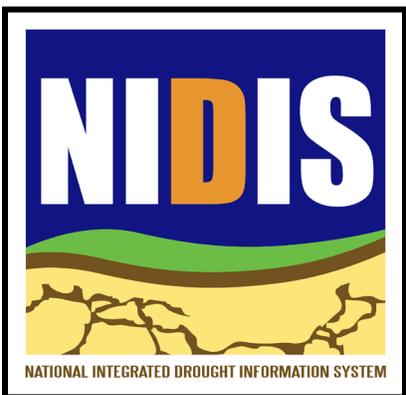


National Integrated Drought Information System – NIDIS



*National Integrated Drought Information System (NIDIS)
Southeast Climate Outlook Forum/NIDIS Full Basin Meeting*

Albany, GA. Nov. 18-19, 2010

Meeting Notes



Executive Summary

Climate Outlook Forum

The Climate Outlook Forum consisted of presentations of current conditions in the basin, a seasonal outlook, and a long-lead forecast. Key points from the presentations included:

- Current Conditions
 - We are currently in the La Niña phase of the El Niño – Southern Oscillation (ENSO) which can lead to dry conditions in the southeast, with conditions becoming drier as you move south
 - The ACF Basin has become increasingly drier over the last few months, with much of South Georgia experiencing below normal precipitation.
 - The products assessed included rain fall averaged over various time periods, soil moisture, streamflow and groundwater
- Seasonal Outlook
 - The current La Niña conditions are anticipated to persist into spring, maintaining the dry conditions, and perhaps will continue into the winter of 2011 -2012
 - The seasonal outlooks are produced by looking at the effects of long-term trends, soil moisture, and, when appropriate, the ENSO cycle
- Long-lead Forecast
 - There are not many La Niña years to rely on for comparison, but given what we do know...
 - The current La Niña could end sometime between fall 2011 and summer 2013
 - A second year of La Niña conditions *could* mean wetter conditions in the southeast relative to the dry conditions of the first year
 - These conclusions are based on the analysis of the Multivariate ENSO Index (MEI) and other analyses of climate data from the southeast
- Implications of the forecast for drier conditions in the ACF Basin
 - Average streamflows during a La Niña event can be above or below normal (during the last 3 events they were below normal)
 - In the last several years deficits in rainfall during the recharge period into the summer accentuated water resource concerns, therefore current conditions do lead to concerns about the 2011 water supply
 - La Niña conditions can negatively impact groundwater recharge for months
 - Rainfall amounts during January, February, and March of 2011 will determine the scale of drought impacts during summer 2011
 - If La Niña persists through spring 2011, it is likely that groundwater level declines will result in intermittent flows in parts of Spring Creek sub basin by mid summer
 - If La Niña persists into winter 2012, groundwater level declines will occur throughout the lower ACF Basin resulting in significant streamflow declines and

- the need for supplemental releases from federal reservoirs on the Chattahoochee River to meet target state line flows during summer 2012
- In addition, a persistent La Niña will result in diminished spring discharge in the lower Flint River Basin enhancing the possibility of flow reversals from the river into the Upper Floridan aquifer
 - La Niña conditions are not necessarily bad for agricultural interests, with the main negative impact being pasturing conditions
 - The lifecycle of important species such as crawfish can be disrupted during times of low flow

A discussion was held to determine the group's interest in and the feasibility of producing a climate outlook for the ACF basin based on the information presented. The group decided that the state climatologists would issue press releases for their respective states and the Southeast Climate Consortium will host webinar briefings reviewing current and projected conditions for the ACF basin for interested basin stakeholders.

ACF Full-Basin Meeting

The goals of the ACF full-basin meeting held on 19 November 2010 at the Bridge House in Albany, GA included (1) providing updates to stakeholders regarding current NIDIS work in the basin, (2) providing a summary of the feedback heard regarding drought issues at all three NIDIS sub-basin meetings that were held last year, (3) determine the priority elements for the NIDIS Regional Drought Early Warning Information System (RDEWS) for the ACF basin and to (4) establish committees to begin implementation of the RDEWS.

In order to keep stakeholders in the basin up to date, reviews of two projects in the ACF basin currently being funded by NIDIS were given. The project titles and lead principal investigators (PI) are listed below:

- Reducing Drought Risks in the Southeast USA: Quantification of Drought Information Value, Development of Drought Indices, and Communication of Drought Information (Puneet Srivastava, Univ. of Auburn, Lead PI)

- Needs, Uses, Perceptions, and Attitudes towards Weather and Climate Forecast Information by Water Resource Managers in the Southeastern United States (Chris Martinez, Univ. of Florida, Lead PI)

The goals of the projects along with the rest of the participating investigators were presented to the stakeholders.

Pam Knox, Assistant State Climatologist for Georgia, presented a review of the data committee's activities, including the latest version of a spreadsheet of data sources relevant to the ACF basin. The data committee compiled this spreadsheet over the last few months and it is available to stakeholders for their use and for their input. If you would like to review the spreadsheet, or contribute to it, please contact Pam Knox (pknox@uga.edu).

Stakeholders saw a brief overview of the new ACF RDEWS web page on the Drought Portal (<http://www.drought.gov/portal/server.pt/community/acfrb>). This web page is a work in progress and NIDIS is open to receiving feedback on web page content and layout.

Meeting summaries were given for the three sub-basin meetings that were held in the past year: Upper Chattahoochee (Pam Knox), Middle Chattahoochee and Flint (Tom Littlepage, ADECA), and the Apalachicola River & Bay (Dan Tonsmiere, Apalachicola Riverkeeper). To prioritize RDEWS activities that will benefit stakeholders across the basin, concerns that were heard at the sub-basin meetings were categorized for presentation to the group to consider as potential elements of an RDEWS for the basin. There were nine general areas of common concerns heard across the basin. These common concerns, ranked in order of importance by the group, are as follows:

- Drought education and enhanced communication across the basin
- ACF Basin webinars and climate outlooks to assess current conditions and present short- and long-term forecasts
- Basin data sets (inventories, access)
- Presentation of information (emphasis on basin-scale graphics)
- Forecasting improvements
- Development of a drought index for the basin
- Improved interactions with the US Army Corps of Engineers
- Consistency in drought planning among the 3 states
- Resolve discrepancies in our understanding of groundwater issues in the basin

Committees were formed to address the top four concerns, with data and presentation of information combined into one.

The **Education and Communication Committee** will be led by Chris Martinez at the University of Florida. This committee has a wide range of topics and stakeholder groups that could be addressed. A workshop to educate the media about drought was brought up as a valuable task for this group.

The **ACF Basin Webinars and Climate Outlooks Committee** will be led by Keith Ingram at the University of Florida. It is anticipated that stakeholders from all three basin states will contribute to the production of these webinars, which will address current and future conditions in the basin.

The **Data and Presentation of Information Committee** will be led by Pam Knox at the University of Georgia. This group will continue to develop the ACF basin data spreadsheet and make plans for future activities which will allow easier access to data in the basin.

Please read the complete meeting summary for more detail on any of the above topics.

Meeting Notes

Climate Outlook Forum

Thursday, November 18, 2010

Welcome and Introductions (*Mark Masters, Flint River Water Planning and Policy Center*)

Goals and Objectives of Forum (*Lisa Darby and Chad McNutt, NOAA/NIDIS*)

- To assess current and predicted hydrometeorological conditions, including the potential impacts of La Niña
- Develop a seasonal climate outlook on the ACF basin scale and disseminate to climate-sensitive groups

Observed and Predicted State of the Climate System

Current conditions in the Southeast and in the ACF (*David Stooksbury, Univ. of Georgia*)

When it comes to precipitation, averaging times matter:

- 12-mon precipitation (Nov '09 – Nov '10) - showed above normal precipitation
- 6-mon precipitation (May '10 – Nov '10) – the southeast started to look drier, especially in southeast Alabama
- 1-mon precipitation (Oct '10 – Nov '10) – much of south Georgia was below normal

Q: Can the NCEP-NOAH soil moisture percentile product be produced more often (it's currently produced weekly). A: It would take more resources.

- It is important to look at several soil moisture models for trends and to know their biases. It is not realistic to expect one model to have all the answers.
- Current conditions: soil moisture is dry and the streamflow is very low in some places. Must interpret the Chattahoochee stations on the USGS streamflow plot with caution since the Chattahoochee is managed by the Corps.
- Groundwater wells in Georgia are also low
- The Corps reservoir levels are below the rule curve
- It was not just the lack of land-falling hurricanes that hurt the southeast this year by not bringing additional rain, but the lack of streaming tropical moisture from the Gulf to the southeast US
- It was an active hurricane season, but storms tended to form more easterly than usual, reducing chances of land-fall
- March 1-4, 2011 is the NCEP stakeholder meeting
- Q: How do you define the difference between weather and climate? A: When the weather forecast is no longer useful and we have to switch to climatology (right now, a

good weather forecast won't go beyond about 7 days). This is a move from a deterministic forecast to a probabilistic forecast.

Climate Prediction Center 90-Day Seasonal Outlook and introduction to CPC and Seasonal Forecasts (*Mike Halpert, NOAA/Climate Prediction Center*)

- On the 6-10 day outlook, the white areas on the map trend toward normal
- On the seasonal outlook, the white areas on the map convey equal chances of above normal, below normal or normal (anything can happen)
- Other Climate Prediction Center (CPC) products (<http://www.cpc.noaa.gov/>)
 - Drought outlook
 - Hazards assessment
 - Weekly weather and crop bulletin
 - Weekly and monthly sea surface temperature (SST) products
 - Box and whisker plots by climate division
 - Seasonal hurricane outlooks
 - Monthly ENSO prediction and diagnostic discussions
- Selected other climate services at CPC
 - Joint Agriculture Weather Facility
 - CPC International Desks
- There is an applied climate research component to the CPC – an integrations of science and service
- The latest seasonal outlook (issued the day of the meeting) shows the southeast US as the driest part of the country and Texas as the warmest part of the country
- The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, the El Niño – Southern Oscillation (ENSO) cycle
- The precipitation forecast is better than the temperature forecast if it is an El Niño or La Niña year, otherwise it is worse than the temperature forecast
- The upcoming spring is likely to be dry with La Niña anticipated to persist at least into the Northern Hemisphere spring 2011; some models predict La Niña will strengthen further and peak during the Northern Hemisphere early winter 2011-2012.
- The other oscillations (e.g., Pacific Decadal Oscillation [PDO]) are harder to predict since they have more of an atmospheric component, whereas the ENSO is based on ocean temperatures which change more slowly and are easier to predict

Long-lead Forecast: Potential for a Two-Year La Niña (*Klaus Wolter, CIRES, NOAA/ESRL/WWA*)

- According to the Multivariate ENSO Index (MEI, <http://www.esrl.noaa.gov/psd/people/klaus.wolter/MEI/mei.html>) there was a record-low anomaly about 1 month ago. The anomaly has weakened since, but Klaus anticipates that we haven't seen the last of the strong anomalies.
- The dynamic and statistical models are currently in agreement, which isn't always true
- There aren't that many years or events to rely on for comparisons

- The state of the PDO matters in assessing the ENSO. A negative PDO correlates with a longer La Niña. It's a strong signal in the winter, murky the rest of the year.
- In summer the La Niña can mean wet conditions in the southeast
- In the fall there is a decent dry signal with La Niña (correlates better than El Niño)
- In the spring there are weak correlations
- A La Niña spring following a fall/winter case results in drier conditions in southern Georgia and Alabama; summer a bit wetter
- How long does La Niña last? The MEI from 1871 to 2005 indicates 1.5 to 3 years duration for an MEI < -2.
- The current La Niña event is expected to end between Sep/Oct 2011 and Jun/Jul 2013
- The SECC is funding an effort to look at ENSO persistence
- Out of 7 cases, historically the 2nd year of La Niña in the southeast is wetter than the 1st year. The opposite occurs in the Upper Colorado.
- A major La Niña is occurring right now, with high potential to linger into 2012.
- The 'hyper-active' hurricane season of 2010 is winding down, with a very unusual juxtaposition of a high count of storms that did not make landfall in the U.S. – this represents a lost opportunity for building up a moisture surplus before heading into a typically dry La Niña winter season in the southeastern U.S.
- While the majority of international ENSO forecast models show this strong La Niña to continue into early 2011, they all ease up on its amplitude as we go forward into spring. Niño 3.4 anomalies tend to peak in early (boreal) winter and are typically minimal in April/May (standard deviation drops by almost 50%). This shows that the published models are well trained on historical data. They actually have little proven skill in breaking the 'spring predictability barrier.'
- Klaus will start issuing MEI forecasts next month that cover the next 6-24 months. Current indications are that this will be an event that has a good chance of lasting well beyond spring 2011 (75%).
- With an MEI of < -1 the impacts of La Niña don't change much with the decrease in MEI, but the larger anomaly indicates a longer event

Lunch Break

Implications of Seasonal Outlook for the ACF

Water supply (*Jeff Dobur, Southeast River Forecast Center*)

- Average streamflows during a La Niña event can be above or below normal, however during the last 3 events they were below normal
- There are no big differences in streamflow by season during La Niña events
- Ensemble Streamflow Prediction (ESP) can use all years or select years since 1950, e.g., can choose La Niña years
- ESP drivers are current soil moisture and recent precipitation
- In the last several years deficits in rainfall during the recharge period into the summer accentuated water resource concerns; current conditions do lead to concerns about 2011

Water supply (*Woody Hicks, Joseph W. Jones Ecological Res Ctr*)

- There are no groundwater data from the early part of the century. We only have good groundwater data from 1980, therefore we cannot assess the "pre-modified" groundwater situation in the basin
- Water Balance (WB) = Precipitation (P) – Evapotranspiration (ET)
 - In 2007 the WB was low all year, not just during the recharge season
- In southwest Georgia the ag pumping averages 1 billion gallons/day during the 6-mon growing season. 74% is from the Floridan Aquifer.
- 7-day minimum flows in the Flint River (at Newton) have been reduced by almost 500 ft³/sec since irrigation increased in the 1970's
- La Niña conditions can negatively impact groundwater recharge for months
- Rainfall amounts during January, February, and March of 2011 will determine the scale of drought impacts during summer 2011
- If La Niña ENSO persists through spring 2011, it is likely that groundwater level declines will result in intermittent flows in parts of Spring Creek sub basin by mid summer
- If La Niña ENSO persists into winter 2012, groundwater level declines will occur throughout the lower ACF Basin resulting in significant streamflow declines and the need for supplemental releases from federal reservoirs on the Chattahoochee River to meet target state line flows during summer 2012
- In addition, a persistent La Niña will result in diminished spring discharge in the lower Flint River Basin enhancing the possibility of flow reversals from the river into the Upper Floridan aquifer

Agriculture (*Clyde Fraise, Univ. of Florida*)

- Translate forecast to impacts by commodities
- A grower's main interest is a freeze forecast
- Most freezes occur in ENSO-neutral conditions, so a La Niña forecast is good news for freezes
- Winter vegetables do better in a La Niña year than an El Niño year (e.g., tomato and green peppers yield more)
- Winter pastures could be a problem during a La Niña year, especially if there is over seeding
- In drier years there are fewer fungal diseases
- There is a smartphone application to help farmers determine if anti-fungal treatment is needed
- Farmers could select which varieties to plant based on an ENSO forecast (some varieties are more disease resistant than others)
- Forest fires become a big concern during La Niña
- Agricultural Reference Index for Drought (ARID) – a decision support system on AgroClimate (www.agroclimate.org) is specifically designed to help forage producers cope and adapt to drought conditions in the southeastern US

Natural Resources (*Steve Golladay, Joseph W. Jones Ecological Res Ctr*)

- This presentation will focus on the Flint River since there are no longer any endemic mussels on the Chattahoochee
- Freshwater mussel shells used to be used for buttons and the nucleus for cultured pearls
- There are harvesting guidelines
- Mussels are filter-feeders, which are at the bottom of the food chain
- They improve water quality by filtering 3-6 gallons/day and by depositing particulates onto the sediment
- They improve fisheries
- Freshwater mussel beds are foraging sites
- Freshwater mussels used to be collected by Victorian collectors. These collections may be the best record of past species and their geographical distribution
- Mussels are most abundant and diverse in the tributaries; mid-reaches are most affected by drought
- There are few studies about mussels during times of drought
- There are die-offs if the dissolved oxygen (DO) is < 5 mg/L or the streamflow is < 0.1 m/s
- Some species are more sensitive than others

Natural Resources (*Dan Tonsmeire, Apalachicola Riverkeeper*)

- The Apalachicola River, floodplain and bay is the largest forested floodplain in Florida, and has the highest species diversity of any river system in North America
- There is a \$200 million local seafood industry that produces 90% of Florida's oysters and 10% of US oysters, plus shrimp, crab and finfish
- 90% of all harvested species must spend some part of their life cycle inshore on the marsh and sea grass environment (even grouper)
- The river level controls water in the floodplain
- Crawfish are an integral part of the food chain – they are an important food source of terrestrial and aquatic species
 - Crawfish are unable to complete their growing cycle when only a short period of floodplain inundation occurs during dry conditions

Integration of Impact Information:

(*David Stooksbury, Univ. of Georgia, facilitator*)

Discussion of short-term and long-term sector vulnerabilities and risks

David started the session by asking "What did you hear?"

- There is a correlation between La Niña and drought years, although the impact of La Niña in the southeast can vary
- There is a lot of complex information that will not be understood by the public

- We are probably going to have a drought
- The drought could last longer, maybe 2 years
- An individual's perspective determines what they want to hear

What are the short-term vulnerabilities (next 3-4 months or so)?

- Is the Corps trying to store water? Leveling action is needed.
- We need to inform people that there is a high probability of drought
- Q: What groups are most vulnerable? A: Educating the public is not dependent on vulnerability
- We need to reach out to the ag community, provide historical context
- Educate the public about the climate patterns and that we are likely to see a drier year (analog year 1998)
- Reach out to ecosystem managers – we need data before the drought to be able to assess drought impacts across the watershed
- Determine groups that need to make key decisions by a certain date (e.g., Flint River Protection Act or farmers needing to buy insurance by Feb. 1) and inform them in time
- Farmers can switch crops based on the forecast
- UGA extension office, and many others, could provide a 1-page pdf with a drought assessment
- SE Power Administration needs early warning so they don't over commit on power and then later on pay a high cost for extra power
- Winter forage – vulnerable
- Flint River Protection Act probably doesn't have funding for the upcoming season

What are the longer-term vulnerabilities (out to next summer)?

- Coastal fishing communities
- Will it be time to step up water conservation?
- Sustainable management of the basin – is it a regulatory matter? Will it bring about policy change?
- There will be a higher discharge from the reservoirs
- We need to build more reservoirs – the only way to save water for downstream
- Enhance water systems (e.g., Habersham County)
- There are 10 regulatory water councils in Georgia – their plans are coming on-line next summer
- Landscape and nursery businesses – they will begin planning and stocking up for next year
- Golf courses and utilities
- Trout hatcheries
- Small businesses

Informing Planning and Preparedness *(Keith Ingram, Univ. of Florida, facilitator)*

To kick off this group discussion, Mark Svoboda provided a Drought Monitor primer
ACF Input for U.S. Drought Monitor (*Mark Svoboda, National Drought Mitigation Center*)

- The Drought Monitor authors use a "convergence of evidence" to determine drought monitor levels
- Drought intensity is rated by percentile ranks
- The Drought Monitor is not a forecast or a drought declaration
- The Drought Monitor author strives to identify impacts, assess current conditions, incorporate local expert input and to be as objective as possible
- Products used include: PDI, SPI, KBDI, Modeled and measured soil moisture, 7-day avg. streamflow, precipitation anomalies, crop moisture index, sat. veg. health index, mesonet data, SWSI, reservoir levels, snowpack, SWE, streamflow
- Local expert input is very important – contributors may include the local NWS office, USDA, state climatologists, state drought task forces and regional climate centers
- The Drought Monitor is used to brief the president, governors, other politicians, USDA, Secretary of Agriculture and is widely disseminated through the media
- Monitoring of impacts is virtually non-existent, hampering an accurate assessment of the current conditions
- On the archive tab of the Drought Monitor web site you can retrieve county-level data since 2000
- D2 or D3 are used to activate the farm bill, depending on the circumstances
- Alabama has a good model for providing input to the Drought Monitor author

Outlook Statement and Summary

The group was asked the following questions: Can this group come up with a drought outlook? Would the outlook come from NOAA or from the three state climatologists and the three state EPDs as a joint product? Would we issue such an outlook monthly?

A member of the group questioned the value-added of having an outlook issued from the three states. In answer it was stated that it would reflect an integrated basin approach and would bring attention to the basin as a whole. It could be a "state of the drought" report.

Communicating the outlook to stakeholders

Other comments from the group included:

There could be a media teleconference to roll out the product so that journalists understand what the product is. There could be one or two examples of what happened in analog years.

Impacts and vulnerability are more appealing than the science, but beware of state issues.

Publishing an assessment quarterly might be better than monthly. A special edition could come out if conditions change significantly before the next scheduled release.

Consider the timing of other products, e.g., the CPC puts their seasonal forecast out on the third Thursday of the month - we would want to incorporate the latest outlooks, etc.

Do we really need to do a press release? Will webinars be better?

It was decided that the states issue the press releases and the SECC will hold webinars to review current and future conditions.

NIDIS will work on getting invitations to the UCRB pilot webinars out to the group.

Meeting ends for the day

NIDIS Full-Basin Meeting

Friday, November 19, 2010

Welcome (*Mark Masters, Flint River Water Planning and Policy Center*)

Meeting Goals and Summary of Previous ACF Basin NIDIS Meetings

Meeting Goals (*Chad McNutt, NOAA/NIDIS*)

- To provide updates to stakeholders regarding current NIDIS work in the basin
- To summarize the feedback heard regarding drought issues at all three NIDIS sub-basin meetings that have taken place since last April
- To determine the areas of emphasis for the NIDIS Drought Early Warning System (DEWS) for the ACF basin and to establish committees to begin the implementation of the DEWS

Apalachicola River & Bay (*Dan Tonsmeire, Apalachicola Riverkeeper*)

Topic highlights from the Apalachicola River & Bay Meeting

- *Data*
 - Water budget
 - Data consolidation across sources
 - QA/QC issues
 - Increased collaboration with USGS regarding well data
- *Communication*
 - Tri-state webinars for current conditions
 - Climate outlook presentations to stakeholders
 - Develop and provide general public with drought information -- data visualizations, historical comparisons, educational materials
- *Drought indices*
 - Develop indicators for entering a dry period

- Learn more about how to relate the timing of drought onset to impacts – connect to physical data throughout the basin.
- *Fill information gaps*
 - Seasonal precipitation forecasts in November, reassess by mid-February
 - Improved forecasts for summer, northern basin
 - Assess stakeholders – information needs, possible applications
 - Value of water to natural ecosystems and ecosystem services and biological drought impacts
 - Plain English interpretations of technical products released by the NWS
 - Floodplain and salinity models
- *Can we have input into the Corps water control manual?*
 - Incorporation of ENSO phase effects or Reservoir Operations
 - Drought recovery
- *Flows needed for endangered species*
- *Flows needed to sustain the ecological habitat, diversity, productivity, and system functions*

Middle Chattahoochee & Flint (Tom Littlepage, Alabama Office of Water Resources)

Goal:

- Prioritize and design the NIDIS Early Warning System pilot over the next two years for the ACF Basin

Key Issue Areas

- *Data Gaps – Need to better understand what critical information is missing and most efficient way to collect and disseminate*
 - Groundwater
 - Measurements – real-time vs. monthly vs. yearly reporting
 - Modeling (i.e. surface water – ground water interactions)
 - Assessing aquifer conditions and impacts of demands
 - Future assessments (population growth, etc)
 - Gaps between the current and future demands
 - Soil moisture measurements
 - Surface water/Reservoir information
 - Reservoir stage with historical context
 - Estimate of when the reservoir will run out
 - Index for local vulnerability
- *Threatened and Endangered (T&E) Species*
 - Habitat requirements
 - Mussels: high-diversity of endemic species in the lower Flint
 - Sensitive indicators of stream degradation
 - Populations are declining and becoming isolated
- *US Army Corps of Engineers*
 - The Corps wants 2-way data sharing
 - Ultimately everyone relies on what the Corps does
 - Does the Corps have the best information to make their decisions?
 - Better inflow numbers

- Withdrawal information (the Corps knows what they release and have measurements downstream, but what happens in between?)
 - Better QPF
- *Forecast Issues*
 - Agreement on the value of forecasts from 2 weeks to 3 months
 - Further out valuable but limited ability of the science (although general tendencies would be of some benefit in understanding tendencies)
 - *Need to be sensitive to specific seasonal decision points*
 - Ag: Crop planting windows
 - Crop insurance windows (typically February)
- *Challenges*
 - Litigation (Water Wars)
 - ACF Basin Manual Update
 - State vs. federal roles
 - Common standards and definitions for impacts
 - Can we use this pilot effort with current La Niña conditions?

Upper Chattahoochee (Pam Knox, University of Georgia)

- *Education and Communication*
 - Climate Outlook Forum at the Basin and sub-Basin scale would be useful
 - Strong education component and would be an iterative process.
 - May have little effect on USACE operations but could be very useful to smaller systems, help with customer expectations
 - The early warning system must have way of communicating information at a very local level
 - Assess use of ESP forecasts information, how or if people are using it to make decisions
 - Brief incoming Governors
 - Need credible-unbiased source of data and information
- *Data*
 - Need data at the basin level, data by climate division not as helpful
 - More and better gridded data products (e.g., precipitation)
 - Better placement of stream gauges
 - GA Water Quality Monitoring Network will stop next year if funding is not found
 - During recent drought strain on USGS resources
 - Retrofit gauges, increased demand for gauges, greater need for rating verification
- *Vulnerability*
 - Over last 100 yr. no sig. reduction in annual GA precipitation, vulnerability has increased due to socioeconomic factors
 - A need exists to translate indicators to the public that may not seem relevant to them (people in SW GA understand why low lake levels in northern GA should affect them)
 - Vulnerability and risk should be managed but understand this in the context of public policy (swimming pools)
 - Small reservoirs off main stem are extremely vulnerable

- Understand how housing decline affected water demand in most recent drought. Look at 90s recession as an analog
- *Indicators*
 - Beneficial to have indicators across the three states

Common issues across the basin (Lisa Darby, NOAA/NIDIS)

- The following list was synthesized from group discussions at three previous sub-basin meetings (Apalachicola River and Bay [April 2010], Middle Chattahoochee and Flint [May 2010] and Upper Chattahoochee [Aug 2010]) and are a reflection of the topics that were frequently brought up during these three meetings.
- ***Education and Communication***
 - People across the basin agree that education and communication regarding drought needs improvement
 - General public, lawmakers, politicians
 - Examples: Upstream vs. downstream issues or the results of water conservation efforts
 - Drought information needs to come from a trusted source in an easy-to-understand way
- ***Forecasting improvements***
 - Improved precipitation forecasts, especially for the recharge season
 - Better forecasting for transitioning into and out of drought
 - Finer spatial resolution
 - Better longer-term forecasts
 - Simplified explanations of products
 - Better forecasting of extreme events
- ***Improved interactions with the Corps***
 - Input into water control manual
 - Data sharing
 - Communication
- ***Data***
 - Improved dissemination
 - Appropriate calibration and quality control
 - Access to real-time data (of all kinds...)
 - Soil moisture (in-situ, remote sensing, modeled)
 - Reservoir storage
 - And much much more...
- ***Consistency in drought planning among the three states***
 - Common restrictions near state borders
 - Common set of declarations and responses
 - Decisions based on common data sets
- ***ACF Basin webinars and Climate Outlooks***
 - What are the current conditions?
 - What are the projections?
 - What are the current and anticipated impacts?

- ***Drought Index***
 - Can a basin-wide drought index be established?
 - Something analogous to the Surface Water Supply Index (SWSI) used in the western states
 - Indices for the beginning and ending of a drought
 - Sector-specific indices
 - Indices for the different types of drought (e.g., meteorological, agricultural and hydrological)
- ***Resolve discrepancies in our understanding of groundwater***
 - How much groundwater is withdrawn?
 - How frequently should withdrawals be recorded?
 - Improved modeling
 - Improved access to data
- ***Presentation of Information***
 - Basin-scale graphics available from one web site
 - Historical context/analog years
 - Can we get away from climate divisions?

Clarification and additions to the list of issues - *Chad McNutt and Lisa Darby (NOAA/NIDIS)*

- No additional issues were added to the list

NIDIS-Supported Efforts in the ACF River Basin (*Puneet Srivastava, Auburn University; Chris Martinez, Univ. of Florida; Jessica Bolson, Univ. of Florida*)

Overviews of two proposals were given:

Reducing Drought Risks in the Southeast USA: Quantification of Drought Information Value, Development of Drought Indices, and Communication of Drought Information

Puneet Srivastava (PI), Latif Kalin, Keith Ingram, David Stooksbury, Pam Knox, Jessica Bolson, Muthuvel Chelliah, Richard Marcus, and Matt Dunn

Three separate objectives

- Assess drought-related climate information needs, perceptions, and attitudes of municipal water managers and identify current water supply and drought mitigation policies
- Develop a municipal water deficit index (MWDI) and prototype visualization tool for disseminating drought information
- Quantify the value of drought information for municipal water managers, and evaluate alternative policies for drought risk reduction

Needs, Uses, Perceptions, and Attitudes towards Weather and Climate Forecast Information by Water Resource Managers in the Southeastern United States

Chris Martinez (PI), Norman Breuer, Jessica Bolson, Jim Jones, David Stooksbury, and Tatiana

Borisova

Three separate objectives

- Assess water resource managers' needs, uses, perceptions, and attitudes of weather and climate information and identify barriers and opportunities for adoption
- Develop regional evaporation forecasts for reservoir managers
- Incorporate information on weather and climate variability and change, its potential impacts, and forecast products into educational materials for stakeholders

Update on the NIDIS ACF Pilot Data Committee Activities (*Pam Knox, University of Georgia*)

- Data group started meeting after the December 2009 meeting in Lake Blackshear, GA
- There are approximately 15 members
- Charge was to identify sources of data for the ACF basin for use in identifying drought triggers
- Most work in Google Docs spreadsheet
- Periodic teleconference calls to discuss formats and new sources of databases
- Next steps: prepare public spreadsheet or other format to distribute database info
- Continue to add appropriate databases as they are identified
- Publish information on Drought Portal or other site
- A data distribution tool is being added to the UGA web site to provide region-wide data access in multiple formats (see http://sewater.engr.uga.edu/data_test1.php for test site)

Introduction to the NIDIS ACF web page (*Lisa Darby, NOAA/NIDIS*)

- A brief introduction to the new ACF River Basin web page was given (<http://www.drought.gov/portal/server.pt/community/acfrb?mode=2®ion=acfrb>)
- As of now, the page has links to meeting information, weather and climate information, river information, etc.
- We are open to suggestions for web page content and layout – contact Lisa Darby if you have any input regarding the web page

Communicating Hydrometeorological Information – From Days to Years (*John Feldt, Southeast River Forecast Center*)

Short-term products and tools used by the Southeast River Forecast Center (please see the presentation for example graphics)

- ▣ Deterministic River Forecasts (5 Days)
- ▣ Multi-Sensor Precipitation Estimates
- ▣ Precipitation Forecasts (48-Hours)
- ▣ SERFC Journal
- ▣ Inundation Mapping
 - Based on Numerical Weather Prediction & NWS Hydrologic Modeling

Longer-term products and tools used by the Southeast River Forecast Center (please see the presentation for example graphics)

- ☐ Met Model Ensemble Forecast System (MMEFS)
- ☐ NWS Ensemble Streamflow Prediction (ESP)
- ☐ Hydrologic Ensemble Streamflow System (HEFS)
- ☐ National Water Resources Outlook
 - Based on Numerical Weather Prediction Modeling, Past Rainfall Data, NWS Hydrologic Modeling
- ☐ NWS Ensemble Streamflow Prediction
- ☐ CPC/Princeton/NOAA EMC
- ☐ HEFS
- ☐ SERFC Water Resources Outlook
 - Based on Numerical Weather Prediction Modeling, Past Rainfall Data, NWS Hydro Modeling, Climate Modeling & CPC Guidance

Group Discussion to determine NIDIS ACF Basin Activities
Facilitator: Mark Svoboda (National Drought Mitigation Center)

Prioritize projects

It was suggested that attendees rank the 9 categories presented earlier under "common issues across the basin" with the most important item ranked 10 and the least important item ranked 1. This system allowed for one "write-in" per person for issues not on the list, but deemed important to the attendee. The sum for each issue was calculated. The results of the rankings were:

Education and communication	196 votes
ACF Basin webinars and climate outlooks	194
Data	189
Presentation of information	186
Forecasting improvements	177
Drought Index for the basin	161
Improved interactions with the Corps	145
Consistency in drought planning among the 3 states	117
Resolve discrepancies in our understanding of groundwater	117
Other (6) "impacts" = 10	20

It was decided that the top four issues, as ranked by the meeting attendees, will be the priority issues for the NIDIS Drought Early Warning System (DEWS) in the ACF basin, with Data and Presentation of Information combined into one issue. This does not mean that the remaining issues, or other issues that may come up in the course developing the DEWS, will be ignored.

Implementation of the Projects

Following committees were set up to begin implementation of the projects (NOTE: not all suggested members have been confirmed as of the time of this writing):

Education and Communication

Leader: Chris Martinez

Volunteers: Wilton Rooks, Jessica Bolson

Other people nominated, but not present at the meeting:

Tracy Irani and Mark Boudreau

Bethney Ward has a Sea Grant contact who may be interested in participating

Media/Journalism Workshop Sub-committee

David Stooksbury and Carol Couch (nominated by David S. – need to confirm)

ACF Basin Webinars and Climate Outlooks

Leader: Keith Ingram

Volunteers: Ron Bartel, Tom Littlepage, Puneet Srivastava

Other people nominated – the three state climatologists (John Christy, David Stooksbury and David Zierden), John Feldt (or any members of his team from the SERFC)

Data and Presentation of Information

Leader: Pam Knox

Volunteers: people already on the data committee (Chad McNutt, David Stooksbury, David Zierden, Greg Carbone, Jacob LaFontaine, Jin-Ho Yoon, John Christy, Keith Ingram, Kingtse Mo, Laura Petes, Lisa Darby, Lori Johnston, Mike Brewer, Pam Knox, Ron Bartel, Tom Littlepage, Will Duncan, William Schmitz, Woody Hicks, Yvette Wiley)

Carol Couch offered to help with the biology data base

Bethney Ward has a suggested contact for ecosystem impacts

In addition to these committees, Tom Littlepage and Joel Lanier offered to help develop content and layout for the ACF web page at www.drought.gov.

Anyone else who would like to volunteer for any of these committees is welcome. Contact Chad McNutt, Lisa Darby or the committee leader if you want to help out.

Meeting Adjourns