

# **“Public Water Supply Utilities Climate Impacts Working Group”**

## **WORKSHOP REPORT**

### **Workshop Four**

**Friday, October 7, 2011**

**8:30 – 4:00pm**

**Prepared by  
Lisette Staal, Research Coordinator  
UF Water Institute**

**Hosted by  
Orlando Utilities Commission in Orlando, Florida**

## Contents

|                                                                                                                                                                                                         |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Contents.....                                                                                                                                                                                           | 1                |
| Background: .....                                                                                                                                                                                       | 3                |
| Participants: .....                                                                                                                                                                                     | 3                |
| Goal:.....                                                                                                                                                                                              | 3                |
| Outcomes:.....                                                                                                                                                                                          | 4                |
| Detailed Summary of Workshop 4:.....                                                                                                                                                                    | 4                |
| <b><i>Session 1 – Context and Background .....</i></b>                                                                                                                                                  | <b><i>4</i></b>  |
| Welcome and Introductions .....                                                                                                                                                                         | 4                |
| Looking Back/Looking Forward.....                                                                                                                                                                       | 5                |
| Participant updates.....                                                                                                                                                                                | 5                |
| Task Group updates .....                                                                                                                                                                                | 6                |
| <b><i>Session 2: Introduction: NOAA – CSI Project -"Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning." .....</i></b>          | <b><i>7</i></b>  |
| <b><i>Session 3: Climate projections for Florida: Can we trust the models?" .....</i></b>                                                                                                               | <b><i>7</i></b>  |
| <b><i>Session 4: Collaborative Planning: NOAA-CSI project - "Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning." .....</i></b> | <b><i>9</i></b>  |
| Group Station 1: Utility relevant retrospective simulations and future climate predictions .....                                                                                                        | 10               |
| (Vasu Misra) .....                                                                                                                                                                                      | 10               |
| Group Station 2: Applications of climate information in utilities planning processes, models and decisions support systems (Wendy Graham) .....                                                         | 11               |
| Group Station 3: Knowledge management system (Tracy Irani) .....                                                                                                                                        | 12               |
| Group Station 4: Building the working group. (Lisette Staal) .....                                                                                                                                      | 12               |
| Next Steps for Project Output – Utility relevant retrospective simulations and future climate projections (Vasu Misra) .....                                                                            | 13               |
| Next Steps for Project Output - Applications of climate information in utilities planning processes, models and decision support (Wendy Graham) .....                                                   | 13               |
| Next Steps for Project Output - Knowledge Management System – (Tracy Irani) .....                                                                                                                       | 14               |
| Next Steps for Project Output - Building/ maintaining the group-(Lisette Staal).....                                                                                                                    | 14               |
| <b><i>Session 5: Next Steps – Public Water Supply Utility Climate Impacts Working Group</i></b>                                                                                                         | <b><i>14</i></b> |
| <b><i>Session 6: Reflection and Evaluation .....</i></b>                                                                                                                                                | <b><i>14</i></b> |

|                                                                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| APPENDIX 1 – Agenda .....                                                                                                                                                       | 16 |
| APPENDIX 2 – List of Participants .....                                                                                                                                         | 18 |
| APPENDIX 3 – Draft Research Agenda Matrix.....                                                                                                                                  | 20 |
| APPENDIX 4 – Brief of potential Outreach avenues .....                                                                                                                          | 24 |
| APPENDIX 5 – Brief Project Description - "Collaborative Development of Public Water Supply Utility<br>Relevant Climate Information for Improved Operations and Planning." ..... | 25 |
| APPENDIX 6 – Summary of feedback survey responses (1 low - 5 high) .....                                                                                                        | 27 |

**WORKSHOP Four – “Public Water Supply Utilities Climate Impacts Working Group”**  
**Friday, October 7, 2011, 8:30 – 4:00 pm, Orlando Florida**

**Background:**

This is a report of the fourth workshop of the Public Water Supply Utilities Climate Impacts Working Group bringing together interested stakeholders from public water supply utilities, water management districts and academic institutions in Florida. The UF Water Institute, Southeast Climate Consortium, Florida Climate Institute and the UF IFAS Center for Public Issues Education in partnership with six major public water supply utilities, and three water management districts are focused on increasing the relevance and usability of climate change and variability data and tools to the specific needs of public water supply utilities in Florida. The partners are interested in understanding and addressing how climate variability/change and sea level rise may impact planning and operations of Florida’s public water supply utilities. Detailed information on the “Working Group” is available at the UF Water Institute website [http://waterinstitute.ufl.edu/workshops\\_panels/PWSU-CIWG.html](http://waterinstitute.ufl.edu/workshops_panels/PWSU-CIWG.html)

**Participants:**

Each of the previous 3 workshops was attended by over twenty participants from partnering organizations. Participation continues to grow. Twenty-seven people participated in this workshop including representatives from several organizations that had not engaged previously (see Appendix 1 for workshop agenda, and Appendix 2 for list of participants). In addition, others have expressed interest in participating in the effort, but were not available to participate in this workshop.

**Goal:**

The overall goal of the workshop was to jointly explore opportunities for the working group provided by the recently funded NOAA-CSI project, and to begin collaborative planning as part of the working group. Due to the dynamic nature of the group, with new people/organizations continuing to enter the process, the workshop also focused on bringing everyone up to speed on the progress and core interests of the PWSU-CIWG identified to date. Finally, a key goal focused on determining next steps for the working group.

The specific objectives were to:

1. Review the progress and core interests of the PWSU-CIWG shared to date, and update on pending tasks.
2. Explore opportunities provided by the NOAA-CSI project drawing on PWSU-CIWG key interests in communication/information, science, research, partnership/outreach, and begin collaborative planning.
3. Determine next steps.

## **Outcomes:**

At the meeting, the group agreed on the following:

1. Collaborative planning for the implementation of the NOAA CSI project should move ahead soon.
  - a. An executive advisory group for the NOAA-CSI project was formed( volunteers included - Nancy Gallinaro , Jaynatha Obeysekara, Mike Cullen, Doug Yoder, Alison Adams, Penni Redford, Tirasew Asefa. The executive advisory group will meet with the Project PIs within a month.
  - b. Agreed that identifying teams around each of the NOAA-CSI project “output” areas would be advisable.
2. PWSU-CIWG should continue to meet on a quarterly basis.
  - a. Planning team volunteers included Rob Teegarden, Kevin Morris, Tirasew Asefa, Jessica Bolson, Nancy Gallinaro. Lisette Staal will coordinate meeting with the planning team.
  - b. The next quarterly PWSU-CIWG meeting should be planned for approximately January 2011.

## **Detailed Summary of Workshop 4:**

### **Session 1 – Context and Background**

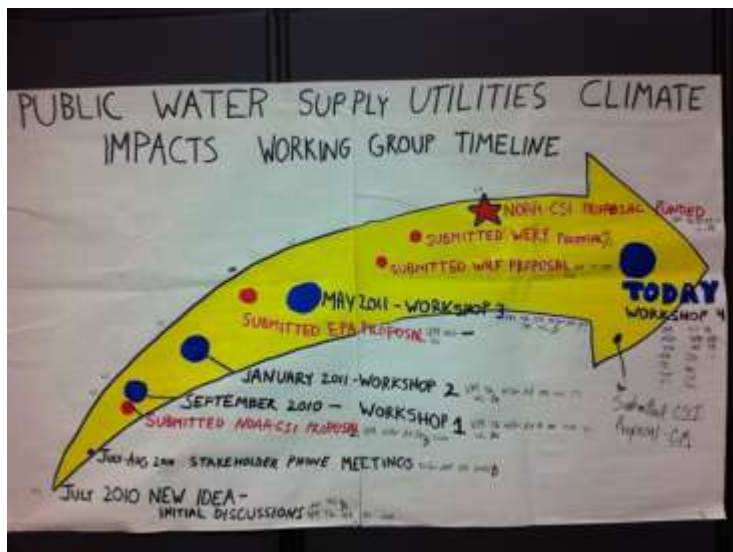
#### **Welcome and Introductions**

Lisette Staal, (UF Water Institute) workshop facilitator, welcomed the participants. During the brief period prior to the start of the workshop a timeline was posted on the wall and participants were asked to initial next to each of the previous working group activities in which they had been engaged (see figure 1). Then, participants introduced themselves, their institutions, and shared how many of the previous PSWU-CIWG activities in which they participated. There were 27 participants from 12 different institutions representing a mix of academics, water resource

suppliers and managers. Of those 27, 5 had never participated before, and 10 had participated in all of the previous workshops.

### Looking Back/Looking Forward

Lisette Staal provided a brief presentation tracing the evolution of the PWSU-CIWG from the initial idea through to the current workshop, highlighting key activities. The idea was brought forward to both the Florida Climate Institute and the UF Water Institute by Alison Adams, Tampa Bay Water. Following several initial information gathering activities there have been 4 workshops and 6 proposals submitted related in some way to the working group effort. In



particular, Lisette emphasized several of the substantive discussions that have helped guide the group to date regarding Utility challenges, needs, and priorities. She also noted that the framework guiding our interactions in the working group is based on theoretical foundations in education, system modeling and collaborative learning. The NOAA-CSI project provides an avenue to move forward on specific applications relevant to utilities, while the working group continues to keep a broader perspective and seeking more opportunities. [Click link here to see presentation.](#)

### Participant updates

As part of the morning warm-up, participants posted relevant “headlines” to share with the group regarding any activities or items of interest. Penni Redford, West Palm Beach, read out the headlines, and each of the participants shared more information regarding the item of interest.



Several “headlines” were shared (See Figure 2) on the next page.

Figure 2: “Headlines” shared by participants of recent updates

**National Climate Assessment!** *Jayantha Obeysekara*  
**AWWA Demand Forecast and Climate!** *Tirusew Assefa*  
**3-State water manager Assessment Survey Begun!** *Chris Martinez*  
**Jim Jones lead author on SE Climate Assessment with Lynne Carter of the NCA !** *Jim Jones*  
**Drought Proofing – West Palm Beach!** *Penni Redford*  
**SECC is leading the SE regional technical report to NCA!** *Keith Ingram*  
**New NOAA – CSI Proposal submitted!** *Chris Martinez*  
**Availability of statistically down-scaled projections!** *Katharine Hayhoe*  
**La Nina returns for a second year!** *David Zierden*  
**Trip to Australia – research proposal with SA Water on water quality and climate change!** *Alison Adams*  
**NSF Call for proposals!** *Jayantha Obeysekara*  
**ACF water/drought newsletter launched!** *Chris Martinez*  
**NOAA CSI Project \$ Arrived!** *Wendy Graham*

### Task Group updates

Four task groups have been focused on specific areas of interest over the last several meetings to address issues identified by the group. The task groups included:

1. Research - Develop a Florida Public Water supply Utility Research Agenda, Lead, Tirusew Asefa, Tampa Bay Water (formed in Workshop 2, January 20, 2011)
2. Science - Plan science workshops to highlight recent climate change/climate variability/SLR relevant to Public Water Utilities, Lead, Wendy Graham, University of Florida. (formed in Workshop 2, January 20, 2011)
3. Explore ways to leverage SUS/FAU/FCI climate white papers on "Water Management", Lead, Len Berry and Nicole Hammer, Florida Atlantic University (formed in Workshop 2, January 20, 2011)
4. Outreach - Explore and suggest mechanisms to share the efforts of PWSU-CIWG with others including smaller utilities, Lead, Jessica Bolson, Miami University (formed in Workshop 3, May 4, 2011)

Brief updates on the task groups were provided. Tirusew Asefa, Tampa Bay Water, assumed leadership of the Research Agenda task group following workshop 3. Since the last workshop, Tirusew worked to update the research agenda matrix based on input from the working group members, and [provided a brief presentation](#) on the current status and distributed the most recent research matrix to the participants. (See Appendix 3 for current draft research agenda). Jessica Bolson, University of Miami focused on the Outreach (task group 4) and shared methods for



outreach and contacting other utilities that might be interested in the PWSU-CIWG (See Appendix 4). Jim Jones, Florida Climate Institute, provided a brief update on the SUS/FCI/FAU white papers series, and upcoming activities that might be of interest to the group. The Science task group (group 2) organized presentations by Drs. Katherine Hayhoe and Jayantha Obeysekara, which were a key part of this workshop (see Session 3).

## **Session 2: Introduction: NOAA – CSI Project -"Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning."**

Dr. Wendy Graham, Director of the Water Institute and PI on the NOAA-CSI Project, gave “a refresher” on the development of the NOAA proposal. The NOAA proposal played an integral part in the development of the PWSU-CIWG concept. Dr. Graham reviewed the original proposal participants and identified new partners who have joined the working group since the submission of the proposal. She outlined the proposed activities as well as the short term and longer term desired project outcomes. (See Appendix 5 for brief project description). [Click link here to see presentation.](#)



## **Session 3: Climate projections for Florida: Can we trust the models?"**



The PWSU-CIWG Science task group organized this session focusing on understanding the strengths, weaknesses and challenges of climate projections for Florida. Presentations provided by Drs. Katharine Hayhoe (Texas Tech University) and Dr. Jayantha Obeysekera (South Florida Water Management District) provided the basis for interactive discussion.





□ Dr. Katherine Hayhoe, Research Associate Professor of Atmospheric Sciences, Department of Geosciences, Texas Tech University [Click link here to see presentation](#)

□ Dr. Jayantha Obeysekera, Hydrologic & Environmental Systems Modeling, South Florida Water Management District [Click link here to see presentation](#)



Discussion following the presentations by Hayhoe and Obeysekera:

- Is stationarity dead? -- importance of accounting for non-stationarity when doing statistical downscaling for future scenarios
- Think about governance issues and how these influence vulnerability – does this overcome scientific and natural variability uncertainty.
- No such thing as deterministic climate prediction ---- climate model predictions are always uncertain.
- Does use of climate model predictions, even though probabilistic (ie, uncertain) improve decisions over not using climate models?
- How to do something analogous to “engineering safety factor” when using climate projections
- How to communicate uncertainty to governing boards and politicians. How can they still make decisions based on results? Especially in context of other crises (economic, Infrastructure)
- Financing -> how does uncertainty in future climate influence financing future capital expansion
- Perhaps focus on drought -- > historical experiences, current vulnerability → building resilience
- Air quality → does uncertain science in models affect regulatory decisions – pit regions against each other (Moving from CARE to CASPAR)
- Water energy nexus
- How is uncertainty affected by length of historical record used to bias correct
- Use “mental model approach” to synthesize complex model predictions and risks or frame issue (i.e drug use by teens) to reach decision makers, public politicians

- What level of uncertainty is acceptable? What level of risk is acceptable to decision makers? Level of risk needed before develop adaptation strategies.
- Scale issues – geographic, the problem is global, decisions are local.
- Time scale – long term problem, short term decision time frame
- Should we be talking to politicians and board members? What are risk factors important to them?
- Be entrepreneurial about adaptation strategies → talk about “climate entrepreneurs” not “sustainability”

#### **Session 4: Collaborative Planning: NOAA-CSI project - "Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning."**

Working in mixed groups participants contributed ideas for each of the key outputs planned for the project. This was important to ensure that their interests, group interests, and those of their institutions are reflected in project implementation. Four stations were located throughout the room, one station for each of the project outputs listed below.

- Utility relevant retrospective simulations and future climate predictions (Vasu Misra)
- Applications of climate information in utilities planning processes, models and decisions support systems. ( Wendy Graham)
- Knowledge management system. (Tracy Irani)
- Building the working group. ( Lisette Staal)

The Project co-PIs responsible for each of the output topic areas remained at the station, while the participants, in predetermined groups, visited each of the stations in turn. Katherine Hayhoe was a resource person in both Dr. Misra and Graham’s groups for two rotations. Brian Kahn joined Tracy Irani’s station as a resource person. Wendylin Bartels as part of the facilitation team worked with Lisette Staal. Participant Groups included:

Group 1 - (Alison Adam, Rob Teegarden, Senthold Asseng, Jessica Bolson)

Group 2 - (Jayantha Obeysekera, Bertha Boldenberg, Penni Redford, Dingbao Wang, Chris Martinez)

Group 3 - ( Tim Cera, Nancy Gallinaro, Syewoon Hwang, Jim Jones, Kevin Browning)

Group 4 - (Scott Laidlaw, Kevin Morris, Tirusew Asefa, David Zierden, Keith Ingram)

Each of the leaders at the stations was asked to

- a) prepare a brief summary of the results of the discussion and
- b) next steps to be shared with the plenary group.

Group discussion results are summarized in the following pages.

## Group Station 1: Utility relevant retrospective simulations and future climate predictions

(Vasu Misra)

Expectation: ENSO and variability of the Atlantic warm pool in the summer are two important climate variations that would be relevant to utilities, which we will be able to deliver especially the fidelity of the IPCC models and their projection. What other variations and variables would you be interested in?

### Discussion Results Summary:

1. Climate information not consistently being used currently by all utilities or water management districts—anecdotes- seasonal cycle to manage surface water
2. Rainfall, Temperature and ET most desired
3. Planning and operations define time horizon/scale
4. Space scale – parochial
5. Capital planning, can use risk factor from climate variability/change, but model linking climate to capital risk factor (viz, finance, env, health )not there
6. Seasonal weather predictability in a warming climate

Figure : Details from flipcharts developed during group discussion.

- Operational
- Long term planning (decadal, centennial) ---- Capital Planning
- What the utility need (different scales- temporal and spatial)
- Sea level rise (30 year frame (miami dade) - up to 50 year (2060) - Saltwater intrusion
  - Uniform ?... utilities
  - Consistent with climate scenario
- Certainty about - SLR increasing, temperature increasing R?
- Near term - observations to constrain projection- use observed analogs
- Seasonal predictability in a changing climate
- Rainfall - daily values
- MFL process (OUC) -> regulatory decisions (CM -> Hydrology ->MFL (long term fixed value
- Rainfall (20 year planning horizon, season prediction, predictability in a changing climate, shift in seasonal cycles)
- Seasonal Cycle -> Surface Water supply system (ET is important) -> 98% reliability in meeting demand
- Winter rainfall -> dry to wet season range
- Risk, Public health and safety, finance, environment and health
- Drought
- Warm Temperatures
- Empirical mode for relating climate with (F.E.H)

## Group Station 2: Applications of climate information in utilities planning processes, models and decisions support systems (Wendy Graham)

Expectation: What are some SPECIFIC utilities and/or water management applications, i.e. planning processes, models and decisions support systems that could be used to exercise the utility relevant historical analyses, retrospective simulations and future climate predictions?

### Discussion Results Summary:

- Current Models being used -
  - OUC and SJR have separate models for Taylor Creek reservoir. Both ingest P,T, and other climate variables. Look at sensitivity of each to climate scenarios
  - SFWMD 2x2 model- drive with ensemble of P and PET times eries for current climate, future climate, evolving climate
  - Miami-Dade MODFLOW/SEAWAT salt water intrusion model. Relative sensitivity to SLR vs climate scenarios.
  - Models used by various WMDs in MFL setting process
  - OUC- MODFLOW model
  - TBW- IHM, stochastic surface water flow predictions model, Surface Water operations model, water demand model
  - Peace River – relationship of tidal interface position to catchment rainfall (develop statistical relationship based on historical data)
  - Effects of salination of Peace River”s reservoirs to increased evaporation under future climates
  - SJR – models used in surface water supply study to establish sustainable yield of river i.e. HSPF, EFDC
  - SJR/SWF/SF- common transient MODFLOW model being developed for CFCC
  - City of WPB/PBC - will check and get back to us
- Ideas:
  - Use common model across different regions (MODFLOW? HSPF? Others?)
  - Let model developers actually run models with our climate scenarios (WMD Staff, Utility Staff, consultants, USGS), to leverage effort
  - Evolve toward common models and data used by WMDs and Utilities
    - Precipitation (gage, gridded, nexrad)
    - Hydrologic models (regional) use same for permitting and planning.
  - Use existing solar electricity generation sites and add sensors to gather additional weather data .

### **Group Station 3: Knowledge management system (Tracy Irani)**

Expectation: To know what groups think about Knowledge Management (KM) as a framework for data sharing, dissemination, collaboration. What kinds of data could be/should be shared? In what form to make them most effective/useful to group? What are most desirable functions that group needs? What levels of permission/security/updating are necessary and optimum? KM can be anything from a database to a suite of tools to store, edit and publish to an online collaboratory. What's needed? What's the governance structure that makes sense?

Discussion Results Summary:

- Communication needs became predominant during the discussion
  - Message consistency, timescale and framing
  - Audience
  - Dissemination
  - What is the message????
- Need to understand the decisions being made
  - Chris and Jessica's needs assessment
- Institutional memory
- Common data repository for climate information
- Florida statewide
- Common format
- Train utilities to use properly

### **Group Station 4: Building the working group. (Lisette Staal)**

Expectation: What does the working group provide for the participants? What would keep them interested in participating? What is needed to help them stay involved?

Discussion Results Summary:

- Representation
  - Regional (add JEA, Melbourne, Cocoa, smaller utilities) and state agencies (FDEP..)  
Identify ways to bring them in at the right time
  - Transition ( try to ensure 3-deep membership within each institution)
  - Target Staff – technical people that can facilitate change (Water users, local government, Cities/counties, Department directors , operations, modelers, water resource managers)
  - inform elected officials
- Communication
  - Framing and telling the group story
  - Articulate relative to master plans and specific issues (i.e., drought and sea level rise)

Share lessons learned

- Pitfall of communication
- Ensuring commitment and institutionalizing
  - Find champions, resources, get people on board
  - PI presentations with tailored messages to get people on board
  - Letter or Declaration of collaboration
  - Knowledge transfer to institutions (3-Deep membership)
- Process
  - Consensus on science/technologies approaches
  - Building relationships
  - Deal with different needs
  - Meet at least quarterly
  - Continue to meet in a central location in the State to allow for more participation.

Following the presentations of discussion results, the NEXT STEPS were presented by individual output and discussed as a full group.

#### **Next Steps for Project Output – Utility relevant retrospective simulations and future climate projections (Vasu Misra)**

1. Isolate case studies (seasonal predictions, utility examples of use) for running through “all four tables” - the full process
2. Attributing physical reasons for climate change over Florida
  - a. Focus message for reader
  - b. Relate to climate variable
  - c. Make it real for reader
  - d. White paper, position paper
3. Evaluate climate variability, model projections (*considerable discussion around this. What specifically will be evaluated needs to be decided and in conjunction with the group focusing on applications of climate information. Added “future projections”*)

#### **Next Steps for Project Output - Applications of climate information in utilities planning processes, models and decision support (Wendy Graham)**

1. Formalize list of possible applications, determine availability of models for 3<sup>rd</sup> party use
2. Wait for climate model/data analysis before making choices and starting applications (this refers to discussion issue noted above - #3 Evaluate “something”)
3. Consider risk management strategies, decision making processes
4. Interesting to compare to CA experience e → their model exploded when driven by climate projects outside of calibration range(CALSIM)
5. Expand beyond models

### **Next Steps for Project Output - Knowledge Management System – (Tracy Irani)**

1. Prioritize suggestions from this meeting
2. Collaborate with Jessica re: needs assessment
3. Work on data repository decisions
4. Develop standardized communication, tools and messages.

### **Next Steps for Project Output - Building/ maintaining the group-(Lisette Staal)**

1. Continue meeting at least quarterly
2. Prepare/tailor the message of the working group's focus, efforts and outcomes (*see #4 in knowledge management*).
3. For developing institutional support consider:
  - a. Present project/working group to agencies and others by district (visits)
  - b. Write to agency leaders to build support for staff participation in the group.
4. Present at conferences as appropriate to share group

## **Session 5: Next Steps – Public Water Supply Utility Climate Impacts Working Group**

### **Specific ACTIONS – To Do List**

1. Compile notes of the meeting, share with working group and post on web including presentations.
2. Move forward with collaborative planning of the NOAA CSI grant - Form an executive advisory group for the NOAA-CSI project and meet within a month (Nancy Gallinaro , Jaynatha Obeysekara, Mike Cullen, Doug Yoder, Alison Adams, Penni Redford, Tirasew Assefa) and identify NOAA-CSI project teams for each of the “output” areas
3. Plan the next quarterly PWSU-CIWG meeting (approximately January 2011)-planning team volunteers included Rob Teegarden, Kevin Morris, Tirasew, Jessica, Nancy.

An additional suggestion was made that it might be useful to have a website of seasonal forecasts developed. Agreed that this was beyond the scope of this group but might an item of interest to FCI/SECC?

## **Session 6: Reflection and Evaluation**

Lisette Staal asked the participants to consider “What will you bring back with you to your institution from this meeting?” Several participant responses noted the importance and value of the network, their learning (i.e., The importance of considering climate predictions in planning, and the need to focus first on seasonal climate, uncertainty sources of climate projection) and usefulness of anticipated outcomes of the NOAA project and other potential activities. Lisette then thanked the participants, OUC as the host, and distributed a feedback form and requested written input from the participants. A total of 23 participants responded, the highest number yet to respond to the exit survey.



In general, respondents continue to express a high level of satisfaction with the workshop output, organization, use of time, level of participation on a scale of 1-5 with 5 being the highest. WMD and Utilities on average rated each of those areas higher than the academics, except ensuring a high level of participation which all rated high. Clarity of next steps received an average rating of 4.02; however, it was lower for academic respondents. A brief summary of exit feedback survey responses appears in Appendix 6.

## APPENDIX 1 – Agenda



Florida  
Climate Institute



### WORKSHOP 4 –Agenda

#### “Public Water Supply Utilities Climate Impacts Working Group”

Friday, October 7, 2011 8:30 – 4:00pm

Orlando Utilities Commission (OUC), Safety & Training Conference Room  
at the Gardenia Avenue office, 3800 Gardenia Avenue, Orlando, FL

#### Objectives:

1. Review the progress and core interests of the PWSU-CIWG shared to date, and update on pending tasks.
2. Explore opportunities provided by the NOAA-CSI project drawing on PWSU-CIWG key interests in communication/information, science, research, partnership/outreach, and begin collaborative planning.
3. Determine next steps.

#### Agenda:

8:30 – 9:00 Registration and Coffee

9:00 – 10:00 Day’s agenda, introductions  
Looking Back/Looking Forward  
Participant updates

Follow-up items from previous workshop (research agenda, outreach, status of SUS paper, statement of collaboration, new name?)

10:00 – 10:15 BREAK

10:15 – 10:45 Introduction: NOAA – CSI Project - “Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning.”

10:45 – 12:00 Climate projections for Florida: Can we trust the models?”

- ☐ Dr. Katherine Hayhoe, Research Associate Professor of Atmospheric Sciences, Department of Geosciences Texas Tech University
- ☐ Dr. Jayantha Obeysekera, Hydrologic & Environmental Systems Modeling, South Florida Water Management District
- ☐ Discussion

12: 00 – 1:00 LUNCH

1:00 – 3:00 Collaborative Planning: NOAA-CSI project - "Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning."

- Utility relevant retrospective simulations and future climate predictions
- Applications of climate information in utilities planning processes, models and decisions support systems.
- Knowledge management system
- Building the working group

3:00 – 3:15 BREAK

3:15 – 3:45 Next Steps

3:45 - 4:00 Reflection and Evaluation

## APPENDIX 2 – List of Participants

| Last name  | First name  | Organization                                                                     | email                                                                                                                                      |
|------------|-------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Adams      | Alison      | Tampa Bay Water                                                                  | <a href="mailto:AADAMS@tampabaywater.org">AADAMS@tampabaywater.org</a>                                                                     |
| Asefa      | Tirusew     | Tampa Bay Water                                                                  | <a href="mailto:tasefa@tampabaywater.org">tasefa@tampabaywater.org</a>                                                                     |
| Asseng     | Senthold    | University of Florida/Southeast Climate Consortium                               | <a href="mailto:sasseng@ufl.edu">sasseng@ufl.edu</a>                                                                                       |
| Bartels    | Wendylin    | University of Florida/Florida Climate Institute/ Southeast Climate Consortium    | <a href="mailto:wendylin@ufl.edu">wendylin@ufl.edu</a>                                                                                     |
| Bolson     | Jessica     | Miami University                                                                 | <a href="mailto:Jessica.Bolson@rsmas.miami.edu">Jessica Bolson</a><br><a href="mailto:jbolson@rsmas.miami.edu">jbolson@rsmas.miami.edu</a> |
| Browning   | Kevin       | Orlando Utilities Commission                                                     | <a href="mailto:kbrowning@ouc.com">kbrowning@ouc.com</a>                                                                                   |
| Cera       | Tim         | Saint Johns River Water Management District                                      | <a href="mailto:Tcera@sjrwmd.com">Tcera@sjrwmd.com</a>                                                                                     |
| Cox        | Carolyn     | University of Florida/Florida Climate Institute                                  | <a href="mailto:crcox@ufl.edu">crcox@ufl.edu</a>                                                                                           |
| Gallinaro  | Nancy       | Palm Beach County Utilities                                                      | <a href="mailto:ngallinaro@pbcwater.com">ngallinaro@pbcwater.com</a>                                                                       |
| Goldenberg | Bertha      | Miami-Dade Water and Sewer Department (WASD)                                     | <a href="mailto:BMG@miamidade.gov">BMG@miamidade.gov</a>                                                                                   |
| Graham     | Wendy       | University of Florida Water Institute                                            | <a href="mailto:wgraham@ufl.edu">wgraham@ufl.edu</a>                                                                                       |
| Hayhoe     | Katharine   | GUEST                                                                            |                                                                                                                                            |
| Hwang      | Syewoon     | University of Florida                                                            | <a href="mailto:aceace111@ufl.edu">aceace111@ufl.edu</a>                                                                                   |
| Ingram     | Keith       | University of Florida/Florida Climate Institute/ Southeast Climate Consortium    | <a href="mailto:ktingram@ufl.edu">ktingram@ufl.edu</a>                                                                                     |
| Irani      | Tracy       | University of Florida Center for Public Issues Education                         | <a href="mailto:irani@ufl.edu">irani@ufl.edu</a>                                                                                           |
| Jones      | James       | University of Florida/Florida Climate Institute/ Southeast Climate Consortium    | <a href="mailto:jimj@ufl.edu">jimj@ufl.edu</a>                                                                                             |
| Kahn       | Brian       | GUEST                                                                            | -                                                                                                                                          |
| Laidlaw    | Scott       | Saint Johns River Water Management District                                      | <a href="mailto:Slaidlaw@sjrwmd.com">Slaidlaw@sjrwmd.com</a>                                                                               |
| Martinez   | Christopher | University of Florida/Florida Climate Institute/ Southeast Climate Consortium    | <a href="mailto:chrisjm@ufl.edu">chrisjm@ufl.edu</a>                                                                                       |
| Misra      | Vasu        | Florida State University/Florida Climate Institute/ Southeast Climate Consortium | <a href="mailto:vmisra@fsu.edu">vmisra@fsu.edu</a>                                                                                         |
| Morris     | Kevin       | Peace River Manasota Regional Water Supply Authority                             | <a href="mailto:KMorris@regionalwater.org">KMorris@regionalwater.org</a>                                                                   |
| Obeyseker  | Jayantha    | South Florida Water Management District                                          | <a href="mailto:jobey@sfwmd.gov">jobey@sfwmd.gov</a>                                                                                       |

|           |         |                                                                                  |                                                                  |
|-----------|---------|----------------------------------------------------------------------------------|------------------------------------------------------------------|
| a         |         |                                                                                  |                                                                  |
| Redford   | Penni   | City of West Palm Beach                                                          | <a href="mailto:PRedford@wpb.org">PRedford@wpb.org</a>           |
| Staal     | Lisette | University of Florida Water Institute                                            | <a href="mailto:lstaal@ufl.edu">lstaal@ufl.edu</a>               |
| Teegarden | Robert  | Orlando Utilities Commission                                                     | <a href="mailto:rteegarden@ouc.com">rteegarden@ouc.com</a>       |
| Wang      | Dingbao | University of Central Florida                                                    | <a href="mailto:Dingbao.Wang@ucf.edu">Dingbao.Wang@ucf.edu</a>   |
| Zierden   | David   | Florida State University/Florida Climate Institute/ Southeast Climate Consortium | <a href="mailto:zierden@coaps.fsu.edu">zierden@coaps.fsu.edu</a> |

## APPENDIX 3 – Draft Research Agenda Matrix

|                                                             |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
|-------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| PUBLIC WATER SUPPLY UTILITIES- CLIMATE IMPACT WORKING GROUP |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
| UTILITY RESEARCH AGENDA DRAFT May-11                        |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
|                                                             |                                                             |                                        |                                                                                                                   | <b>CURRENT</b>                                                                                                                                                                      | <b>ADDITIONAL</b>     |
| <b>CLIMATE AREAS</b>                                        | <b>UTILITY NEEDS</b>                                        | <b>AVAILABLE TOOLS</b>                 | <b>RESEARCH NEEDS</b>                                                                                             | <b>RESEARCH PROJECTS</b>                                                                                                                                                            | <b>RESEARCH NEEDS</b> |
|                                                             |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
|                                                             |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
| <b>Temperature Impacts</b>                                  | Daily and monthly max temperature and Seasonal Temp. Change | NOAA forecasts; SECC - AgroClimate.org | Urban ET estimates associated with temp impacts; EDA on historical temperature vs demand across different sectors |                                                                                                                                                                                     |                       |
|                                                             |                                                             |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |
|                                                             | Irrigation Demand Changes                                   |                                        |                                                                                                                   | 1. Drought index/irrigation water balance forecasts using CPC 3-month outlooks (Martinez)<br>2. Downscaled/bias corrected reference Evapotranspiration across the SE USA (Martinez) |                       |
|                                                             | 1. How seasonal temp. forecasts impact irrigation           |                                        |                                                                                                                   |                                                                                                                                                                                     |                       |

|                         |                                                                                                        |                                                                                                                                     |                                                                                |                                                   |                              |
|-------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------|------------------------------|
|                         | demands                                                                                                |                                                                                                                                     |                                                                                |                                                   |                              |
|                         | 2. Proportion of water demand for irrigation                                                           | WASD submeter billing records                                                                                                       |                                                                                |                                                   |                              |
|                         |                                                                                                        |                                                                                                                                     |                                                                                |                                                   |                              |
|                         | Cooling Demand changes                                                                                 |                                                                                                                                     |                                                                                |                                                   |                              |
|                         | 1. How could cooling water demand change with temp?                                                    | Downscaled IPCC projections and other sensitivity experiments conducted in COAPS ; Winter-Summer variation for current metered flow | Bias correct the projections                                                   | COAPS/USGS-La Florida & COAPS/ORAU project (Vasu) |                              |
|                         |                                                                                                        |                                                                                                                                     |                                                                                |                                                   |                              |
| <b>Rainfall Impacts</b> | Regional rainfall predictions                                                                          |                                                                                                                                     |                                                                                |                                                   |                              |
|                         | 1. Long term rainfall forecasts - 10, 20, 50 years, downscale global climate models to Florida regions | Global Climate models - AR4, NARCAST                                                                                                | Downscale models to Florida, calibrate w/ FI data                              |                                                   |                              |
|                         | 2. Long term changes in rainfall patterns in Florida                                                   | Change in ENSO pre and post 1960                                                                                                    | Demand vs rainfall; r/p between rainfall and temperature for demand estimation |                                                   |                              |
|                         | 2. Short term forecasts for winter-spring dry season, available Jan 1 for 3/1-6/15                     | IASCLIP FORECAST FORUM - IFF, winter forecasts better                                                                               |                                                                                | Downscaled GFS and CFS forecasts (Martinez)       | Better predictions in spring |
|                         | 3. Length of wet or dry season                                                                         | ENSO effects                                                                                                                        | hydroperiod durations; development of indicators                               |                                                   |                              |
|                         |                                                                                                        |                                                                                                                                     |                                                                                |                                                   |                              |
|                         |                                                                                                        |                                                                                                                                     |                                                                                |                                                   |                              |



|                          |                                                            |                                                                   |                                                                                                                           |  |                                                |
|--------------------------|------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------|
| <b>Storms/Hurricanes</b> | Predict Nos./ Likelihood of Florida hurricane impacts      | Good models for total nos. of hurricanes                          |                                                                                                                           |  | Predictions for nos. hurricanes to hit Florida |
|                          | Model inundation and damage                                | GIS inundation model                                              | Climate Compact doing Action Plans                                                                                        |  |                                                |
|                          | Storm surge impacts                                        | Storm surge models                                                |                                                                                                                           |  |                                                |
|                          | (regional or local)                                        |                                                                   |                                                                                                                           |  |                                                |
|                          |                                                            |                                                                   |                                                                                                                           |  |                                                |
|                          | Impact of Storm/inundation on salt water intrusion         | coupled surface/Ground water models                               | coupled surge/surface/ground water models to better predict surge impact on SWI                                           |  | Hydrodynamic model for salt water intrusion    |
|                          | Forecast hurricane tracks with 10-15 day lead time         |                                                                   |                                                                                                                           |  |                                                |
|                          |                                                            |                                                                   |                                                                                                                           |  |                                                |
| <b>Sea Level Rise</b>    | Monitor SLR data vs. models to develop statewide consensus | SE Climate Commission developing white paper                      |                                                                                                                           |  |                                                |
|                          | How do temp. and SLR forecasts correlate?                  |                                                                   |                                                                                                                           |  |                                                |
|                          | Florida SLR predictions                                    | SE Climate Commission developing white paper                      |                                                                                                                           |  |                                                |
|                          |                                                            |                                                                   |                                                                                                                           |  |                                                |
|                          | Salt water intrusion boundary                              | USGS has models and IMS websites for South Florida WQ and WL data | increased vertical delineation across south Florida; hydrostratigraphic correlation to vertical delineations and movement |  |                                                |
|                          |                                                            |                                                                   |                                                                                                                           |  |                                                |

|                         |                                                 |                                           |  |  |                                        |
|-------------------------|-------------------------------------------------|-------------------------------------------|--|--|----------------------------------------|
|                         | Building Coastal Construction Line              | Available for coastal counties            |  |  | Needs to be updated                    |
|                         |                                                 |                                           |  |  |                                        |
|                         | Drainage/Storm water impacts                    | Climate Compact developing Action Plan    |  |  |                                        |
|                         |                                                 |                                           |  |  |                                        |
| <b>Carbon Emissions</b> | Utility methods to reduce carbon footprint      | WERF research - Utility reduction methods |  |  |                                        |
|                         |                                                 |                                           |  |  |                                        |
|                         | Nitrous oxide impacts from ww plants on climate |                                           |  |  | How to measure nitrous oxide emissions |

## APPENDIX 4 – Brief of potential Outreach avenues

Bolson

July 13, 2011

For the *Florida Climate Change Water Utilities Working Group*

### **Methods for contacting utilities:**

1. Through the Florida section of the American Water Resources Association (AWRA). Perhaps through the organization's bimonthly newsletters, handouts distributed at meetings or participation in meetings.
2. Through the 11 Regional Planning Councils in the state. We could contact representatives from the councils for support.
3. Through Local/Regional Climate Change task forces in the state. We could make a list of these task forces with contact information. Perhaps we could use their mailing lists to disseminate information.
4. Through Water Management District contacts and/or meeting participation. The monthly governing board meetings provide a source for networking and dissemination of newsletters/handouts.
5. City offices of sustainability and/or climate change programs within local governments might be good contact points.
6. Perhaps we could use the Florida Planning Toolbox (FAU).
7. We could use the FDEP water supply provider list, however this list needs major updates and cleaning. This would actually be a useful service to provide, an updated contact list of all water managers in the state.
8. We could work with our FDEP contacts to disseminate information, though this might be tricky in the current political atmosphere.

## **APPENDIX 5 – Brief Project Description - "Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning."**

**Project Title:** Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning

**Institutions:** University of Florida (UF), Florida State University (FSU)

**Investigators:** W. Graham (UF), K. Ingram (UF), T. Irani (UF), V. Misra (FSU)

**Total Budget:** \$300,058

**Budget Period:** May 1, 2011-April 30, 2013

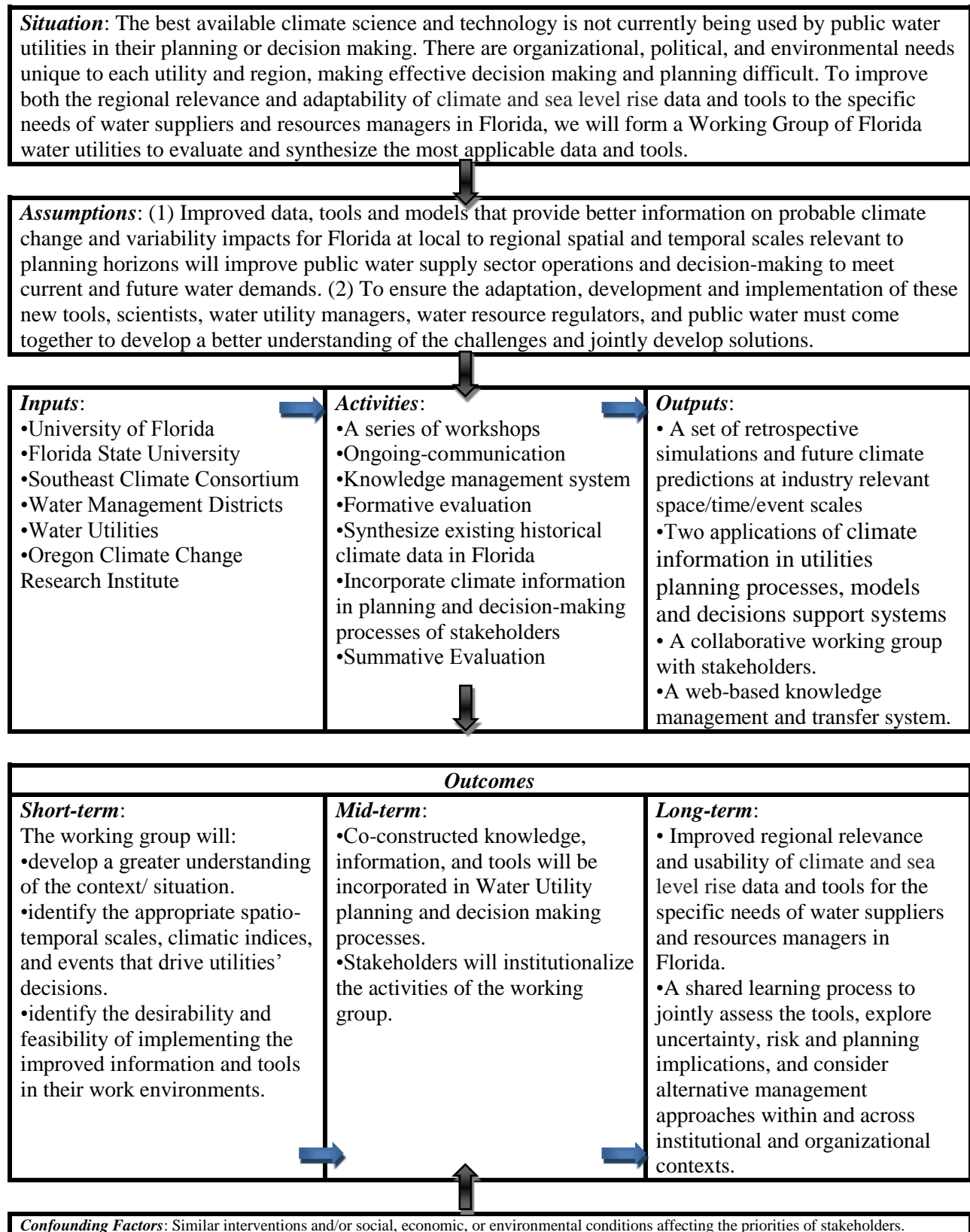
**Abstract:** The University of Florida, Florida State University and the Southeast Climate Consortium, along with representatives from seven major public water supply utilities and three Water Management Districts in Florida, propose to develop and implement a collaborative Working Group to increase the relevance and use of climate variability, climate change and sea level rise data and models by public water supply utilities. The Working Group will operate as a social learning and collaboration platform and will employ participatory methods and a knowledge management framework to promote shared knowledge, data, models and decision-making tools among public water suppliers, water resource managers, climate scientists and hydrologic scientists. While the immediate focus of the Working Group will be on Florida public water supply utilities, the Working Group process and the Working Group products will be transferable and useful nationwide. Furthermore, representatives of the Working Group will participate in the Piloting Utility Modeling Applications for climate change (PUMA) project being coordinated by Dr. Philip Mote, Director of the Climate Change Research Institute at Oregon State University to ensure cross-RISA synergy, consistency and collaboration.

During the course of this two-year project we will:

- Develop a collaborative Working Group comprised of public water suppliers, water resource managers, climate scientists, and hydrologic scientists focused on understanding how climate variability/change and sea level rise may impact planning and operations of Florida's public water supply utilities.
- Identify the appropriate spatio-temporal scales, climatic indices, and events that drive utilities' decisions, and evaluate the practical applicability of current climate tools at these scales through synthesis of historical data, nationally available General Circulation Model (GCM) simulations, and regionally downscaled data products.
- Identify appropriate entry points for climate data and model predictions in Working Group members' models and decision making processes and, for at least two applications, evaluate the usefulness of these data for minimizing current and future risks associated with climate variability/climate change and sea level rise.

The products of this first effort of the Working Group will be a consistent set of retrospective simulations and future climate scenarios at industry relevant space/time/event scales that have been vetted through the academic, public water supply, and regulatory communities in Florida. The accuracy of retrospective simulations and uncertainty of future climate predictions will be thoroughly examined, quantified and documented by the Working Group. These vetted results will provide consistent inputs to existing utility and regulatory agency models and decision processes. All Working Group products will be available through a web-based knowledge management and transfer system including storage, access and retrieval of data reflecting the self-defined needs of the group members.

**Figure 2: Project Logic Model**



## APPENDIX 6 – Summary of feedback survey responses (1 low - 5 high)

|                                                                            | Public Water Supply Utility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Water Management District | Academics | NA (affiliation not indicated) | TOTAL       |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------|--------------------------------|-------------|
| Output                                                                     | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5                         | 4.14      | 4.0                            | <b>4.57</b> |
| Organization                                                               | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4.33                      | 3.86      | 5.0                            | <b>4.43</b> |
| Use of Time                                                                | 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5                         | 4.29      | 5.0                            | <b>4.65</b> |
| Participation-involvement                                                  | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4                         | 4.71      | 4.0                            | <b>4.65</b> |
| Next Steps clear                                                           | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4.33                      | 3.86      | 4.0                            | <b>4.02</b> |
| <b>The most important thing that you are taking away from this meeting</b> | <ul style="list-style-type: none"> <li>* The importance of considering climate predictions in planning</li> <li>* The need to focus first on seasonal climate</li> <li>* Grant funded; Katharine's talk</li> <li>* Facilitation technique</li> <li>* This is a group moving forward on the same page</li> <li>* funding granted - need to consider use of climate course in our next water supply public group</li> <li>* uncertainty sources of climate projection</li> <li>* We have started the NOAA project -- Yeah!!</li> <li>* A lot of work in a short period of time</li> <li>* A unique, well engaged group of academics and utility managers</li> <li>* This is a very positive energy group! Not critical or negative!</li> <li>* How important it is to present the "forest" picture of climate change rather than the "trees" (or even the leaves or branches or individual tree rings :) that we usually focus on as scientists</li> <li>* Lots of enthusiasm. Lots of work.</li> </ul> |                           |           |                                |             |
| <b>The most important thing the group should do next....</b>               | <ul style="list-style-type: none"> <li>* develop the common message and data standardization</li> <li>* Get home safely</li> <li>* prioritize</li> <li>* Devise a strategy</li> <li>* set priorities and make small groups that can address them</li> <li>* keep going</li> <li>* Start the steady slaying(?)</li> <li>* Get down to a doable plan and start working on it.</li> <li>* Keep the momentum going</li> <li>* stay together</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |           |                                |             |
| <b>Who else do you believe should be participating in this group?</b>      | <ul style="list-style-type: none"> <li>* other utilities and some local government planners</li> <li>* JEA (2)</li> <li>* FL DAC, Julie Dennis, Matt Preston</li> <li>* utilities</li> <li>* Broward County</li> <li>* More investor owned utilities</li> <li>* a few more utilities as water managers</li> <li>* not sure</li> <li>* other institutes</li> <li>* Technical staff from political discussion office</li> <li>* Cocoa, Melbourne and JEA to represent the peninsula completely</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           |           |                                |             |

|                             |                                                                                                                                                                                                                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             |                                                                                                                                                                                                                                                                                   |
| <b>Additional comments:</b> | <ul style="list-style-type: none"> <li>* Good Job!</li> <li>* excellent</li> <li>* Good job. Great idea to include heavy involvement by social scientists to tease coherent ideas from all these convoluted, brilliant minds.</li> <li>* Great organization &amp; fun!</li> </ul> |