

Pioneering Desalination

By Christopher P. Hill

The future of water supply and desalination in Florida

Florida has historically been a pioneer in U.S. desalination. The Sunshine State boasts more than 150 desalination facilities with a combined capacity of more than 515 million gal per day (mgd), and accounts for almost 25% of Florida's total water supply. From groundwater to seawater, no state possesses more operating desalination capacity.

There are many reasons for this success: Firstly, much of the state has relied on groundwater for public water supplies. This is due not only to the widespread availability of groundwater resources, but also to the limited availability of reliable, fresh surface water in much of the state. As the population of Florida has grown and the availability of fresh groundwater has diminished, there has been a movement toward alternative water supplies, including brackish groundwater, surface water and seawater.

Obstacles to Development

The future of Florida's water supply includes a much greater reliance on brackish water and seawater, which will require the use of desalination technologies. The state's five water management districts are responsible for sustain-

able management of its water resources. Each of the districts develops a Regional Water Supply Plan (RWSP) every five years evaluating the adequacy of existing drinking water supplies and identifies potential future supplies. The most recent RWSPs for

each of the districts identify a total of 126 brackish water and 11 seawater projects with combined capacities of up to 545 mgd and 290 mgd, respectively (Figure 1).

Knowing that desalination will play such a critical role in future water supply development, there are still a number of challenges facing the industry. Many of the obstacles Florida faces are the same obstacles faced by water supply development in other parts of the U.S. and the world. These include both technical challenges such as concentrate management, marine impact, energy management, pretreatment and other process concerns. Non-technical challenges include permitting, project funding and public acceptance.

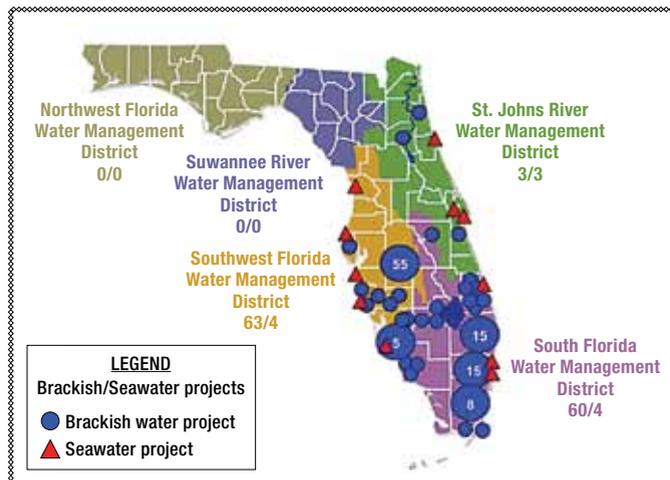
With that in mind, the following discussion is intended to focus on four of the most significant challenges facing desalination and water supply development in Florida: concentrate management, permitting, energy management and project financing.

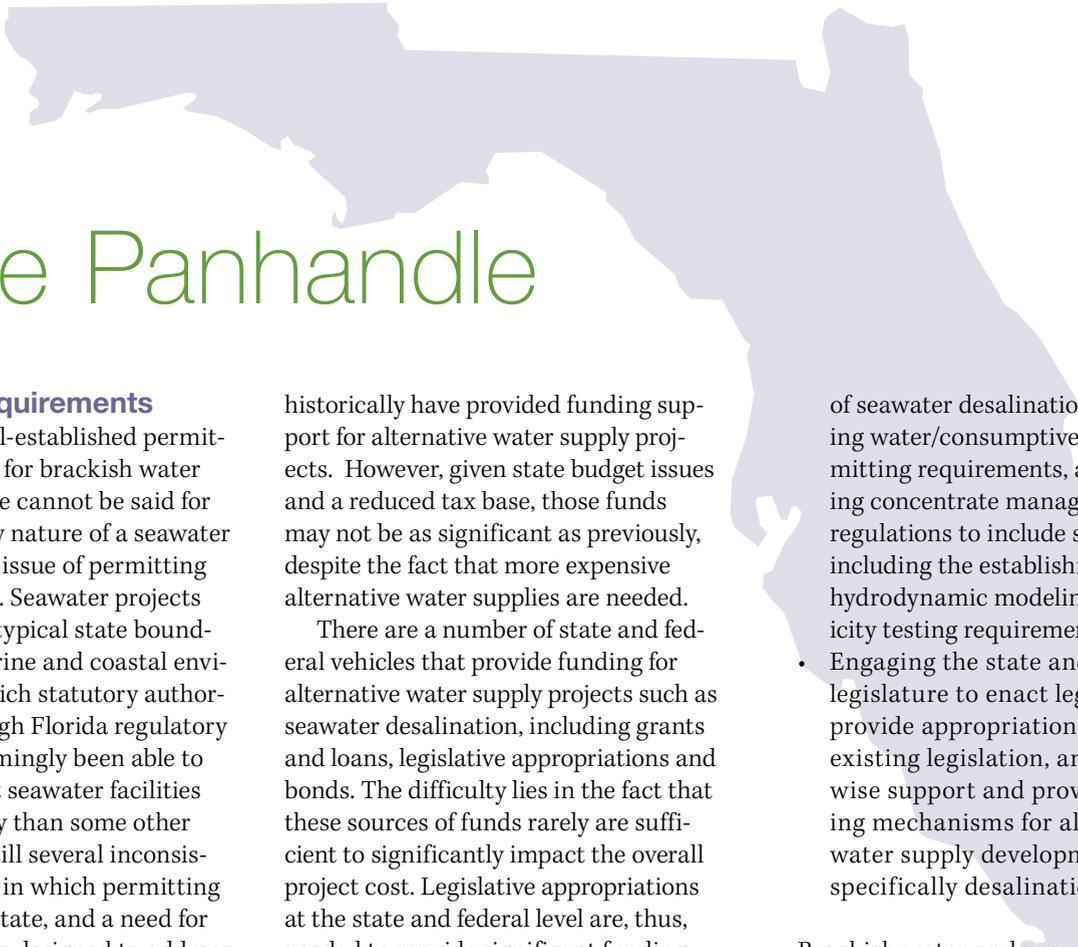
Concentrate Management

Concentrate management represents a significant challenge to brackish and seawater supply development. Many of the existing brackish water desalination facilities in Florida currently discharge to deep injection wells. This is possible primarily due to a deeply buried portion of the Lower Floridan Aquifer in the southern part of the state known as the "boulder zone," which has suitable hydrogeological and water quality conditions for injection.

Though many of the possible brackish water and seawater facilities shown in Figure 1 lie within the boundaries of the boulder zone, a substantial portion do not. For those facilities, particularly inland brackish water facilities, other alternatives to deep well injection will be required.

Figure 1. Brackish & Seawater Supply Projects Contained in Regional Water Supply Plans





in the Panhandle

Permitting Requirements

Florida has well-established permitting requirements for brackish water facilities. The same cannot be said for seawater: The very nature of a seawater project makes the issue of permitting more complicated. Seawater projects move beyond the typical state boundaries and into marine and coastal environments over which statutory authority can vary. Though Florida regulatory agencies have seemingly been able to accept and permit seawater facilities much more readily than some other states, there are still several inconsistencies in the way in which permitting is handled in the state, and a need for revised regulations designed to address seawater desalination.

Energy Consumption

Great efforts have been made to improve energy efficiency in desalination. The incorporation of newer, more efficient energy recovery devices has resulted in significant reductions in energy consumption. Future advances in membrane materials and more efficient recovery devices will further reduce energy demands; however, what is needed in Florida, and the desalination market in general, are investments in renewable energy, such as solar, wave and wind energy.

One of the most significant hurdles to achieving public acceptance of seawater desalination is greenhouse gas (GHG) emissions and the process's carbon footprint. Incorporation of renewable energy into the project design or to offset GHG emissions will go a long way to increasing public acceptance of these projects.

Project Financing

A significant hurdle for desalination implementation in Florida is funding. The water management districts

historically have provided funding support for alternative water supply projects. However, given state budget issues and a reduced tax base, those funds may not be as significant as previously, despite the fact that more expensive alternative water supplies are needed.

There are a number of state and federal vehicles that provide funding for alternative water supply projects such as seawater desalination, including grants and loans, legislative appropriations and bonds. The difficulty lies in the fact that these sources of funds rarely are sufficient to significantly impact the overall project cost. Legislative appropriations at the state and federal level are, thus, needed to provide significant funding for desalination.

Strategies for the Future

In Florida, as elsewhere, proactive strategies to remove these obstacles and facilitate future water supply development are needed. Such strategies include:

- Developing strategies to deal with inland brackish water desalination, including increased focus on concentrate minimization and the value of concentrate as a water resource, demonstration of zero-liquid discharge technologies and development of new, more efficient membrane processes;
- Conducting investigations to determine the feasibility of wind, solar, wave and other renewable forms of energy; encouraging power companies to invest in renewable energy; and working with the power companies to site new power facilities to consider co-location of seawater desalination facilities;
- Establishing consistent regulatory policies regarding the permitting

of seawater desalination, including water/consumptive use permitting requirements, and revising concentrate management regulations to include seawater—including the establishment of hydrodynamic modeling and toxicity testing requirements; and

- Engaging the state and federal legislature to enact legislation, provide appropriations through existing legislation, and otherwise support and provide funding mechanisms for alternative water supply development, specifically desalination.

Brackish water and seawater desalination will play a significant role in Florida's future water supply. To ease the development and implementation of future supplies, Florida and the industry at large should proactively engage in strategies to eliminate or minimize obstacles to future supply development. These include strategies to address concentrate management, energy management, permitting challenges and project financing.

Public acceptance is another challenge typically facing desalination projects. While opponents of desalination are constantly sending negative information to the public and politicians, the industry is slow to react due to lack of available information or an unwillingness to engage in public debate. The result can be catastrophic for a project and the industry as a whole. **MT**

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