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Good morning, Madam Chairwoman and members of the Committee, I am J. John Feldt of the National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service. I am the Hydrologist-In-Charge of the Southeast River Forecast Center, located in Peachtree City, Georgia. Thank you for inviting me to discuss drought conditions in the southeastern United States and NOAA's role in coordinating and providing climate and drought information to federal agencies and states.

NOAA's vision is an informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions. NOAA pursues this vision through its mission to monitor, understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs. NOAA's weather and climate programs provide the nation with services and information to protect lives and property, and improve management of weather and climate sensitive sectors, such as energy, agriculture, water, and living resources through environmental observations, analyses and predictions, forecasts, and sustained user interaction. No region of the United States is immune to the impacts of drought. NOAA's weather and climate programs work to monitor conditions and provide forecasts to meet the nation's need for reliable and accurate drought information.

In my testimony today, I will first discuss the ongoing severe drought in the southeast. I will then focus on the new National Integrated Drought Information System (NIDIS), and the role NIDIS will play in coordinating and providing climate and drought information to help the Nation better prepare for, and respond to, the effects of drought. However, before I do so, I would like to define drought and touch on its impacts.

Defining Drought

In the most general sense, drought refers to a period of time when precipitation levels are abnormally low, impacting human activities and the environment. While there is no single definition of drought that meets all local needs, drought refers to a deficiency in long term average precipitation over a period of time resulting in a water shortage that has an adverse impact on the environment, agriculture, industry, recreation or domestic consumption. Scientists evaluate precipitation, temperature, soil moisture, ground water, and surface water data for the present and recent past to determine if water shortages exist. Drought is not a purely physical phenomenon, but is an interplay between water availability and the needs of humans and the environment. Drought is a normal, recurrent feature of climate. It can occur almost anywhere, although its features vary from region to region. Because droughts can have profound societal and environmental impacts, there are several definitions of drought, each correct in its use. These include meteorological drought, which is defined by the magnitude of precipitation departures below long-term average values for a season or longer; agricultural drought, which is defined as the soil moisture deficit that impacts crops, pastures, and rangelands; and hydrological drought, which is defined by significant impacts on water supplies. NOAA provides information on all three types of droughts in its U.S. drought information products.

Drought is a unique natural hazard. It is slow in onset, does not typically impact infrastructure directly, and its secondary effects, such as impacts on tourism, commodity markets, transportation, wildfires, insect epidemics, soil erosion, and hydropower, are frequently larger and longer lasting than the primary effects. Primary effects include water shortages and crop, livestock, and wildlife losses. Drought is estimated to result in average annual losses to all sectors of the economy of between $6 to 8 billion (in 2002 dollars; *Economic Statistics for NOAA*, April 2006, 5th edition). The costliest U.S. drought of the past forty years occurred in 1988 and caused more than $62 billion (in 2002 dollars) of economic losses (*Economic Statistics for NOAA*, April 2006, 5th edition). Although drought has not threatened the overall viability of U.S. agriculture, it does impose costs on regional and local agricultural economies. Severe wild fires and prolonged fire seasons are brought on by drought and strong winds. These raging fires, similar to the ones in California this past year, can cause billions of dollars in additional damages and fire suppression costs.

Drought in the Southeast

The southeast United States, including parts of Virginia, North and South Carolina, Tennessee, Georgia, Alabama, Mississippi and Florida, has been in the midst of a historic drought for the past two years. After receiving significant rainfall from an active hurricane season in 2005, drought conditions took hold across the southeast. Typically, there are two periods of the year that bring significant rainfall to the southeast. These include winter into early spring and then the tropical season. These time periods present the greatest chance for flooding, but also for recharging groundwater and reservoirs.

Below normal rainfall during the spring of 2006 was followed by a lack of land-falling hurricane/tropical storms for the area. The following spring (2007) also recorded well below average precipitation, followed by another inactive hurricane season across the southeast states.

As destructive as hurricanes and tropical storms can be, they are part of the climatology of the southeast that can bring beneficial rains to many areas. In addition to an inactive tropical season, excessive heat during the late summer months increased evaporation rates from the soils and from the ground.

Currently, some areas along the Gulf Coast of Alabama, Florida, and areas of south Georgia have received enough rainfall to result in some improvement of conditions. However, areas near the mountains of the Carolinas, Georgia, eastern Tennessee, and Alabama have not received enough rainfall to fill some of the major reservoirs. This month will be critical to "recharge" the water supplies in those areas.

The historic southeast U.S drought is nearing two years in duration. During any prolonged drought, the question on everyone's mind is "When will it end?" While the state of the science is never certain, there are two factors to consider: the typical length of a major drought and the prevailing climate signal.

A major southeast U.S. drought typically lasts from two to three years. If this drought lasts three years, we would not expect much improvement until at least this summer. From a climate signal standpoint, we have been in the midst of a moderate or strong La Niña episode since last fall. This type of climate signal typically produces dry weather over the southeastern United States. Climate models show a trend out of a La Niña and into neutral conditions late this spring or this summer. The recent U.S. Seasonal Drought Outlook (Feb-May 2008) predicts some improvement in southeast drought conditions.

NOAA's National Weather Service (NWS) has been providing information to key decision makers in support of drought management activities since the onset of the southeast drought. Throughout the duration of the drought, informed decisions had to be made with regard to the operation of local water facilities, management of federal and private reservoirs, and the determination of mandatory water conservation measures.

A number of new and innovative services have been developed to help meet the critical needs of drought management officials. NWS Weather Forecast Offices have been attending local and state drought management meetings and providing hydrometeorological support and forecast information.

My office, the Southeast River Forecast Center (SERFC), has been front and center in providing drought support services. Since the start of the drought, the SERFC has worked alongside the U.S. Army Corps of Engineers (USACE) and the U.S. Geological Survey in providing hydrometeorological analysis and support for reservoir operations. SERFC staff have provided briefings to USACE officials several times a month and have attended constituent on-site workshops and meetings.

The SERFC has also developed several new services, which provide critical information in direct support of drought operations for individual states, federal government agencies, the media, and the private sector. "Critical Water Watch" and "SERFC Journal" products are issued on a weekly to bi-weekly basis to convey technical information relating to critical water supply users.

The SERFC also issues a weekly "Water Resources Outlook," which is a 15-minute multi-media presentation where NOAA meteorologists and hydrologists provide expertise and forecast information to support decision makers in their efforts to manage the drought conditions. Hundreds of users view the Water Resources Outlook, including state and federal water managers, private reservoir operators, emergency managers, and a multitude of others involved in responding to this historic drought.

National Integrated Drought Information System (NIDIS)

I would now like to focus on a new effort NOAA is leading the development of to help the nation better prepare for and respond to the effects of drought: NIDIS. NIDIS will be a valuable resource to water users and decision makers in the southeast and elsewhere in the United States.

The *National Integrated Drought Information System Act of 2006* (Public Law 109-430) prescribes an approach for drought monitoring, forecasting, and early warning. Led by NOAA, this approach is being developed through the consolidation of physical/hydrological and socio-economic impacts data, engaging those affected by drought, integration of observing networks, development of a suite of drought decision support and simulation tools, and interactive delivery of standardized products through an internet portal. NIDIS is envisioned to be a dynamic and accessible drought risk information system that provides users with the capacity to determine the potential impacts of drought, and the decision support tools needed to better prepare for and mitigate the effects of drought.

In its 2000 report, National Drought Policy Commission (Commission) observed that the United States would benefit from the development of a national drought policy with preparedness as its core. The Commission laid out the characteristics of such a coordination and preparedness system that would increase the resilience of the nation and of local communities to drought. As requested in the 2004 Western Governors' Association Report, *Creating a Drought Early Warning System for the 21st Century: The National Integrated Drought Information System*, NIDIS is being designed to serve as an early warning system for drought and drought-related risks in the 21st century. With these guidelines in mind, the explicit goal of NIDIS is to enable society to respond to periods of short-term and sustained drought through improved monitoring, prediction, risk assessment, and communication.

Over the next five years, NIDIS will build on the successes of the U.S. Drought Monitor, Seasonal Outlooks, and other tools and products provided by NOAA to effect fuller coordination of relevant monitoring, forecasting, and impact assessment efforts at national, watershed, state, and local levels. NIDIS will provide a better understanding of how and why droughts affect society, the economy, and the environment, and will improve accessibility, dissemination, and use of early warning information for drought risk management. The goal is to close the gap between the information that is available and the information that is needed for proactive drought risk reduction. Federal monitoring and prediction programs are also working with universities, private institutions, and other non-federal entities to provide information needed for effective drought preparedness and mitigation.

NIDIS will provide more comprehensive and timely drought information and forecasts for many users to help mitigate drought-related impacts. For example, hydropower authorities will benefit from enhanced water supply forecasts that aim to incorporate improvements in monitoring soil moisture, precipitation, and temperature for snowpack conditions into forecasting efforts and drought information for water management decisions. Municipalities and state agencies will have improved drought information and forecasts when allocating both domestic and industrial water usage. Water resource managers will have access to more information when balancing irrigation water rights with the needs of wildlife. Purchasing decisions by ranchers for hay and other feed supplies will be enhanced through the use of drought information to identify areas of greatest demand and the potential for shortages. Farmers will be better positioned to make decisions on which crops to plant and when to plant them. Since drought information is used in allocating federal emergency drought relief, improvements in monitoring networks will also lead to more accurate assessments of drought and, as a result, emergency declaration decisions that better reach out to those communities in need of assistance. An example of a specific improvement in monitoring networks is the addition of soil moisture sensors to the climate reference network by NOAA/NIDIS. Also, in partnership with Department of Agriculture (USDA), priorities for snow cover/snow telemetry sites will be updated as need arises. The identification of monitoring gaps, primarily snow cover, soil moisture, stream gauge (U.S. Geological Survey), which are needed to improve the early warning systems, are to be identified in each NIDIS pilot program (i.e., test program for the design and implementation of early warning systems in selected locations). Cross-agencies partnerships to fill monitoring gaps will be developed.

A hallmark of NIDIS will be the provision of decision support tools coupled with the ability for users to report localized conditions. To this end, NIDIS will link multi-disciplinary observations from a number of sources to 'on-the-ground' conditions that will yield value-added information for agricultural, recreational, water management, commercial, and other sectors. Multi-disciplinary observations include land surface conditions (e.g. for fire/fuel risk and soil moisture), streamflow and precipitation observations, climate models, and sectoral and environmental impacts information (to identify potential high impact areas or sectors for different types of drought events). Also, impacts information (i.e, how drought is affecting a location, how similar/past droughts have affected the location) must be provided by NIDIS, as required in the NIDIS Act, the Western Governors Report, and decades of study on what information leads to effective early warning triggers for response.

The first step towards accomplishing these goals was to produce an implementation plan. With the results of deliberate and broad-based input from workshops held with federal, state, and local agencies, academic researchers, and other stakeholders, the NIDIS implementation plan was produced and published in June 2007. The NIDIS implementation plan outlines the governance structure, priorities, and operational requirements needed to meet the objectives of the program. To provide guidance on system implementation, technical working groups were formed to focus on five key components of NIDIS. These components are public awareness and education, engaging preparedness communities, integrated monitoring and forecasting, interdisciplinary research and applications, and the U.S. Drought Portal.

A lot of progress has been made since the NIDIS program was established. The NIDIS Drought Portal (www.drought.gov), launched in November 2007, is now online and operational, providing comprehensive information on emerging and ongoing droughts, and enhancing the nation's drought preparedness. Other current NIDIS activities include conducting the first national workshop to assess the status of drought early warning systems across the United States. A NIDIS southeast drought workshop will be held in Peachtree City, Georgia, in April 2008 to discuss drought early warning information systems for the southeast region.

While NOAA is the lead agency for NIDIS, NOAA works with numerous federal agencies, emergency managers and planners, state climatologists, and state and local governments, to obtain and use drought information. NOAA routinely disseminates drought forecast information via its NWS drought statements, and collaborates with state drought committees and the media to assure NOAA information is correctly understood and used. NOAA strives to provide an end-to-end seamless suite of drought forecasts, regional and local information, and interpretation via its Climate Prediction Center, six Regional Climate Centers, Regional Integrated Sciences and Assessments (RISA) including the Southeastern Climate Consortium, local NWS field offices and state climatologists. Efforts are underway to improve drought early warning systems including coordinating interagency drought monitoring, forecasting, and developing indicators and management triggers for societal benefit. The other major federal agencies involved in NIDIS are the Department of Interior, USDA, the National Aeronautic and Space Administration, the Department of Energy, the Department of Homeland Security, the Department of Transportation, the Army Corps of Engineers, the Environmental Protection Agency, and the National Science Foundation. There is significant leveraging of existing observing system infrastructure, data, and products produced by operating agencies, for example, stations of the NOAA National Weather Service Cooperative Observer Program, USDA Natural Resources Conservation Service SNOTEL (SNOpack TELemetry) network, Soil Climate Analysis Network, National Climate Data Center Climate Reference Network, and the United States Geological Survey streamflow and ground-water networks, as well as the USDA-Joint Agricultural Weather Facility and the USDA-Natural Resources Conservation Service/Water and Climate Center Weekly Report - Snowpack/Drought Monitor Update. NIDIS also provides a framework for coordinating the research agenda among these agencies.

The FY 2009 President's Budget requests $10.4 million within NOAA's budget request to support NIDIS and NOAA's efforts to monitor and forecast drought including an increase of $2.0 million to develop improved climate forecast products. This increase will support the development of new drought monitoring and prediction products and accelerate future improvements of NOAA's operational climate forecast and application products through the use of competitive grants.

Concluding Remarks

Madam Chairwoman, this concludes my testimony. I thank you for the opportunity to discuss drought conditions in the southeastern United States and NOAA's role in coordinating and providing climate and drought information to federal agencies and states. The topic of drought is critical given its economic and environmental impacts in the United States and the increasing

demand for drought information to help manage the demand for water. I would be happy to answer any questions you or other Members of the Committee may have.