USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002NC2B

Title: Reduced Cost Strategies for Regional Integration of Surface and Groundwater Use

Project Type: Research

Focus Categories: Water Quality, Models, Management and Planning

Keywords: Water Resources Development, Groundwater Management, Water Treatment Facilities, Resource Planning

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Abstract: Fifteen counties in the eastern part of North Carolina have been classified as a “Capacity Use Area”, a designation that provides the legal framework for regulation of groundwater withdrawals. This region, collectively known as the Central Coastal Plain Capacity Use Area (CCPCUA), has traditionally been dependent on groundwater for much of its water supply, however, increasing usage has led to concerns over reductions in aquifer levels and saltwater intrusion. Under rules recently put forth by the State, communities within the CCPCUA will be issued groundwater pumping permits and will subsequently be required to reduce their withdrawals by as much as 75% over the next 16 years. In order to meet this goal, new water sources must be developed and current sources used more efficiently. Conservation will play some role in improving the efficiency of regional water use. The CCPCUA rules also make provisions for the transfer of groundwater pumping permits amongst regional users, laying the foundation for the state’s first water market and providing another means of improving use efficiency. New water sources will, however, still need to be developed and surface water (e.g., Neuse and Tar rivers) is the obvious choice. Surface water treatment is more expensive than that of groundwater and will involve substantial capital expenditure on treatment facilities, as well as on transport infrastructure for communities located far from surface water sources. Surface water is also subject to greater flow

variability than groundwater, forcing considerations of supply reliability. Thus, a number of alternatives exist for developing and managing scarce water resources in the CCPCUA. Research is required to evaluate methods by which this can be done in the most cost effective manner. The work proposed herein represents a continuation of a project already in progress. Current efforts focus on the development of a model that minimizes water supply and treatment costs for regional groups of communities. The central contribution of this work is in estimating the cost savings achievable through development of regional drinking water treatment facilities. These savings are based largely on tradeoffs between the economies of scale inherent in water treatment and the diseconomies of scale associated with conveyance, an area largely unexplored in the drinking water literature. While a useful result in itself, a number of additional factors will need to be considered in order to apply these results to policymaking. This proposal extends the current work by expanding to consider a wider range of alternatives and circumstances. Results will specify a water asset "portfolio" for each community, composed of a combination of groundwater (including transferred pumping permits), surface water, and the yield from conservation activities. The model will return combinations of these assets that minimize water supply and treatment costs over a multi-period time horizon as constrained by supply reliability. Current estimates of the expense associated with more traditional approaches to meeting future water demand in the CCPCUA range from $180-250 million in capital costs alone, a figure that would be very burdensome to these 15 counties, several of which rank among the poorest in the state. The portfolio approach, complemented by the development of regional treatment facilities and transferable pumping permits, is likely to significantly reduce these costs.
