TIME PERIOD ADDRESSED BY REPORT: 06/01/2013 –5/31/2014

**SECTORAL APPLICATIONS RESEARCH PROGRAM (SARP) –
PROJECT ANNUAL REPORT**

PROJECT TITLE: Collaborative Development of Public Water Supply Utility Relevant Climate Information for Improved Operations and Planning

INVESTIGATORS:

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TIME PERIOD ADDRESSED BY REPORT: 6/01/2013 – 5/31/2014 **(YEAR 3)**

I. PRELIMINARY MATERIALS

A. Research project objective.

To increase the regional relevance and usability of climate and sea level rise data and tools for the specific needs of water suppliers and resources managers in Florida. The project will (1) 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, (2) 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 nationally available General Circulation Model (GCM) simulations and statistically and dynamically downscaled GCM data products for the region, and (3) Identify appropriate entry points for climate data and model predictions in Working Group members' models and decision making processes and evaluate the usefulness of these data for minimizing current and future risks associated with climate variability/climate change and sea level rise.

B. Stakeholders and decision makers

Florida Public Water Supply Utilities

- Alison Adams, Tampa Bay Water
- Maurice Tobon, Palm Beach County, Water Utilities Department
- Kevin Morris, Peace River Manasota Regional Water Supply Authority
- David Richardson, Gainesville Regional Utilities
- Robert Teegarden, Orlando Utilities Commission
- Douglas Yoder, Miami-Dade Water and Sewer Department
- Barbara Powell, Broward County

Florida Water Management Districts

- Jayantha Obeysekera, South Florida Water Management District
- Michael Cullum, St Johns River Water Management District
- Ken Herd, Southwest Water Management District

Florida State Climatologist

- David Zierden, SouthEast Climate Consortium

C. Approach

Our approach centers on building a stakeholder-scientist network as a social learning and collaboration platform to promote shared knowledge, data, models and decision-making tools relevant to climate impacts and water supply planning. The working group and key beneficiaries are public water suppliers, local governments, water resource managers, climate scientists and hydrologic scientists engaged with planning and operations of Florida's public water supply utilities. While the immediate focus of the Working Group is on Florida public water supply utilities, the Working Group process and the Working Group products will be transferable and useful nationwide. The working group is collaboratively defining and exploring the most important issues faced by water utilities at a range of planning and management timescales, possible impacts of climate variability/change and sea level rise on these issues, and the relevant spatio-temporal scales at which climate-related information is needed to assess risks of potential impacts. The project will provide feedback to the national climate science community on additional research needed to improve the utility of local- to regional-scale climate simulations/predictions for water resource based on applications.

D. Matching funds/activities

Throughout the project, network members from the Public Water Supply Utilities, Water Management Districts and local governments have provided in-kind support through paying their own travel costs and staff time to attend quarterly project meetings and conduct project specific activities between quarterly meetings. During 2013-2014 funds from Tampa Bay Water were used to fund an additional Ph.D. student who is working on this project (stipend and tuition approximately $33, 700 per year). Funds from the South East Climate Consortium base grant (approximately $23,500 per year) were used to co-fund a post-doctoral associate who worked on the project. Synergies continue between the FloridaWCA and the Florida Climate Institute. During this reporting period the group has made outreach efforts to explore options to sustain the network beyond the grant funding currently available. A strategic planning meeting is scheduled for June 18th, 2014.

E. Partners

- Southeast Climate Consortium (SECC)
- UF/IFAS Center for Public Issues Education
- Florida Climate Institute
- Florida State Climatologist

- Tampa Bay Water
- Palm Beach County Water Utilities
- Peace River Manasota Regional Water Supply Authority
- Gainesville Regional Utilities
- Orlando Utilities Commission
- Broward County
- Miami-Dade Water and Sewer Department
- South West Florida Water Management District
- South Florida Water Management District
- St Johns River Water Management District

II. ACCOMPLISHMENTS

A. Project timeline and tasks accomplished during this reporting period

Project accomplishments are reported here by objectives and tasks in the work plan.

Objective 1: 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.

Interactive Workshops and Networking - Three workshops (June 26, 2013, October 30-31, 2013, and April 10 2014) were held during this reporting period bringing the total to 11 workshops conducted since the initiation of the "working group." During this reporting period workshops took on an increased focus on the user contexts, potential application of the climate information for decision making, and communicating climate science to policy & decision makers. Average attendance at the workshops remained high, averaging over 20 participants with a strong core of actively engaged participants.

Group Identity - The Florida Water and Climate Alliance – FloridaWCA continues to build its core group and has actively projected its identity through the logo, website and participant outreach in a variety of professional venues.

Cognitive/Learning Styles and Social Networks and Institutional Cultures – Our group building and evaluation strategies proposed the use of social network analysis, Kirton Adaption-Innovation Inventory (KAI), and focus groups. As the group progressed, we chose to focus on Kolb's Learning Styles introducing theories and inventories of individual cognitive differences rather than the KAI. Theories articulated by Jung and Kolb and Kolb's learning style indicator (Accommodators, Divergers, Assimilators, and Convergers) were introduced as a way of recognizing individual differences and preferences. During Workshop 9 participants took and self-scored the Kolb's Learning Style Inventory, then grouped themselves according to which of the four style preference categories they scored into. Group members found this helpful and discussed how this could relate to challenges group members feel when trying to communicate complex science to other group members of different learning styles.

In addition to the in-workshop activity focused on Learning Styles, an online survey was distributed before workshop 10 to all past and present workshop attendees. This survey was designed in a way to capture all respondents' learning style in a way that could be easily analyzed. This was done to follow up with the high level of interest exhibited by workshop participants in workshop 9, where they self-scored their learning style during the workshop. However, due to the public nature of the workshop and the limited time given, it was decided an online survey to recollect this data was appropriate.

The most common learning style found among stakeholders was Assimilating, which indicates that these individuals are best at understanding a wide range of information and putting it into concise, logical form. The second most common occurrence was Balanced; this is not one of the four learning styles, in fact, it means that these individuals can move in any given direction (i.e. Assimilating, Accommodating, Diverging, or Converging). The last three learning styles each had one individual exhibiting that preference. The Accommodating style has the ability to learn primarily from 'hands-on' experience, the Converging style is best at finding practical uses for ideas and theories, and the Diverging style is best at viewing concrete situations from many different points of view. By understanding the composition of the group in terms of diversity of learning styles, and the strengths and weaknesses associated with each type, the group may develop more effective ways of collaboration.

Group Process – Formative evaluation of the stakeholder engagement/facilitation process has informed each working group meeting and each workshop was followed up by the collection of post-workshop evaluation reflection questions and workshop visioning and reflection exercises. Framing analysis was conducted on the information available and categorized into three major themes: a) Purpose of group, b) Communication differences, and c) Using climate information at work. The main elements under each one of these themes are described below.

<u>Purpose of the group</u>: Stakeholders connected the purpose of the group with their expectations; in particular, they mentioned three key expectations: 1) to learn and understand climate change research and its impacts on utilities, 2) to collaborate with others, and 3) to use information to improve the planning process. Stakeholders also mentioned their hope to gain the ability to apply climate data practically as a result of participating in this group. The group was considered an important asset because it offers stakeholders the opportunity to collaborate with others with the common vision of sharing information and expertise and create strategies and tools useful for planning purposes.

<u>Communication priorities</u>: Under this theme, stakeholders identified best communication practices such as getting their point across, planning ahead, and listening to others as results of their participation in the group. They also mentioned that sometimes they don't listen to others, which would be a worst communication practice. The take home message for stakeholders was the importance of teamwork and good communication.

<u>Using climate information at work</u>: The main challenge identified here was to make data useful and practical to enhance its use for planning. Stakeholders realize that there is a key opportunity for using climate information for planning because it allows for making better decisions, and also that they must make some changes in their practice to increase the use of this information.

Overall, there was agreement among the group that 1) the purpose of the group is to share and develop research tools to be used for planning and decision-making, 2) it important to listen to others when communicating and 3) it is important to prepare and stick to your point when communicating in front of an audience, and 4) the main challenge and opportunity comes from using data for practical planning purposes. However, there was a difference in opinion over whether part of the group's purpose is to communicate with policy makers outside the group vs. focusing on sharing information just to group members. Also, communication challenges (e.g. feeling too nervous or shy to speak in the group or confusing others with overly technical communication) and communication style differences (e.g. engaging friendly style preferred by non-academics vs. technical style about individual research expertise preferred by the university community) were points of divergence among group members.

Based on this framing analysis, it was recommended that working groups such as FloridaWCA continue to devote time during workshops to discussing communication strategies and how to strategically achieve goals. Based on this project, future diverse stakeholder working groups could benefit from incorporating discussion of communication strategies at the beginning stages of group formation. It was also suggested that learning about diverse learning styles and communication preferences within the group can help a group to function more cohesively.

Knowledge Management System (KMS) – The full design and soft roll out of the KMS site, http://floridawca.org, during the last reporting period was followed by the establishment of a clearinghouse for materials during this reporting period. The website now contains all relevant working group documents, publications and an increasing number of participant identified relevant resources. The potential for use of the website for blogs and other internal group communications still needs to be tapped.

Objective 2: 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.

Three technical teams continued their work focused on 1) **Seasonal Scale Forecasts**, 2) **Long-term Climate Scenarios** 3) **Sea-level Rise/Change**. Project activities reported previously evaluated the skill of seasonal precipitation and temperature forecasts for the region, assessed the ability of nationally available reanalysis products and GCM retrospective simulations (CMIP3) to reproduce historic climatology in Florida at utility-relevant space-time scales using both dynamic and statistical downscaling techniques, and evaluated the potential for incorporation of these reanalysis data and retrospective climate predictions information into selected hydrologic models. Results this reporting period are outlined below.

1) **Use of Reanalysis Data in Hydrologic Models to Predict Seasonal Streamflow**

We contrasted four centennial long meteorological datasets comprising of two sets of observations (Climate Research Unit [CRU] and Parameter-elevation Regressions on Independent Slopes Model [PRISM]) and two atmospheric reanalysis (20^{th} Century Reanalysis [20CR] and Florida Climate Institute-Florida State University Land-Atmosphere Regional Reanalysis version 1.0 [FLAReS1.0]) to diagnose the El Niño and the Southern Oscillation (ENSO) forced variations on the streamflow in 28 watersheds spread across the Southeastern United States (SEUS). We forced three different calibrated lumped hydrological models with precipitation from these four sources of centennial long datasets separately to obtain the median prediction from 1800 (= 3 models x 600 simulations per model per watershed per season) multi-model estimates of seasonal mean streamflow across the 28 watersheds in the SEUS for each winter season from 1906 to 2005. We then compared and contrasted the mean streamflow and its variability estimates from all three of the centennial climate forcings. The multi-model strategy of simulating the seasonal mean streamflow is to reduce the hydrological model uncertainty. We focused on the boreal winter season when ENSO influence on the SEUS climate variations is well known. We found that the atmospheric reanalysis over the SEUS are able to reasonably capture the ENSO teleconnections as depicted in the CRU and PRISM precipitation datasets. Even the observed decadal modulation of this teleconnection by Atlantic Multi-decadal Oscillation (AMO) is broadly captured. The streamflow in the 28 watersheds also show similar consistency across the four datasets in that the positive correlations of the boreal winter Niño3.4 SST anomalies with corresponding anomalies of streamflow, the associated shift in the probability density function of the streamflow with the change in phase of ENSO and the decadal modulation of the ENSO teleconnection by AMO is sustained in the streamflow simulations forced by all four climate datasets (CRU, PRISM, 20CR, and FLAReS1.0). The ENSO signal in the streamflow is consistently much stronger in the southern watersheds (over Florida) of the SEUS across all four climate datasets. However during the negative phase of the AMO there is a clear shift of the ENSO teleconnections with winter streamflows in northern watersheds (over the Carolinas) exhibiting much stronger correlations with ENSO Niño3.4 index relative to the southern watersheds of the SEUS. This study clearly indicates that the proposed methodology using FLAReS1.0 serves as viable alternative to reconstruct 20th century SEUS seasonal winter hydrology that captures the interannual variations of ENSO and associated decadal variations forced by AMO. However it is found that the FLAReS1.0 forced streamflow is far from adequate in simulating the streamflow dynamics of the watershed over the SEUS at daily time scale. This work was recently accepted for publication in Earth Interactions. http://coaps.fsu.edu/~vmisra/enso-seus.pdf

2) **Use of Dynamically Downscaled Future GCM Projections to Predict Steamflow**

Potential future climate change impacts on streamflow in the Tampa Bay region were evaluated using the FSU COAPS Land-Atmosphere Regional Ensemble Climate Change Experiment for the Southeast United States at 10-km resolution (CLARREnCE10). The CLARREnCE10 dataset, http://floridaclimateinstitute.org/resources/data-sets/regional-downscaling, includes retrospective (1969-2000) and future (2039-2070, A2 scenario) predictions from three GCMs that were dynamically downscaled to 10-km resolution using the FSU RSM. The three GCMs selected by FSU for downscaling were the Community Climate System Model (CCSM), the Hadley Centre Coupled Model, version 3 (HadCM3) and the Geophysical Fluid Dynamics Laboratory GCM (GFDL). The daily precipitation and temperature predictions from each downscaled GCM were bias-corrected using a CDF mapping approach. The bias-corrected downscaled retrospective and future daily precipitation and temperature data were then used as inputs for the Tampa Bay Water Integrated Hydrologic Model. All other parameters, forcing terms and initial boundary conditions for hydrologic simulation were identical to those used in the calibrated hydrologic model.

Results showed that all three downscaled bias-corrected GCMs consistently estimated a 1-3ºC increase in mean daily temperature over the study area for the future period (2039-2070) under the A2 emission scenario. In contrast the three downscaled bias-corrected GCMs predicted significant differences in precipitation for the future period. The CCSM predicted a decrease in precipitation for all months in the future. The HadCM3 showed a slight increase in precipitation in the winter months and a decrease in the summer months. GFDL showed a significant decrease in July precipitation but increases in precipitation for most months of the year.

Hydrologic model predictions showed that although each of the GCMs predicts a consistent increase in future temperature, differences among future precipitation estimates propagated into significant differences in future streamflow predictions. In other words, the precipitation signal overwhelmed the temperature signal in predicting hydrologic implications of projected future changes. The high uncertainty in precipitation and thus streamflow estimates across the three GCMs found here indicates that additional GCM predictions (with multiple greenhouse gas emission scenarios) should be examined before any actionable recommendations can be made. Due to the extreme time and computational expense associated with dynamic downscaling for GCMs, statistical downscaling of the larger set of GCMs using the BCSA method developed by Hwang and Graham (2013) is recommended for future work. A manuscript is currently being prepared on this work for submission to a peer reviewed journal.

3) Sea Level Rise/Change

During the previous reporting period we compiled recent publications with regionally relevant information on sea level change. This reporting period we made the publications available through the knowledge management system. It is clear that the group has a strong and growing interest in sea level rise. We focused one of the interactive workshops (workshop 10) in South Florida exploring current plans and responses of several cities and counties to sea level change, and conducted a field trip to the City of Miami Beach. In addition during this reporting period, FloridaWCA participants used growing statewide interest in Sea Level Rise to reach out to groups not currently involved in the FloridaWCA. Both Tampa Bay Water and Peace River Manasota are participating a nascent group in South west Florida that is bringing local counties together around the issue of sea level rise. They shared information on these efforts at the FloridaWCA meetings and informed the new organization about the existence and activities of FloridaWCA. In addition, the Florida Department of Environmental Protection, in partnership with the five Florida Water Management Districts, formed a task group that has met over the last year to discuss issues of Sea Level Rise. Discussions of potential synergies between this group and the FloridaWCA have recently taken place.

Objective 3: 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.

In the last reporting period we noted that only one of the group member's existing models (Tampa Bay Water's Integrated Hydrologic Model, described above) had been identified as appropriate for incorporating downscaled climate predictions and projections for planning and decision making. This reporting period brought us into Phase 4 of the FloridaWCA framework focused on evaluating usefulness and actual application of the climate information at the operational and planning levels in at least two utilities. As a result of the participation with the FloridaWCA, Peace River moved forward on developing a decision model incorporating climate variability data. (See section B below for details of this effort led by Kevin Morris.)

B. Application of your findings to inform decision making

Hydrologic predictions using reanalysis data, retrospective predictions and future climate projections described above were shared at workshops and reinforced previous preliminary findings that these exercises do not provide actionable information due to large uncertainties in predictions. During this reporting period, Workshop 9, held on June 26th 2013 also **e**xplored practical application of seasonal climate forecasts by two utilities helping participants to consider where do might be helpful with decision making in their own institutions.

Tirusew Asefa (Tampa Bay Water) provided a presentation entitled, "Use of Climate Information in Tampa Bay Water Decision Support Tools" sharing current use of seasonal data by Tampa Bay Water in operations planning. Discussion followed on how new seasonal forecast data developed in this project might be used to further improve operations in Tampa Bay Water and other Utilities. Kevin Morris presented his development of a decision support tool for Peace River Manasota Regional Water Supply Authority based on historic climate data coupled with readily available scientific forecast products. In his presentation, "Decision Tool Development Exercise: "When to Start ASR Recovery?," he explored managing risk of starting Aquifer Storage and Recovery operations too early or too late within the Peace River Manasota Regional Water Authority. The document he developed, Peace River Decision Model , was distributed at the workshop, is available at the Florida WCA website, and is currently being written up for publication. Discussions during workshop on the value of decision tools, the development of the decision tool in different contexts, and criteria for choosing variables and scaling according to importance encouraged other Utilities to consider entry points for climate data and model predictions in their own models and decision making processes.

C. Planned methods to transfer the information and lessons learned from this project

Participants have reported sharing information in their own organizations, as well as making presentations to their contacts in various professional venues (2014 Water Institute Symposium, SECC meetings, RISA meetings, PUMA meetings, WUCA meetings, Professional society meetings). The website, newsletters, poster and oral presentations have provided opportunities to share project information. Throughout the life of the project FloridaWCA participants have actively sought out collaborative project opportunities. During this reporting period several proposals have been submitted.

D. Significant deviations from proposed work plan

None

E. Completed publications, white papers, or reports (with internet links if possible).

- **Websites (same as previous reporting period)**
- http://floridawca.org
- http://waterinstitute.ufl.edu/WorkingGroups/PWSU-CIWG.html
- http://waterinstitute.ufl.edu/research/projects_detail.asp?TA=Water+and+Climate&Contract=79361

- **Publications (this reporting period)**
- Asefa, T. and A. Adams, 2013, Reducing bias corrected precipitation projections uncertainties: A Bayesian based indicator weighting approach, Journal of Regional Environmental Change (2013) 13:111-120 DOI 10.1007/s10113-013-0431-9
- Hwang, S., W. Graham, A. Adams, and J. Guerink, Assessment of the utility of dynamically-downscaled regional reanalysis data to predict streamflow in west central Florida using an integrated hydrologic model, Regional Environmental Change, doi: 10.1007/s10113-013-0406-x, 2013.
- Hwang, S., and W. Graham, Development and comparative evaluation of a stochastic analog method to downscale daily GCM precipitation, Hydrol. Earth Syst. Sci., 17, 4481-4502, doi:10.5194/hess-17-4481-2013, 2013.
- Hwang, S., W. Graham, J. Guerink, and A. Adams, Hydrologic implications of errors in bias-corrected regional reanalysis data for west-central Florida, Journal of Hydrology, 510:513–529, http://dx.doi.org/10.1016/j.jhydrol.2013.11.042, 2014.
- Hwang, S., and W. Graham, Assessment of alternative methods for statistically downscaling daily GCM precipitation outputs to simulate regional streamflow, Journal of the American Water Resources Association, doi:10.1111/jawr.12154, 2014.
- Li.Haiqin, et. al. (Dec. 2013) Projected climate change scenario over California by a regional ocean-atmosphere coupled model system, Climatic Change
DOI 10.1007/s10584-013-1025-8
- Li, Haiquin and V. Misra, (Jan 2014), thirty-two-year ocean-atmosphere coupled downscaling of global reanalysis over the Intra-American Seas, Springer-Verlag Berlin Heidelberg 2014

- Misra,V. (Summer, 2013) The NOA MAPP Climate Prediction Task Force, **U.S. CLIVAR VARIATIONS Summer 2013, Vol. 11, No.**
- Nag, B., V. Misra, and S. Bastola, 2014: Validating ENSO teleconnections on Southeastern United States Winter Hydrology Earth Interactions. In press

- **Workshop Reports and Presentations (this reporting period)**

There were three workshops with 20 presentations during this reporting period. Information for each workshop including agenda, summary report, and presentations is available on the Floridawca.org website.

- Workshop 9 – http://floridawca.org/node/325
- Workshop 10 - http://floridawca.org/node/333
- Workshop 11 - http://floridawca.org/node/357

In addition, information on all other workshop and working group documents are available at the Floridawca.org website.

- **Outreach – Presentations, Media, Information**

Participants have reported sharing information in their own organizations, as well as making presentations to their contacts in various professional venues (2014Water Institute Symposium, SECC meetings, RISA meetings, PUMA meetings, WUCA meetings, and other professional society meetings). Bertha Goldenberg (Miami Dade Water and Sewer), Mike Cullum (SJRWMD), and Kathryn Frank (UF), all active in FloridaWCA, served on the 2014 Water Institute Symposium “Water Supply Planning in a Non-Stationary World” planning committee and moderated symposium sessions. Bertha Goldenberg led two sessions on Water Supply Planning and Management, Mike Cullum convened a panel on Climate Predictions in Water Supply, and Kathryn Frank convened a panel featuring two current regional water supply planning initiatives in Florida. FloridaWCA participants contributed the following nine presentations within these sessions:

- **Tirusew Asefa**, Tampa Bay Water, Coping with uncertainties in CMIP5 precipitation projections: A case study from west central Florida
- **Jessica Bolson**, Wharton Risk Management and Decision Processes Center, Early lessons learned from the Florida Water Climate Alliance on the integration of climate information into water resource decision-making
- **Kathryn I Frank**, Department of Urban and Regional Planning, UF, Coastal Utilities’ Response To Saltwater Intrusion
- **Tracy Irani**, **Odera, E., & Staal, L.** Center for Public Issues Education, Water Institute, UF/IFAS, Creating Stakeholder Collaborations for Water Use Planning in an Uncertain Future: The Case of the Florida Water and Climate Alliance
- **Kevin Morris**, Peace River Manasota Regional Water Supply Authority, Synthesis of Diverse Data in Developing a Decision Tool for Initiating Recovery from an Aquifer Storage and Recovery System
- **Jayantha Obeysekera**, South Florida Water Management District, Scenario-based, Integrate Assessment of the Greater Everglades System to Climate Change

- **Di Tian**, University of Florida, Forecasting short-term urban water demands based on the Global Ensemble Forecast System
- **Galen Treuer**, Leonard and Jayne Abess Center for Ecosystem Science and Policy, University of Miami, Using behavioral science to support south Florida water management
- **Alison Adams**, Tampa Bay Water, asked the panel members (leaders of Florida's agencies responsible for water planning and management) about their support for climate change research for use in hydrologic modeling to help understand climate change impact on water resources as it relates to Florida and the Southeast during the final plenary session. Click here for the video stream of the question and response.

III. GRAPHICS: PLEASE INCLUDE THE FOLLOWING GRAPHICS AS SEPARATE ATTACHMENTS TO YOUR REPORT

Graphics appear at the end of this document and are attached to the report as separate documents.

Photo /Slide 1: Introduction to the Florida Water and Climate Alliance

Photo/ Slide 2: FloridaWCA timeline reflecting workshops and activities to date.

IV. WEBSITE ADDRESS FOR FURTHER INFORMATION

- http://waterinstitute.ufl.edu/WorkingGroups/PWSU-CIWG.html
- http://FloridaWCA.org

V. ADDITIONAL RELEVANT INFORMATION NOT COVERED UNDER THE ABOVE CATEGORIES

NA

VI. REFERENCES

NA

Slide 1: Introduction to the Florida Water and Climate Alliance

Slide 2: FloridaWCA timeline reflecting the 8 workshops and activities to date.