Texas Water Development Board

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TO: Board Members

THROUGH: Jeff Walker, Executive Administrator
Robert E. Mace, Ph.D., P.G., Deputy Executive Administrator, Water Science and Conservation
Todd Chenoweth, Interim General Counsel

FROM: Erika Mancha, Manager, Innovative Water Technologies

DATE: November 3, 2016

SUBJECT: 2016 Biennial Report on Seawater and Brackish Groundwater Desalination

ACTION REQUESTED

Consider approving the 2016 Biennial Report on Seawater and Brackish Groundwater Desalination.

BACKGROUND

In 2003, the 78th Texas Legislature passed House Bill 1370, directing the Texas Water Development Board (TWDB) to participate or conduct studies to advance the development of seawater desalination and report progress to the governor, lieutenant governor, and speaker of the house of representatives not later than December 1st of each even-numbered year. In 2015, the 84th Texas Legislature passed House Bill 30, amending Texas Water Code §16.060 to also require the TWDB to report on the progress of brackish groundwater desalination in the state and the identification and designation of local or regional brackish groundwater production zones in four specific aquifers (Carrizo-Wilcox Aquifer between the Colorado River and the Rio Grande, Gulf Coast Aquifer, Blaine Aquifer, and Rustler Aquifer). As required by House Bill 30, TWDB will continue studying and identifying areas for zone designations for the remaining aquifers in the state by December 1, 2022, and include the results of the studies in forthcoming biennial reports.

Key Issues

The report includes:

1) *the results of the board's studies and activities related to seawater or brackish groundwater desalination during the preceding biennium;*

2) *an identification and evaluation of research, regulatory, technical, and financial impediments to implementing seawater or brackish groundwater desalination projects;*
3) *an evaluation of the role the State should play in furthering the development of large-scale seawater or brackish groundwater desalination projects in the state;*
4) *anticipated appropriation from general revenues necessary to continue investigating water desalination activities in the state during the next biennium; and*
5) *identification and designation of local or regional brackish groundwater production zones in areas of the state with moderate to high availability and productivity of brackish groundwater that can be used to reduce the use of fresh groundwater.*

The 2016 biennial report is the first report to discuss both seawater and brackish groundwater desalination. With respect to seawater desalination, this is the seventh report in the series and marks the completion of 14 years toward advancing seawater desalination in Texas. This is also the first report to discuss the progress made in furthering brackish groundwater desalination and identifying and designating brackish groundwater production zones in the aquifers of the state.

RESULTS OF THE TWDB'S STUDIES AND ACTIVITIES IN DESALINATION

Since 2002, the TWDB has funded $3.2 million for seawater desalination studies, including three feasibility studies, two pilot-plant projects, and several guidance and research studies. Staff is monitoring the seawater industrial desalination plant being built by M&G Resins USA, LLC and which is expected to become operational in the first quarter of 2017. The City of Corpus Christi is also conducting two seawater desalination feasibility studies, one for municipal and the other for industrial use.

Between 2004 and 2009, the TWDB funded 17 projects and studies totaling $2.7 million related to brackish groundwater desalination including the implementation of demonstration projects, preparation of guidance manuals, and conducting research studies. Staff is monitoring San Antonio Water System's 12-million-gallon-per-day brackish groundwater desalination plant which is expected to become operational in the last quarter of 2016. State funds to advance seawater and brackish groundwater desalination in Texas were exhausted in 2010.

In 2010, the TWDB funded three projects totaling $449,500 related to the Brackish Resources Aquifer Characterization System Program. Recently, with the passing of House Bill 30 (84th Texas Legislature, 2015) TWDB funded seven aquifer projects totaling over $1.7 million.

EVALUATION OF RESEARCH, REGULATORY, TECHNICAL, AND FINANCIAL IMPEDIMENTS

The relatively higher cost and site specificity of seawater and brackish groundwater desalination compared to the cost of developing existing fresh water supplies continues to be an impediment to advancing desalination in Texas. Factors that affect the cost of desalination include: permitting, treatment, brine disposal, and transmission pipelines. In

general, costs and technical requirements for desalination projects depend on site specific conditions as a result of which new studies are required for each project.

In 2015, the 84th Texas Legislature passed House Bill 2031 relating to the diversion, treatment, and use of seawater and the discharge of treated seawater and brine resulting from the desalination of seawater. The overall goal of the legislation is to streamline and expedite the regulatory and permitting process associated with seawater desalination.

The legislature also passed House Bill 409 relating to seawater desalination and brine disposal. The bill stipulates that a general permit can be used to authorize the use of Class I injection well for the disposal of nonhazardous brine produced by desalination of seawater. The well must meet requirements of the federal underground injection control program (Texas Water Code §27.025). On November 16, 2016, the Texas Commission on Environmental Quality will consider adopting the proposed rules for House Bill 2031 and House Bill 4097.

EVALUATION OF THE ROLE THE STATE

The role of the State is to continue providing leadership and support to advance seawater and brackish groundwater desalination in Texas. Opportunities for continued state involvement include (1) facilitating meetings between water providers or municipalities and regulatory or planning agencies during the financial application and permitting process, (2) providing financing through existing TWDB programs to entities interested in pursuing seawater and brackish groundwater desalination, and (3) working with private and public partners to advance the implementation of desalination in the state.

ANTICIPATED APPROPRIATION FROM GENERAL REVENUES

As part of the 2018–2019 legislative appropriations request, the TWDB requested baseline funding of $2 million to further desalination activities during the next biennium. The TWDB's current financial assistance programs are available to public entities that need assistance to fund the planning, design, and construction phases of seawater and brackish groundwater desalination plants. Since 1989, TWDB has financed 34 desalination projects for a total of approximately $326 million.

DESIGNATION OF BRACKISH GROUNDWATER PRODUCTION ZONES

House Bill 30 (84th Texas Legislature, 2015), required the TWDB to designate brackish groundwater production zones in four aquifers, determine the volumes of water that a brackish groundwater production zone can produce over 30- and 50-year periods, and make recommendations on reasonable monitoring to observe the effects of brackish groundwater production within the zone.

On October 20, 2016, the Board approved the Executive Administrator's recommendations and designated one zone in the Carrizo-Wilcox Aquifer, four zones in the Gulf Coast Aquifer, and three zones in the Rustler Aquifer. All the zones contain groundwater that is slightly to moderately saline (1,000 to 10,000 milligrams per liter of total dissolved solids).

The table below presents the volumes of brackish groundwater that could potentially be produced from designated zones in the three aquifers over 30- and 50-year periods.

Aquifer	Annual pumpage (acre-feet/year)	30-year cumulative (million acre-feet)	50-year cumulative (million acre-feet)
Carrizo-Wilcox	43,000	1.29	2.15
Gulf Coast	45,700	1.37	2.28
Rustler	15,680	0.47	0.78

In general, for the three aquifers which have designated zones, staff recommends monitoring aquifers above and below the recommended zones to observe the effects of producing brackish groundwater from the zones. Staff also recommended monitoring the permeable sands associated with the shale units above and below the aquifers that serve as hydrogeological barriers.

RECOMMENDATION

The Executive Administrator recommends approval of the 2016 Biennial Report on Seawater and Groundwater Desalination.

Attachment(s): 2016 Biennial Report on Seawater and Brackish Groundwater Desalination