Findings of a Statewide Evaluation and the Long-Term Implications for the Future of Water Reuse

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Florida Senate Bill (SB) 536 required the Florida Department of Environmental Protection (FDEP) to conduct a comprehensive study and submit a report on the expansion of the beneficial use of reclaimed water, stormwater, and excess surface water in the state by Dec, 1, 2015. The study required FDEP to:

- Identify factors that prohibit or complicate the expansion of the beneficial use of reclaimed water, stormwater, and excess surface water and recommend how these factors can be mitigated or eliminated.
- Identify measures that would lead to the efficient use of reclaimed water.
- Identify the environmental, engineering, public health, public perception, and fiscal constraints of such an expansion, including utility rate structures for reclaimed water.
- Identify areas in the state where traditional water supply sources are limited and the use of reclaimed water, stormwater, or excess surface water for irrigation or other purposes is necessary.
- Recommend permit incentives, such as extending current authorizations for long-term consumptive use permits for all entities that substitute reclaimed water for traditional water sources, that become unavailable or otherwise cost-prohibitive.
- Determine the feasibility, benefit, and cost estimates of the infrastructure needed to construct regional storage features on public or private lands for reclaimed water, stormwater, and excess surface water, including the collection and delivery mechanisms for beneficial uses, such as agricultural irrigation, power generation, public water supply, wetland restoration, groundwater recharge, and waterbody base flow augmentation.

In the course of completing the study, FDEP is required to hold a minimum of two public meetings to gather input on the study and provide an opportunity for the public to submit written comments before submitting the report. While the FDEP study includes beneficial use of reclaimed water, stormwater, and excess surface water, this article focuses on the use of reclaimed water.

There has been much discussion and progress made in recent years regarding potable reuse, with several significant indirect potable reuse (IPR) and direct potable reuse (DPR) efforts being implemented throughout the United States. This follows decades of resistance to potable reuse by the public; however, the water supply urgency in some of the most arid regions of the country, as well as more extensive research and better consumer education by utilities and professional associations, have helped sway public opinion.

With regard to potable reuse, the conclusions of the SB 536 report will significantly impact future implementation of reuse in Florida, as well as the rest of the U.S. The bill rightly seeks to identify impediments and incentives to reuse, and ideally will result in implementation of incentives within the state of Florida that increase the potential for future potable reuse opportunities and expand the role of reuse in the future of the state's water supply. Similar incentives could ideally be implemented in other regions of the U.S., and potable reuse would play a role in solving their respective water supply crises as well.

On the other hand, should FDEP make recommendations that unintentionally inhibit the future implementation of potable reuse, it could set the state and other regions back years or even decades. While there is no indication at the moment that this will occur, it is nonetheless a potential concern when legislatures get involved in water policy issues.

Methodology

Approach Overview

To complete the study, FDEP has developed a stepwise approach that includes a number of public meetings and extensive stakeholder engagement prior to preparation of the final report. The SB 536 workgroup consisted of representatives from a number of state agencies, including:

- Florida Department of Environmental Protection
- Department of Agriculture and Consumer Services
- Florida Department of Transportation
- Northwest Florida Water Management District
- St. Johns River Water Management District
- South Florida Water Management District
- Southwest Florida Water Management District
- Suwannee River Water Management District

At the onset of the study, FDEP established five work teams for each of the major study areas:

1) Reclaimed water
2) Stormwater
3) Excess surface water
4) Reservoirs
5) Aquifer storage and recovery

The study began in the summer of 2014 with a stakeholder survey. The survey was followed by a series of public meetings in each of the five Florida water management districts, which concluded in late 2014. The FDEP and the work teams spent the majority of 2015 preparing the draft study, which is anticipated in August of this year. Following additional opportunity for public and stakeholder comment, FDEP issued the final report by Dec. 1, 2015, as required.

Survey Construct

The survey included nine statements or questions: five related to the beneficial use of reclaimed water and four related to the beneficial use of stormwater and excess surface water. The five statements or questions related to use of reclaimed water are:

1) Please evaluate the degree of importance of the following factors in prohibiting or complicating the expanded use of reclaimed water.
2) Please evaluate the importance of the following incentives that could further the expanded use of reclaimed water.

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3) Please evaluate the importance of the following methods for increasing storage of reclaimed water in your area.
4) Please evaluate the degree of importance of the following factors in prohibiting or complicating the indirect potable reuse of reclaimed water.
5) Are there other issues concerning reclaimed water that you'd like to discuss?

For each of the first four statements, the survey identified a number of factors related to each area of interest and asked the respondent to rate the importance of that factor on a scale of 1 (not important) to 5 (very important). Each question also allowed the respondents to add and rate their own factors. Question 5 allowed for an open-ended response (up to 2000 characters) of additional factors a respondent thought should be given consideration by FDEP.

Of particular significance in the construct of the survey was the specific mention in statement 4 of "indirect potable reuse" rather than simply "potable reuse" or also including "direct potable reuse." As has been stated previously, DPR is being implemented in various locations throughout the U.S. Its apparent deliberate exclusion from this survey could be a significant shortfall of the final report and prevent future consideration of DPR as a viable alternative water supply in Florida.

Results and Discussion

Survey Respondents

A total of 949 individuals responded to the online survey, as summarized in Table 1. Respondents were allowed to identify themselves by more than one descriptor (e.g., both an "individual water user" and a "consultant"), which makes parsing of the responses difficult. However, it is reasonable to state that a diverse array of interests and knowledge levels were represented by the respondents.

Table 2 summarizes the sectors of interest for the survey respondents. Again, it's difficult to parse the sectors of interest of a given individual as multiple sector choices were allowed; however, based on the responses, it is possible to say that the majority of sectors were well represented in the responses.

Impediments to the Expanded Use of Reclaimed Water

Table 3 summarizes the survey results relative to impediments to the expanded use of reclaimed water. Of particular note is that potable reuse, specifically whether indirect or direct potable reuse is allowed or considered, is listed

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Table 1. Florida Department of Environmental Protection SB 536 Survey Respondents (FDEP, 2014)

Describe Self (multiple choices allowed)	%
Individual Water User	26%
Local Government	24%
Public Utility	23%
Consultant	18%
Wastewater Utility	12%
Environmental Organization	11%
Regulatory or Oversight Agency	6%
Professional Association	6%
Water Supply Authority	5%
Community Outreach Group	5%
Private Utility	4%
Builder/Developer/Contractor (added)	4%
Academia	4%
Industrial Association	3%
Research Organization	3%
Manufacturing/Commercial/Industrial (added)	2%
Attorney	2%
Farmer/Cattleman/Ag Operations (added)	1%
Total Responses Statewide	949

Table 2. Florida Department of Environmental Protection Survey Respondents Sectors of Interest (FDEP, 2014)

Sectors of Interest (multiple choices allowed)	%
Public Supply	49%
All	40%
Commercial/Industrial	31%
Recreational Irrigation	31%
Agriculture	23%
Power Generation	8%
Total Responses Statewide	949

Table 3. Impediments to the Use of Reclaimed Water (FDEP, 2014)

Impediments (Totals = Number of Important + Very Important Responses)	Reclaimed Water
Infrastructure availability	655
Fiscal constraints (cost-prohibitive, bond funding, utility rate structures, etc.)	604
Storage availability	585
Regulations/regulatory actions	556
Environmental constraints	548
Reliability of supply	511
Public perception/customer resistance	475
Direct potable reuse not allowed/considered	468
Public health issues	460
Inefficient use of current reclaimed water supplies	459
Indirect potable reuse not allowed/considered	430
Supplementation needed	409
Technical expertise of local utility operators	407
Public's trust of utility operators	403
Engineering constraints/technology not available	336

Table 4. Incentives to Encourage Beneficial Reuse of Reclaimed Water (FDEP, 2014)

Impediments (totals =Number of Important + Very Important Responses)	Reclaimed Water
Funding assistance for projects	664
Regulatory changes	491
Funding or other assistance for educational programs to influence public perception	476
Increased permit durations	371

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as a potential impediment to expanded use of reclaimed water. Therefore, when one considers the survey response, the results may or may not be indicative of the opinions of the noted factors with regard to expanded potable reuse, but the results are promising with regard to possible acceptance of potable reuse. In the case of both IPR and DPR, the fact that these are not allowed or considered was determined to be either a very important or important impediment to expanded use of reclaimed water by more than 50 percent of respondents. This would seem to indicate that the majority of respondents would be accepting of potable reuse.

The least significant impediment noted was "engineering constraints/technology not available." Again, though the survey did not specifically mention potable reuse, the results would seem to indicate that the respondents generally believe the technology exists to safely implement potable reuse.

Infrastructure availability and fiscal constraints–not public perception or public health issues–were the most significant impediments to expanded use of reclaimed water. Nearly 70 percent of respondents noted that infrastructure availability was either an important or very important impediment, while nearly 64 percent noted the same about fiscal constraints; only half noted public perception as a significant impediment, and fewer than half noted health concerns.

Incentives to Encourage the Expanded Use of Reclaimed Water

Table 4 summarizes the survey results relative to incentives needed to encourage expanded use of reclaimed water. Similar to the impediments to expanded use of reclaimed water, the survey focused on incentives to encourage the expanded use of reclaimed water; it does not specifically mention potable reuse. Funding assistance (70 percent of respondents) and regulatory changes (52 percent) were identified as the most-needed incentives to encourage expanded use of reclaimed water. It is also worth noting that better public education is also perceived as needed (50 percent) to encourage expanded use of reclaimed water.

Storage Alternatives for Reclaimed Water

With regard to storage of reclaimed water, survey respondents identified natural storage systems (wetlands and aquifers) as the preferred storage alternatives, rather than man-made features, such as reservoirs (Table 5). This could be perceived as significant because it indicates a tendency for respondents to desire that reclaimed water be returned to the environment and could indicate a higher level of acceptance for IPR, thought that is just one interpretation. It's worth noting that "salt water barrier" was identified as important or very important by less than 40 percent of respondents. There are several major efforts within the state to use reclaimed water to provide a saltwater barrier and it's possible that this concept or the degree or potential degree of saltwater intrusion into coastal aquifers was not clearly understood by the respondents.

Factors Prohibiting or Complicating Indirect Potable Reuse of Reclaimed Water

There was only one survey question that specifically addressed potable reuse and it focused on the factors prohibiting or complicating the IPR of reclaimed water. The implications of the fact that the survey addressed only IPR are discussed in the conclusion section of this article. The results are presented in Table 6.

Fiscal constraints were viewed as the most significant factor limiting the potential for future IPR by 56 percent of respondents, followed by public perception (52 percent), regulations (48 percent), environmental constraints and public health issues (41 percent each), and engineering constraints/technology (29 percent). Based on the results of the survey, it appears there is a general belief by the respondents that IPR is technically feasible, if the public perception, regulatory, and financial barriers to its implementation could be eliminated.

Direct Potable Reuse Constraints, Opportunities, and Recommendations

The majority of FDEP's recommendations with regard to potable reuse focused on IPR. Specifically, FDEP recognized ongoing groundwater recharge and surface water augmentation efforts and concluded this was likely the most viable and acceptable method of potable reuse for Florida.

With regard to DPR, FDEP concluded that it was a viable alternative water supply; however, there were a number of barriers to future DPR implementation, including:

- Relative availability of lower-cost groundwater/surface water
- No clear regulatory structure
- Sustained reliability
- Impacts of commercial and industrial discharges
- "Yuck" factor

Despite these constraints, it's recognized that potable reuse, and specifically DPR, presents many opportunities with respect to future water supply alternatives. Notably, despite the large volume of nonpotable reuse currently practiced in the state, there are still many areas or geographies with large uncommitted reclaimed water supplies that were estimated to be more than 883 mil gal per day (mgd) in 2013. There are also a number of areas in the state with limited groundwater and surface water supply availability. In these areas, potable reuse has great potential to augment existing water supply portfolios and meet future water supply needs. The FDEP-recommended development of a regulatory framework for potable reuse and appropriation of funding through the water management districts could aid in future implementation of DPR.

Table 5. Preferred Storage Alternatives for Reclaimed Water (FDEP, 2014)

Storage Methods (Totals = Number of Important + Very Important Responses)	Reclaimed Water
Wetlands and other natural features	501
Aquifer recharge	500
Aquifer storage and recovery	459
Reservoirs	428
Dispersed water storage	423
Salt water barrier	372

Table 6. Factors Prohibiting or Complicating Indirect Potable Reuse

Indirect Reuse Methods (Totals = Number of Important + Very Important Responses)	Reclaimed Water
Fiscal constraints (cost-prohibitive, bond funding, utility rate structures, etc.)	534
Public perception/customer resistance	493
Regulations/regulatory actions	455
Environmental constraints	393
Public health issues	392
Engineering constraints/technology not available	278

Conclusion

The FDEP SB 536 study is an impactful first step to expanded use of reclaimed water and future potable reuse efforts in the state of Florida. Results of the survey of nearly 1000 individuals indicate a willingness to accept both IPR and DPR as a possible future alternative water supply. In both instances, the fact that these alternatives are not allowed or not considered was thought to be a serious impediment to future implementation by more than half of survey respondents.

Fiscal constraints and public perception were viewed as the most significant factor limiting the potential for future IPR by the majority of respondents. Regulatory barriers and environmental constraints were also viewed as significant limiting factors by nearly half of survey respondents. It is interesting that more than 40 percent of respondents viewed public health issues as a limiting factor, yet less than 30 percent felt engineering constraints or technology limitations were a limiting factor. This suggests a disconnect of the link between technology and protection of public health. Based on the results of the survey, it appears there is a general belief by the respondents that IPR is technically feasible, if the public perception, regulatory, and financial barriers to its implementation could be eliminated.

Perhaps a significant shortfall of the FDEP survey is that it does not go far enough with regard to opinions related to DPR. While the survey specifically addresses IPR, the exclusion of DPR from the survey and some of the opinions regarding future DPR implementation seem to indicate an uncertainty or unwillingness to accept it as a method to expand the use of reclaimed water in the future. Lack of sufficient consideration of DPR represents a missed opportunity to identify public and industry concerns regarding the future implementation of DPR and develop a strategy to address these concerns. Such a decision is counter to recent trends in the industry and lacks the foresight needed to assure future sustainable water supplies for the residents of Florida.

References

- Florida Department of Environmental Protection (2014). SB 536 Workshop, Southwest Florida Water Management District. Oct. 29, 2014; Tampa, Fla.
- Florida Department of Environmental Protection (2015). Report on Expansion of Beneficial Reuse of Reclaimed Water, Stormwater, and Excess Surface Water.