THE SOUTHEAST RIVER FORECAST CENTER RESPONSE TO EVOLVING CUSTOMER NEED

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INTRODUCTION

The Southeast River Forecast Center (SERFC), an operational branch of the National Weather Service (NWS), was established in 1955 to provide flood and low-flow river forecasts for the southeastern United States (SERFC, 1999). This purpose remains a major part of SERFC operations today. But customer needs have evolved in recent years, prompting an expansion of SERFC products and services. To provide the highest level of service in this expansion, SERFC has joined with numerous groups in pursuit of a variety of science-based initiatives.

From August through October, 1999, Hurricanes Dennis, Floyd, and Irene cumulatively generated widespread record flooding across the eastern Carolinas and eastern Virginia. The United States Geological Survey (USGS) estimated the greatest flooding to have a recurrence interval of at least 500 years in the Tar River basin after Hurricane Floyd (USGS, 2000). In response to the flooding, the SERFC pooled resources with numerous federal and state agencies in a project called the North Carolina Floodplain Mapping Project. One of the project's goals is to improve river forecasts in the Tar River basin.

The rapid increase in population near coastal areas has lead to additional partnerships designed to improve and enhance forecasting capabilities in these areas. One partnership with the University of Central Florida couples tidal modeling as input into an unsteady-state hydraulic model known as FLDWAV in an attempt to improve overall river forecasting on South Carolina's Waccamaw River. Another project designed to improve flood forecasting near coastal areas is the modeling of the St. John's River in eastern Florida. This river basin does not easily conform to traditional modeling methods. The SERFC is implementing FLDWAV in this basin using cross sectional data from the St. John's River Water Management District. In addition, NOAA's Coastal Storms Initiative, a multi-agency (including SERFC) task force created to improve the response of coastal communities to coastal storms, is modeling the St. Johns River.

Also, in Florida, the SERFC is developing a model for Lake Okeechobee in South Florida. Again, traditional modeling methods are inadequate to simulate this lake, where the primary inflow is direct rainfall and the primary outflow is evaporation. SERFC is coordinating with several agencies to build the most appropriate forecast model.

NORTH CAROLINA FLOODPLAIN MAPPING PROJECT

The aftermath of Hurricanes Dennis, Floyd, and Irene in 1999 showed the need for emergency managers to have access to real time innundation mapping. This need was organized into a full scale multi-agency project called the North Carolina Floodplain Mapping Project. This project involves the State of North Carolina, the USGS, the Federal Emergency Management Agency, NOAA's Coastal Services Center, the U.S. Army Corps of Engineers, and the SERFC, among other agencies and contractors. Among the many planned deliverables are new digital flood insurance rate maps, new flood hazard data and floodplain topographic mapping, and the development of a real-time flood forecasting and inundation mapping capability. The SERFC is responsible for delivering the last capability.

The NWS's Advanced Hydrologic Prediction Services (AHPS) is a multifaceted program intended to provide new information and products through the infusion of new science and technology. This program delivers the most graphically advanced hydrographs available on the web, probabilistic forecast graphics, extended streamflow prediction (ESP) graphics, and flood inundation mapping

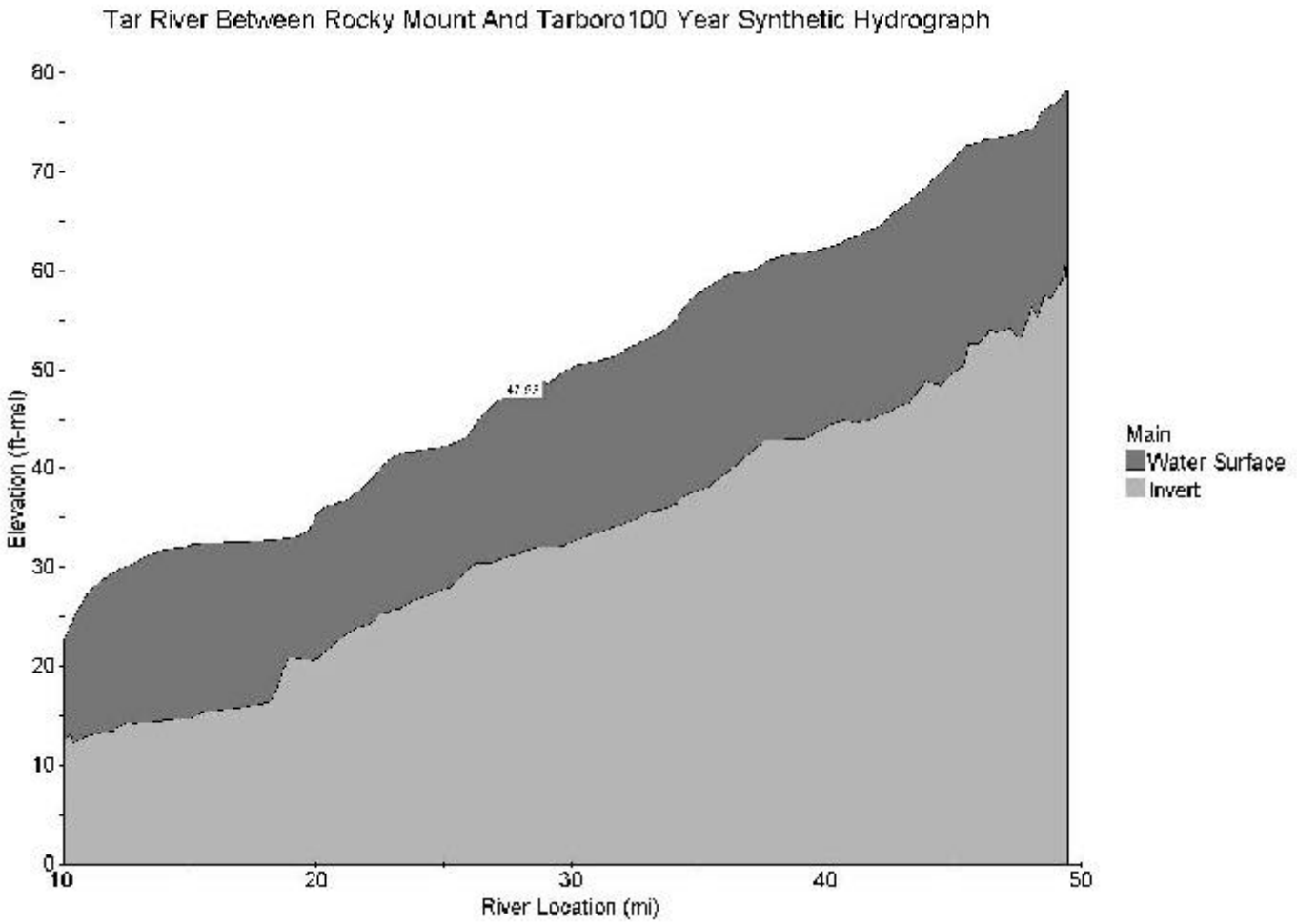

Figure 1: **Water Surface Profiles generated by FLDWAV.**

along with the latest in hydrologic forecast modeling to improve forecast accuracy, such as FLDWAV.

The SERFC has begun the work toward completing these tasks by updating forecast and graphical capabilities in the Tar River basin of eastern North Carolina, where the worst of the 1999 flooding took place. This has included adding five additional river segments into the existing operational lumped hydrologic river model, calibrating the entire basin (performed by Riverside Technology, Inc. of Fort Collins, CO), and eventually implementing FLDWAV as a routing tool throughout the basin.

SOUTH CAROLINA TIDAL MODELING

An explosion in coastal population throughout the southeastern United States has generated an increasing need for enhanced forecast capabilities in some areas. In response to this need, the SERFC has partnered with the University of Central Florida in an effort to incorporate astronomical tides and coastal storm surges into the modeling of the Waccamaw River at Conway, SC. Dr. Scott Hagen of the University of Central Florida is using a two-dimensional tidal model to generate tidal simulations at the Conway gaging site. This tidal model output is then used as input into FLDWAV, which in turn is used by the National Weather Service River Forecast System (NWSRFS), the modular hydrologic framework used by the NWS River Forecast Centers to perform their forecast functions, to generate a forecast. Currently, Dr. Hagen is attempting to use the tidal model to simulate the storm surge effects of Hurricane Hugo (1989) on the water level gage height at the Conway gage. Successful demonstration of tidal modeling at Conway will lead to the implementation of this model at other coastal rivers in the southeastern United States.

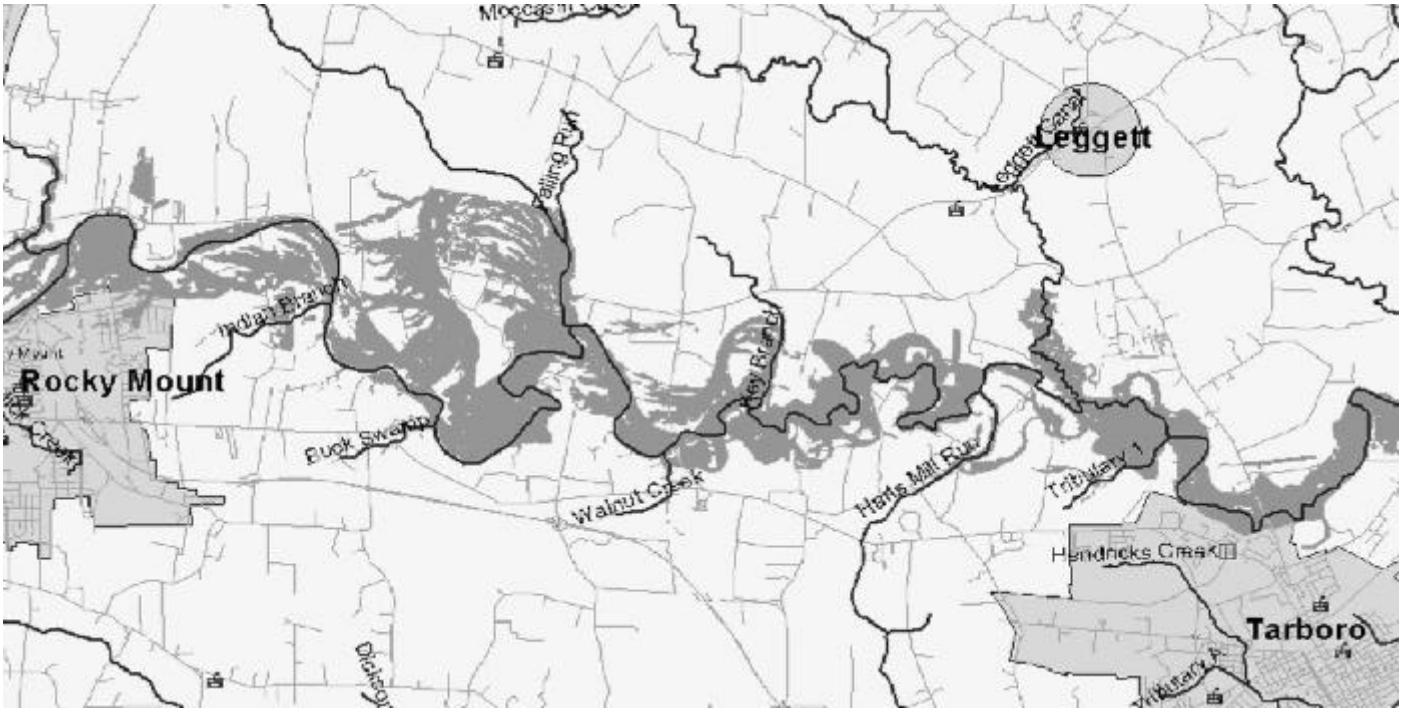

Figure 2: **Flood innundation map.**

FLORIDA PROJECTS

Coastal population increases have led to unique hydrologic forecast requirements in Florida. One example is the St. Johns River basin in eastern Florida. This basin does not conform well to traditional lumped hydrologic modeling. The SERFC is implementing FLDWAV into this basin, from Lake Harney downstream to DeLand, FL, using cross sectional data from the St. Johns River Water Management District. Output from this modeling should be available for operational use by the summer of 2003. Meanwhile, a separate multi-agency (including SERFC) task force called NOAA's Coastal Storms Initiative, is developing a plan to model the lower end of the St. Johns River.

Another hydrologic problem requiring a distinct solution is the prediction of lake levels on Lake Okeechobee in South Florida. Other lakes modeled by SERFC have a well-defined surface inflow, such as one or more streams, and a well-defined outflow, such as one or more dams serving a variety of purposes. Lake Okeechobee is part of the Okeechobee waterway connecting the Gulf of Mexico to the Atlantic Ocean. Water levels within the lake itself are controlled by a series of canals connected to the lake by structures. The primary inflow for this lake is not streamflow, but rainfall directly onto the lake. The primary outflow is not through the connecting structures, but through evaporation. To date, the lake is modeled by using six separate segments, or sub-basins. Two segments represent Fisheating Creek, three segments represent the Kissimmee River, and another segment represents the lake itself. SERFC is coordinating with several agencies to build the most appropriate model.

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