

Central Florida Regional Water Transmission System—A Proposal

Purpose

It is proposed that the State of Florida Legislature enact enabling legislation to create a Regional Water Transmission Agency that would design, construct, operate and maintain a regional water transmission system along with the seawater desalination plants. It is further proposed that such an organization be funded with bonds backed by the State of Florida. The necessary revenues for operation and maintenance expenses, as well as debt service would be generated by charges to the Agency's customers based upon unit quantities of water delivered.

The need for such an Agency arises from the fact that the transmission component of an Alternative Water Supply project is often more costly than the treatment component, given the long distances over which treated water must be transported. That cost is prohibitive to an end-of-pipe customer because there are relatively few customers to share the cost. A Regional Water Transmission System, operated as a single agency, rather than as individual utilities, will generate an economy of scale that minimizes costs to any individual customer, while it introduces improved reliability of operations

Executive Summary

The St. Johns River Water Management District, in cooperation with the CFCA utilities, began the development of conceptual alternative water supply project options. The initial approach was developed around two sources of surface water, the St. Johns and Lower Ocklawaha Rivers; later a seawater desalination option along the Coquina Coast was included.

Initial estimates for transmission of water produced by the alternative water supply facilities showed this element to be very costly, often accounting for more than half the capital cost of the entire project. Furthermore there are inherent uncertainties with any individual water supply withdrawal point; these include extreme events such as hurricanes, flood, droughts and source water contamination, any of which may disrupt the water supply. In addition, there remains significant environmental, political and public objections to surface water withdrawals. It was clear that these initial systems lacked reliability and operational flexibility. A single event could shutdown the supply of water, thus making it necessary to consider linking two or more water sources for the purposes of reliability and redundancy.

The most challenging aspect of the transmission of water is not engineering but is ownership and governance. The transmission systems will transit multiple jurisdictional areas complicating the initial construction of the system and later operational and maintenance issues.

To overcome all these issues, this paper proposes the creation of a regional water transmission system through a single organization that would design, construct, operate and maintain such a system. Such an organization would be funded with bonds backed by the State of Florida. It is further proposed that this organization could be authorized to construct, operate and maintain seawater desalination plants that could be sited adjacent to power plants along the coasts.

Details

In 1994, St. Johns River Water Management District as part of its Water Supply Needs and Sources Assessment, advised the East Central Florida Public Water Supply Utilities to begin planning for alternatives to ground water sources due to growth projections and projected unacceptable water resources impacts. More recent evaluations based on updated computer modeling of the Floridian and surficial aquifers confirmed the projected unacceptable impacts to aquifer-dependent water resources; which includes lakes, wetlands and springs. Three water management districts, South Florida (SFWMD), Southwest Florida (SWFWMD) and St. Johns River (SJRWMD) have agreed to limit ground water withdrawals to the 2013 demands within the Central Florida Coordination Area (CFCA). The CFCA includes all or parts of Lake, Orange, Osceola, Polk and Seminole counties.

The water management districts, in cooperation with the CFCA utilities, began the development of conceptual alternative water supply project options. The initial approach for the SJRWMD portion of the CFCA was developed around two sources of surface water, the St. Johns and the Lower Ocklawaha Rivers. Each option consisted of a water supply facility along with a dedicated transmission system. Due to the complexity and cost associated with permitting and construction of these alternative systems, the various utilities realized the need to pool resources and take advantage of purported economies of scale. Conceptual plans for alternative water supply projects were developed for the Lower Ocklawaha River in Marion County; the St. Johns River near Deland, the St. Johns near Yankee Lake, the St. Johns near State Road 46 and the St. Johns/Taylor Creek Reservoir; and for seawater desalination along the Coquina Coast (Flagler County).

Initial estimates for transmission of water produced by the alternative water supply facilities showed this element to be very costly, often representing more than half the total capital cost for the entire project. Pipelines sized to carry “base load” (average day) demands at project “build out” to the participants in a given water supply project were conceptualized and used to estimate probable costs. The assumption was made that the new water sources would be used to meet “base load” and that existing groundwater sources would be used to meet peak day demands. Capital, operating and maintenance costs for each pipe segment (and

associated repumping stations) were preliminarily apportioned to the various downstream subscribers based on the percentage of pipe capacity required by each downstream user.

There are inherent uncertainties associated with any individual water supply withdrawal point regardless of the source. Extreme events including hurricanes, floods, droughts and source water contamination, as well as mechanical failure could cause periodic system failure and interruption of product water delivery. It is clear that fully independent water supply projects with one way transmission pipelines lack reliability and operational flexibility that would be provided by an interconnected regional transmission system. As envisioned, such an interconnected system would be able to transport from any connected source to any connected demand center. An integrated interconnected transmission system would provide a level of redundancy and reliability not provided by a series of fully independent water supply projects. In addition, SJRWMD has stated that once a surface water supply withdrawal is permitted, the permit will be subject to periodic renewal wherein environmental impacts will be evaluated and third party challenges may be offered. The SJRWMD statement that a surface water source could be eliminated or reduced due to future environmental or political actions is further justification that the pipeline network needs to be built to accommodate movement of water throughout the region to avoid dependence on any given source.

Probably the most challenging aspect of the regional alternative water supply initiative, however, is not engineering, system redundancy or science related. It is the issue of ownership and governance. Models in the region exist for sharing wastewater plant capacity (South Central Regional Wastewater System Treatment and Disposal Board, etc. in Brevard County) and wastewater collection and transmission (South Seminole North Orange County Wastewater Transmission Authority). Few, if any, examples exist in Florida for potable water transmission governance. To accomplish regional pipeline governance, separate interlocal agreements for each pipeline segment could be negotiated with each combination of users, but this concept could, for example in the case of the transmission system contemplated for the Yankee Lake Plant, result in numerous agreements between combinations of parties in different Counties, multiple construction contracts, and extremely difficult and complex coordination issues. Of equal concern is the lack of flexibility for others who were not part of the original group that built them to use these pipelines in the future. Such use would require that excess capacity be included in the original design. Finally, routine operation and maintenance would suffer from the same limitations and constraints.

Funding the shared pipeline projects using debt would be complicated and very difficult because no revenue stream would be associated with the pipelines themselves. For the Yankee Lake Project the Seminole County Commission has stated as part of their “deal points” with their “partners” that they would strongly prefer the transmission systems be handled “by others” but that they would require assurances that they would be constructed to ensure the use of their plant facilities. Obviously they are concerned with pipeline construction. However, neither the County nor their potential partners have formulated a solution that has been embraced.

By interconnecting the various alternative water supply projects stated earlier into one system, a Central Florida Water Transmission concept is proposed. The system would be supplied with potable water from all the available alternative water supply sources that can be permitted thus providing the necessary reliability to meet the area's needs. The proposed system modifies existing single-source systems by eliminating redundant pipe sections, expanding selected pipe sections to allow movement of water in either direction and employing dual paths that provide operational flexibility. This gives local and regional water planners a wide array of source and transmission options from which to meet their needs. The conceptual system consists of over 500 miles of pipe ranging in size from 8 inches in diameter up to 72 inches and there are 16 booster pumping stations. The system could be built in phases and ultimately be extended across the peninsula giving the ability to supply potable water from desalination plants sited along both coasts and from water treatment plants supplied from all available permissible surface water sources. While various surface water sources continue to be included, environmental, political and public concerns may reduce if not eliminate them as a viable source.

Centralized computer control and monitoring could be used to properly manage the transmission and delivery of water to meet the demands of the various utilities. Such a control system could be configured to provide additional safety and security features such as leak detection, remote valve operation to isolate a break, remote booster pump station operation and detection of unauthorized activity within the system corridors.

The organization that would design, construct, operate and maintain the regional water transmission system could be an adjunct to the Water Management Districts or a separate entity. It is proposed that such an organization, however structured, be funded with bonds backed by the State of Florida. It is further proposed that this organization would design, construct, operate and maintain seawater desalination plants that could be sited adjacent to future power plants erected along the coasts. Revenues collected from the utilities based upon unit quantities shipped, would provide the funds to payoff the bonds as well as met maintenance and operating expenses. The utilities would be required to have Consumptive Use Permits from their respective Water Management District in order to take water up to their allocation from the transmission system. This is, in the opinion of the authors of this document, the single most effective incentive that could be offered by State of Florida to encourage multiple utilities to subscribe to centralized alternative water supply projects.

Robert Thielhelm Keith Riger Ray Sharp
City of Mt. Dora City of DeLand City of Leesburg

Central Florida Regional Water Transmission System - A Proposal

