need to rethink how and how quickly plans can be formulated to focus on the truly needed information needed for making decisions.
- In these planning efforts, all need to recognize that they won't get everything they want and they may learn through the engagement process that other things are important.
- The SFWMD and other Task Force partners should further develop the multi-decision model development (decision-making model and not a design model). Scientists can tell managers the type of questions that can be answered by science.
- There is a need to know what resources are available up-front so stakeholders understand the scope, resource constraints and goals.
- Need to reflect back to all stakeholders that their inputs were heard, evaluated and used where appropriate.

F. NEXT ACTION STEPS

On behalf of the Task Force, Shannon Estenoz thanked all of the Workshop participants for their patience and active engagement in the process, as well as the scientists and managers who provided presentations. She suggested that this Workshop was a first step in reflecting on the challenges of linking science with management and enhancing stakeholder involvement in restoration. She summarized the next action steps including:

1. A concerted effort by the Task Force and its partners to continue to build a science framework that can practically link together the various agency modeling efforts at play in Everglades restoration;

2. Facilitating an ongoing conversation among decision-makers, managers, stakeholders and scientists to make the best use of these tools by asking the Science Coordination Group and Working Group to reflect on the Workshop results and to recommend to the Task Force how to further enhance the use of science to inform decision-making and management in Everglades restoration efforts including how to organize a joint review and analysis of the 2012 biannual system-wide indicators report; and

3. The SFWMD will take the lead in convening an inter-agency team in coordination with the SCG and the Working Group to work on a multi-decision model and identifying the questions the model should answer.

At the conclusion of the Workshop participants were asked to complete a Workshop evaluation survey.

The Workshop adjourned at 5:35 PM.

APPENDIX # 1—WORKSHOP AGENDA

SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE
February 17, 2011
Workshop Agenda
North Collier Regional Park Exhibit Hall
15000 Livingston Road
Naples, Fl 34109

Task Force Duties: To provide intergovernmental coordination, exchange information, facilitate the resolution of conflict, coordinate programmatic science, assist members, and promote public participation.

Context for the Workshop

- *The National Research Council (NRC) reports that accelerated restoration progress is even more important given continued declines in the ecosystem.*
- *To adapt and maximize restoration progress going forward, science and decision making must be thoughtfully linked and stakeholders fully engaged.*
- *In January Secretary Salazar and ASA(CW) Darcy committed to an improved planning process that would be informed by what we've learned.*
- *The NRC reports that as restoration begins to change the ecosystem, open and transparent mechanisms for integrating science into decision making will be beneficial for everyone.*

Public engagement will take place at various points throughout this interactive workshop. The Chair will call a break at a convenient time during the workshop.

Thursday, February 17, 2011 – Task Force Workshop 1:00 – 5:30PM

Welcome, Workshop Goals, Guidelines and Introductions (Tab 1) *The workshop responds to the National Research Council (NRC) recommendations and Task Force guidance from the October meeting and will identify follow-on actions to help accelerate restoration benefits by improving the use of science in decision making and stakeholder engagement.*	Will Shafroth
Linking Science and Decision Making (10 p) (Tab 2) ***Purpose:*** *To provide a project-level and system-wide example of tools for linking science and management. In order for science to be useful to decision makers, it must be communicated in understandable terms and related to actions that they can control.*	Greg May
Stakeholder Involvement and Analytical Tools (15 p) (Tab 3) ***Purpose:*** *To present an example of analysis and communication tools as well as robust stakeholder involvement used in restoration planning.*	Temperince Morgan Tom Van Lent
Discussion Regarding the Example Above ***Purpose:*** *To discuss the use of the analytical and communication tools and stakeholder involvement in restoration planning. The NRC report recommends strengthening analytical tools for evaluating restoration planning alternatives and implementing more robust stakeholder engagement practices.*	Facilitated Discussion

SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE

February 17, 2011

Workshop Agenda

North Collier Regional Park Exhibit Hall
15000 Livingston Road
Naples, Fl 34109

Continued – Thursday, February 17, 2011

System-wide Ecological Indicators, Background and Status (15 p) (Tab 4) ***Purpose:*** *To provide an overview of the tool that the Task Force uses to assess the current status of the ecosystem and to track how it will respond to implementation of the suite of projects and operational changes over time.*	Bob Doren
System-wide Ecological Indicator Example (10 p) (Tab 5) ***Purpose:*** *To provide an overview of the underlying science and communication of the status of one of the indicators.*	Joel Trexler
Feedback on the System-wide Ecological Indicator Stoplights as a Communication Tool ***Purpose:*** *To solicit feedback regarding the System-wide Ecological Indicator stoplight assessments as a communication tool. The NRC stated that the stoplight assessment does an excellent job of communicating the status of each indicator but recommended that feedback should be sought in order to refine future assessments.*	Facilitated Discussion
Multi-Objective Decision Tools (10 p) ***Purpose:*** *To provide an update on the South Florida Water Management District's collaboration with MIT to develop tools for maximizing restoration benefits through analysis using multiple criteria.*	Carol Wehle
What Other Tools, Efforts, or Engagement Approaches do We Need and What Needs to be Improved? ***Purpose:*** *To discuss and identify improvements to current efforts and other mechanisms that could be used to enhance the use of science in decision making.*	Facilitated Discussion
Follow-on Actions Discussion ***Purpose:*** *To identify specific follow-on actions to ensure an on-going comprehensive and layered dialogue between scientists and decision makers and to help accelerate restoration benefits by improving the use of science in decision making and stakeholder involvement in restoration planning.*	Facilitated Discussion
Adjourn	Will Shafroth

Friday, February 18, 2011 Groundbreaking Ceremony 10:00 – 11:30AM

Evite and Directions (Tab 6)	Updated 2/04/11

APPENDIX # 2—PARTICIPANT LIST

Task Force Members/Alternates/Ex Officio/Guests Present

1. Shannon Estenoz, Director, Everglades Restoration Initiatives, U.S. Department of Interior for Will Shafroth Acting Assistant Secretary and Chair of the Task Force
2. Jose 'Pepe' Diaz, Commissioner, Miami Dade County
3. Gene Duncan, Miccosukee Tribe of Indians
4. David Hawk, Chief Operating Officer for Linda Lawson, □ Director, Office of Safety, Energy and Environment, U.S. Department of Transportation
5. Jim Giattina, Water Protection Division Director□ , Environmental Protection Agency, Region 4
6. Greg Knecht for Herschel Vinyard, Secretary, □ Department of Environmental Protection□
7. Greg May, Executive Director, SFERTF
8. Patricia Power, Consultant to the Seminole □ Tribe of Florida□ for Jim Shore, General Counsel
9. Kevin Powers, Chair, Water Resources Advisory Commission, Governing Board member, South Florida Water Management District
10. Larry Robinson, Assistant Secretary, National Oceanic and Atmospheric Administration
11. Rock Salt, Principal Deputy Assistant Secretary for Jo-Ellen □ >Darcy, Assistant Secretary of the Army□
12. Keith Saxe, Assistant Chief for Ignacia Moreno, Assistant □ Attorney General, U.S. Department of Justice
13. Carol Wehle, Executive Director, South Florida Water Management District
14. USDA)
15. Ed Wright, Environmental Liaison for Ann Mills, Deputy Under Secretary U.S. Department of Agriculture
16. Susan Markely, Chair, Science Coordination Group, Miami Dade DERM
17. Dan Kimbal, Chair, Working Group
18. Eric Buermann as Chair of the SFWMD's Governing Board

Workshop Presenters

1. Dr. TomVan Lent, Everglades Foundation
2. Temperince Morgan, SFWMD
3. Bob Doren, Retired, former
4. Joel Trexler, FIU
5. David Policansky – NRC Staff
6. Matt Harwell - USFWS□
7. Jayantha Obeysekera, SFWMD

Workshop Participants

1. Stu Appelbaum ACOE Jacksonville

2. Sarah Barmeyer – NPCA
3. □ Ronnie Best – USGS
4. Joan Browder – NOAA
5. Tony Buitrago - Everglades Partner Joint Venture (EPJV)□
6. Billy Causey – NOAA
7. Chuck Collins - FFWCC□
8. Brad Cornell - Collier Audubon□
9. Eric Draper – Florida Audubon□
10. Debra Drum - SFWMD□
11. Rebecca Elliott - SFWMD□
12. □ Jennifer Hecker - Conservancy of SW Florida□
13. □ Dave Horning – FWS
14. □ Julie Hill-Gabriel - Audubon of Florida□
15. Susan Gray - SFWMD□
16. Todd Hopkins - USFWS□
17. Eric Hughes - EPA
18. Don Jodrey, DOI
19. Bob Johnson – NPS, Everglades National Park□
20. Susan Kaynor - ACOE Jacksonville □
21. Michael Kinard - ACOE Jacksonville □
22. Steve Kopecky - ACOE HQ□
23. Judd Laird, Lakepoint restoration□
24. Patrick Leonard - FWS□
25. Tom MacVicar - Consultant□
26. Mike Magley - ACOE Jacksonville □
27. John Marshall - Arthur R Marshall□ Foundation
28. Troy McPherson - Conservancy of SW Florida
29. Gail Mitchell – EPA
30. Sylvia Pelizza - FWS□
31. COL Pantano ACOE Jacksonville □
32. Pete Quasius - Collier Audubon (pronounce cautious)□
33. Stephanie Romanach - USGS□
34. Barry Rosen – USGS
35. General Todd Semonite - SAD Commander Corps□
36. Dawn Shirreffs - NPCA□
37. Fred Sklar - SFWMD□
38. Kim Taplin ACOE Jacksonville□
39. Tom Teets - SFWMD□
40. Dave Tipple ACOE Jacksonville
41. Steve Trexler - USFWS□
42. Garrett Wallace - SFWMD□ □ □

43. Lori Whitaker – SFWMD

SFERTF Staff

Carrie Beeler, Kevin Berger, Allyn Childress, Jose Calaleiro, Dennis Duke, Mary Plumb and Sandy Soto

Facilitators

Robert Jones and Jeff Blair, FCRC Consensus Center

APPENDIX # 3—WORKSHOP EVALUATION SUMMARY

SOUTH FLORIDA ECOSYSTEM RESTORATION TASK FORCE WORKSHOP

FEBRUARY 17, 2011—NAPLES FLORIDA
WORKSHOP EVALUATION SUMMARY

Task Force Member Evaluations= 5 of 11 members *(Federal, State, Regional and Tribe)*
Audience Participant Evaluations= 14

Notes on Evaluation Results:

- Participants rated each item using a 10 to 0 scale, where **10 means totally agree and 0 means totally disagree**.
- **Averages** = the overall mean average of the Task Force members and the Audience members separately.
- **Standard deviation**= the level of divergence in rankings for each group. Generally a 2.0 or less means relatively little variance (i.e. rankings mostly cluster around the average); 2.1 and higher means there was a higher level of variance (i.e. rankings may include some high marks 8-10 as well as low marks 0-3). So for example statement B # 5 TF responses included: two 10s, an 8, 6 and 1 ranking resulting in a standard deviation of 3.3. B #5 Audience responses included: four 10s, one 9, three 8s, one 7, one 6, two 5s, one 4 and one 2 resulting in a standard deviation of 2.5.
- For the Task Force the standard deviation ranged from a low of 1.0 to a high of 3.3. For Audience participants the standard deviation ranged from a low of 1.3 to a high of 2.9.
- **Caution should be taken in analyzing these results due to the relatively small number of surveys for both the audience and the Task Force.**

PLEASE ASSESS THE OVERALL WORKSHOP.

Task Force Average	*Standard Deviation*	*Audience Average*	*Standard Deviation*	
8.75 of 10	1.3	7.9 of 10	**1.7**	1. The agenda packet was very useful.
6.4 of 10	2.2	7.7 of 10	**2.1**	2. The workshop goals were stated at the outset.
6.75 of 10	1.3	7.0 of 10	**2.2**	3. Overall, the workshop goals were fully achieved.

PLEASE TELL US HOW WELL THE FACILITATORS HELPED THE PARTICIPANTS ENGAGE IN THE MEETING.

Task Force Average	*Standard Deviation*	*Audience Average*	*Standard Deviation*	
7 of 10	2.8	8.0 of 10	2.4	13. The facilitators made sure the concerns of all workshop participants were heard.
7.6 of 10	2.7	8.0 of 10	2.5	14. The facilitators helped us arrange our time well.

PLEASE TELL US YOUR LEVEL OF SATISFACTION WITH THE MEETING?

Task Force Average	*Standard Deviation*	*Audience Average*	*Standard Deviation*	
8.5 of 10	1.5	6.8 of 10	2.5	18. Overall, I am very satisfied with the workshop.
9 of 10	1.0	6.0 of 10	2.6	19. I am satisfied with the outcome of the workshop

WHAT DID YOU LIKE BEST ABOUT THE MEETING?

Task Force Comments

- Tool description
- Discussion on use of stoplights.

Participant Comments

- Linking planning, policy and science.
- The important issues discussed
- Presentation on the "stop light" indicators; great start but the process requires refinement.
- Stakeholder involvement emphasized.
- Although we were still "audience", open discussion and dialogue was important
- River of Grass workshops restart coming
- Comments from audience
- The process and the involvement of the audience.
- Questions and comments from Task Force members
- More open discussion and public involvement

HOW COULD THE WORKSHOP HAVE BEEN IMPROVED?

Task Force Comments

- We need to next examine what the decision process is and we make collaborative or collection decisions.

Participant Comments

- More time
- Unclear about next steps
- Longer time and increased focus on actionable follow up items
- More examples on the use of indicators

- More in depth description of the River of Grass process. No on explained or provided examples of how the models were used in the process
- We started talking about stakeholder engagement and benefits analysis and never explained how the ROG engagement can be used with Federal FACA.
- More emphasis on valuing ecosystem services using the Costanza synthesis.
- Facilitation was poor overall lack of steering. Program wandered all over and did not focus well. Another meeting that will make no difference. Disappointing.
- Offer as much time for "audience" as for panelists.
- Actually identify what kind of science managers need. Have no idea what the "stakeholder" process of ROG was exactly.
- Waste of lots of very highly paid government/state salaries.

DO YOU HAVE ANY OTHER COMMENTS THAT YOU WOULD LIKE TO ADD?

Participant Comments

- Thank you for having this dialogue. We as scientists want "our science" to have a value. Help us deliver what you need to make your decisions.
- I look forward to participating in the next steps discussed at this meeting.
- We never gave the details of how to change the USACE planning process. There were not new benefits methodologies even discussed. The ROG example would not even fly with USACE review process.
- More discussion on the definition of synthesis. Written comments were submitted to Chair person Estenoz.
- Did well to cram a lot into a short time.
- The overall workshop was very useful and beneficial. The only downside was the short amount of time. Great job to the organizers.
- Please don't waste paper/ink with full page prints of blue slides. Try notes format or 2-4 slides per page.
- Did not get any understanding of "science" in the ROG stakeholder process. Who/how determined the 1-2-3-4 restoration scores? How did science get integrated with other factors like cost/acre or cane production? Is there any example of how these stakeholder team scenarios were incorporated into acquisition? What exactly was the project effect of acquisition on flow goal?
- Don't see objective evidence to show that process wasn't skewed by SFWMD's predetermined outcome. Ms. Whele said it wasn't process driving the acquisition, then what was it? What decisions did it influence? Her comment was more informative than entire presentation. "Planning overtaken by events" would have been better to show more "tools" Don't see connection to decisions; which seems to support Mr. Duncan's comment. Did not like facilitator's deflection of Mr. Duncan. Thought it was patronizing. What scientists put data on the table? Why didn't they show us that?
- Questions on the meeting evaluation are too self-serving. Maybe objectives that were state were met, but state objectives did not address issue of science in decisions well.
- Including stakeholders in the process design and assurance of incorporation of collaborative recommendations into decision making is key.

COMMENT FORM: Jennifer Hecker, Conservancy of Southwest Florida

1. In employing analytical tools such as valuation tools, it is important to include all values (such as ecological/habitat values not included in the River of Grass process). Excluding those upfront (such as assuming farm lands don't have habitat values, though in many

instances they do) results in potentially overlooking important tradeoff between values (e.g. water storage vs. habitat protection for upland wildlife species).

2. Ecological indicator stoplights are helpful to identify deficiencies or trends, but are not data rich enough to form management decisions and in turn, policy changes to implement such adaptive management decisions.
3. The Ecological Indicator Spotlights are not helpful in communicating the ecosystem response to on-going restoration efforts in instances where external factors are influencing trends (e.g. higher nutrient load inputs leading to declining water quality despite efficient STAs functioning as planned). Would not recommend their use for assessing restoration progress without investigation to identify and quantify the influence of external factors as well.

APPENDIX # 4—WORKSHOP GUIDELINES

- The workshop and the various presentations and sessions will be an informal opportunity to explore challenges and identify opportunities linking science with decision making.
- **The facilitator** will seek to provide opportunity for comments, balance participation & minimize repetition. Look to the facilitator and raise your hand to be recognized to speak. Facilitator(s) will call on participants in turn.
- **The Task Force members** will have an opportunity to pose questions or offer ideas in relation to their coordination mission and at the conclusion of the Workshop review any ideas on the Task Force's role in enhancing the linkages.
- **The workshop presenters** will be asked to answer clarifying questions and then participate in the workshop discussion of challenges and options for each session.
- **The public participants** will be encouraged to offer comments and suggestions during each session.
- Offering or exploring an idea does not necessarily imply support for it.
- Participants are encouraged to look for themes emerging from the discussion.
- Listen respectfully to understand others' ideas and opinions. Seek a shared understanding even if you don't agree.
- Be focused and concise in offering your points and contributions and share the airtime.
- **Parking Lot.** Facilitators will help capture topics that are important but not directly on point at this Workshop or too complex to deal with during the workshop in a "parking lot" which will be part of the Workshop report.
- **Comment Form.** There will not be a separate public comment for the Workshop. Please use the comment for written comments you would like to be included in the workshop report.

APPENDIX #5—LINKS TO WORKSHOP PRESENTATION MATERIALS

http://www.sfrestore.org/tf/documents/handouts_tf_past_021711.html

APPENDIX #6—ABOUT THE CENTER

CONSENSUS CENTER

"Facilitating Consensus Solutions, Supporting Collaborative Action."

http://consensus.fsu.edu/

The Florida State University
Morgan Building, Suite 236
2035 East Paul Dirac Drive
Tallahassee, FL 32310
Phone: (850) 644-6320
Fax: (850) 644-4968

Mission: **The FCRC Consensus Center serves as an independent public resource facilitating consensus solutions and supporting collaborative action.**

The Consensus Center, based at Florida State University in Tallahassee and University of Central Florida in Orlando, provides consensus building, collaboration and consultation services, education, training and research to build consensus solutions to public challenges, facilitate a broader understanding of the value of consensus solutions and collaborative approaches and create a cadre of citizens, leaders, professionals and students skilled in using collaborative consensus building processes.

The Center offers neutral technical assistance to a wide range of professionals, agency staff and private citizens and organizations engaged in collaboration on public challenges. We help to design and implement efforts for community and public problem-solving and strategic planning, intergovernmental collaboration, and on land use, environmental, energy and other issues.

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