HB 1437: NO NET LOSS MUNICIPAL INTERBASIN TRANSFER THROUGH AGRICULTURAL WATER CONSERVATION

Stacy Pandey¹ John McLeod²

ABSTRACT

The HB 1437 Agriculture Water Conservation Program is an innovative way to meet rising municipal demands in Williamson County, Texas, conserve river water used for irrigation, and maintain agriculture productivity. The program provides grants to implement water conservation projects on farms and in LCRA irrigation divisions through a municipal conservation surcharge.

In 1999, the Texas Legislature passed House Bill 1437 authorizing the Lower Colorado River Authority to transfer up to 25,000 acre-feet of water per year to Williamson County (through Brazos River Authority (BRA)) under certain conditions including 1) The transfer results in "no net loss" of water to the lower Colorado River basin, and 2) A conservation surcharge on the transferred water is collected from BRA customers to help pay for the conservation projects (currently 25%).

Based on BRA water demands, a 7-year plan was developed through engineering studies and public meetings to conserve approximately 3,500 ac-ft/yr of agriculture water, representing a combination of conservation projects including precision leveling and automation of canal gates in irrigation divisions.

The grant program, begun in 2006, has provided partial funding to precision level 6,275 acres of farm land. Farms that have participated in this program received a 30% cost share in addition to a 50% cost share from the EQIP³ program. To date, 4,830 acre-feet of water has been conserved from these grants. A water savings verification program is under development and will be implemented in 2008. Ongoing challenges include revised water demands, savings verification, and interaction with other water projects.

INTRODUCTION

HB 1437 Enabling Legislation

Due to high population growth rates and limited water supplies, water utilities within Williamson County have had to look outside of their river basin to meet projected demands for water. Williamson County lies within the Brazos River Basin, which is adjacent to the Lower Colorado River Basin in Texas. House Bill (HB) 1437, passed by the Texas Legislature in 1999, authorizes the Lower Colorado River Authority (LCRA)

¹Water Conservation Coordinator, Lower Colorado River Authority, 3700 Lake Austin Blvd, Austin, TX 78703, <u>stacy.pandey@lcra.org</u>

² Senior Project Manager, Lower Colorado River Authority, 3700 Lake Austin Blvd, Austin, TX 78703, john.mcleod@lcra.org

³ Environmental Quality Incentive Program (administered through NRCS)

to provide up to 25,000 acre-feet of surface water per year for use in specific areas of Williamson County. The LCRA is a conservation and reclamation district created by the Texas Legislature in 1934. LCRA supplies electricity for Central Texas, manages water supplies and floods in the lower Colorado River basin through the operation of six dams, manages three irrigation divisions, develops water and wastewater utilities, provides public parks, and supports community and economic development in 58 Texas counties.

According to HB 1437, this water would be transferred under four major conditions:

- 1. Water is transferred in a manner that assures "no net loss" of surface water to the Colorado River Basin.
- 2. A conservation charge for transferred water is added to the base water rate, with proceeds from the conservation charge to be deposited into the Agricultural Water Conservation Fund (Ag Fund). The legislation set a minimum 10 percent conservation charge and authorized the LCRA Board to adjust the conservation charge as necessary to mitigate any adverse effects of the transfer.
- 3. The Board may use money from the fund only for the development of water resources or other water use strategies to replace or offset the amount of surface water to be transferred to Williamson County.
- 4. LCRA consults with an advisory committee, comprised of representatives from Colorado, Wharton and Matagorda counties, prior to using funds from the Agricultural Water Conservation Fund.

Interbasin Permit and Water Contract

In October 2000, LCRA and BRA signed a 50-year water sales agreement for the 25,000 acre-feet of water. In addition to the standard contract provisions, the agreement included a 25 percent conservation charge for transferred and reserved water and a clause that allows BRA to terminate the agreement not earlier than August 22, 2011.

In August 2001, the Texas Natural Resource Conservation Commission issued the interbasin transfer permit to BRA to transfer up to 25,000 acre-feet of water per year to Williamson County under the conditions authorized in HB 1437. As of March 2008, no water transfers have occurred.

HB 1437 Implementation Study

In 2004, the LCRA Board authorized an engineering study and public meetings to develop a plan for implementing the HB 1437 program. Major goals of the study were to define the term "no net loss," evaluate potential conservation projects and develop an implementation plan to allow the water transfer to occur under the provisions of the HB 1437 legislation. The plan, developed after review and comment by the Brazos River Authority, municipal customers, local farmers and members of the public, includes these important features:

- Developed a definition for "no net loss;"
- Evaluated Williamson County water demands and developed a seven-year plan to meet them through a combination of conservation projects including precision leveling 6,000 acres of farmland and rehabilitation and automation of canal gates in the LCRA irrigation divisions,
- Determined that the volume of agriculture water conserved under the planned projects satisfies projected municipal demands, meets the no net loss condition, and is eligible for interbasin transfer to Williamson County;
- Established a 25 percent conservation surcharge on the water transferred to Williamson County customers; and
- Presented additional recommendations for program implementation including policy definitions, additional engineering studies, and businesses and administrative practices.

In March 2005, the LCRA Board adopted a revised LCRA Board Policy 501, "Water Resources," that incorporated the demands of HB 1437 Agricultural Water Conservation Program. The policy included the definition of no net loss. The HB 1437 implementation study is available at the Web site: <u>www.hb1437.com</u>. Figure 1 presents a general location map for the project.



No Net Loss

Four principles were identified to help define "no net loss" to comply with HB 1437:

- Clear and technically sound procedures for measuring water transferred to Williamson County and water provided to the Lower Colorado River Basin;
- Balancing over a number of years for water excess and water deficit;
- Assuring that water for transfer will be available during a critical drought; and
- Any water measurement criterion should detect water loss and provide remedial action.

No Net Loss is defined in the LCRA Board Policy 501 as a hydrologic condition where the average annual volume of transferred water is equivalent to, or less than, the combined average annual volume of conserved water, developed water, and returned Water resulting in a reduced reliance on Surface Water for agricultural irrigation.

Transferred Water < Conserved Water + Developed Water + Returned Water

Average annual volume is defined as the arithmetical average volume of water over a contiguous 3-year period. This averaging provision was included in the policy and allows for flexibility in adding groundwater and reuse water from outside the Lower Colorado River watershed to balance any unexpected diversions within the averaging period.

PROGRAM OVERVIEW

The HB 1437 Agricultural Water Conservation Program is one part of the LCRA's efforts to conserve water in agricultural uses. The program joins individual producers, local soil and water conservation districts and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) in a collaborative effort to conserve water. The goals of the HB 1437 Program are to:

- 1. Reduce agricultural use of surface water,
- 2. Plan and implement conservation projects to fulfill contract obligations for HB 1437 water,
- 3. Provide grants from the Agricultural Water Conservation Fund to implement water conservation projects, and
- 4. Provide the program performance information to meet the requirements of the LCRA Board, Williamson County water customers, and the public.

Demand Projections for HB 1437 Water

The current HB1437 program plan was developed during the 2005 implementation study and included a combination of on-farm and in-division conservation improvements that balanced the projected water demands in Williamson County with the funds available in the Agricultural Water Conservation Fund. These water demand projections were developed by the Brazos River Authority and its customers, and are reviewed and updated as new information becomes available. In October, 2007 BRA presented LCRA revised demand projections for HB1437 water.

Figure 2 compares the HB1437 water demands used to developed the current HB1437 implementation plan with the updated demand projections recently provided by the BRA and their customers. The original projections provided by BRA show that about 16,000 acre-feet per year would be needed by 2020, with a steep increase in demand from 2012 to 2017. The new demand projections show that only 7,500 acre-feet per year will be needed in 2020, a near 50% reduction from the earlier projection.

The customers of the HB1437 water have changed as well. The City of Round Rock has reserved the largest percentage but does not expect to be taking water until 2014. Two entities, Chisholm Trail Sanitary Utility District (CTSUD) and the City of Georgetown have cancelled their contracts with BRA for HB1437 water. These BRA estimates are reviewed annually by LCRA staff.



Demand Projections for HB1437 Water

Figure 2. Water Demand Projections for HB1437 Water

<u>Program Plan</u>

The HB 1437 Program Plan includes a series of projects and studies to be completed during the period 2005 to 2012. The earliest cancellation date of the LCRA/BRA HB 1437 water contract is August 22, 2011, 10-years after the effective date of the

BRA/LCRA contract. The goal of this short-term program plan outlined in the HB1437 Implementation Study is to make available 3,500 acre-feet of HB 1437 water per year for transfer to Williamson County by 2009 to meet the 2004 projected demand of 2,260 acrefeet/year by 2012.

The plan, initiated in 2005, consists of three areas of activity.

- **Program and Policy** provides the foundation of the program. Activities include development of board policy to define no net loss, expansion of program oversight by customers and the public and development of the program's administrative processes and procedures.
- **Contract and Financing** develops the business practices that provide financial stability and accountability to the program. These activities include development of the procedures for requesting water for transfer; acquiring assurances for program water needs beyond 2011 and debt financing agreements for construction of conservation projects.
- **Projects and Studies -** plan, construct and operate the various conservation projects. These activities include the engineering design, construction, technical studies and monitoring programs.

A summary of the HB 1437 program plan is presented in Table 1.

- **Planning Horizon:** 2005 2012 (plus field maintenance from 2014 through 2016)
- HB1437 Water Available for Transfer: 3,500 acre-feet per year. •

On-Farm Projects	In-Division Projects	Studies and Management
Precision level 6,000 acres of farmland	Construction of eight canal check structures in one of the LCRA irrigation divisions.	Conservation measurement and monitoring
Construction Cost - \$2.436 million (includes \$0.6 million for field maintenance)	Construction Cost - \$1.749 million	Oversight and customer communication
		Program administration
Total cost: \$5.176 million		

 Table 1. Conservation Projects and Program Costs

Funding sources: Ag Fund - \$3.9 million, EQIP - \$0.92 million, Farmer - \$0.37 million

Program Funding

The program is funded through the income stream generated from the conservation surcharge applied to the water sales contract. The conservation surcharges is applied to both reserved water and transferred water. The conservation surcharge rate must be sufficient to maintain a positive balance in the Ag Fund. Income to the Ag Fund is based on the following rates:

- Conservation Surcharge 25%
- Normal Raw Water Cost: \$126/ac-ft
- Reserved Water Cost: \$63/ac-ft
- Max Available Water: 25,000 ac-ft/yr

<u>Schedule</u>

Under the current implementation plan for the projects, by 2009 at least 3,500 acre-feet of HB 1437 water would be conserved and available for transfer to Williamson County.

During the initial period (2005 - 2007), when only precision leveling is used, system capacity is 2,000 acre-feet per year and increases to 3,500 acre-feet per year with anticipated in-division improvements in 2008. Figure 3 shows how this implementation plan satisfies the projected water demands for HB1437 water through 2012.

Figure 3 also compares BRA's updated projection with current plans and shows a significant decrease in the rate of demand growth for HB1437 water. The decrease is relatively small through 2012 but during the period 2012 - 2017 the rate of demand increase is reduced by over 70% (2,700 acre-feet/year to 700 acre-feet/year). This demand change signals a need to update the HB1437 plan.



HB1437 Demand vs. Supply

Figure 3. HB 1437 Demand vs. Supply

130

PROGRAM RESULTS

The program began in November 2005, when the LCRA Board approved the revised Board Policy 501. Initial efforts focused on developing the administrative and management procedures for implementing a grant program for on-farm conservation projects, and completing the interlocal agreement with the NRCS (Natural Resources Conservation Service) to integrate with their Environmental Quality Incentives Program (EQIP). This program pays 50 percent of on-farm conservation projects. The agreement was formally executed in March 2007.

In 2006, the LCRA policies necessary for program implementation were developed and adopted. These included:

- LCRA Board adopted a revised Board Policy 501 which defined no net loss and incorporated the HB1437 water transfer requirements into LCRA policies.
- LCRA Board authorized an interlocal agreement with the NRCS.
- LCRA Board adopted the application guidelines, eligibility rules and contract provisions for awarding cost sharing conservation grants from the Ag Fund. These guidelines integrated the NRCS technical specifications and payment certification processes into the requirements for the HB 1437 grant program.

How does the Grant Program Work?

This section presents a overview of the grant program, additional details on the program are available on the program Web site: <u>www.hb1437.com</u>.

- 1. Producers submit an application to their local irrigation division office.
- 2. LCRA screens applications for eligibility and ranks eligible applications through a random selection lottery if demand exceeds available funds. LCRA notifies applicants of the award and signs a Cost Sharing Agreement with the applicant.
- 3. When the project is complete and certified by the local NRCS office, the producer submits a request for payment and is reimbursed for up to 30 percent of the cost of the approved acceptable practice based on NRCS guidelines in place at the time of contract award.
- 4. The LCRA reviews completed projects annually to monitor conservation success (the agreement stipulates that LCRA must be granted access to the field for inspection/measurement). The field must be in production within three years of the completion date and must be maintained to NRCS standards for the service life of the project.

On-Farm Conservation Projects

A summary of the program-funded on-farm conservation projects completed from 2006-2007 is presented in Table 2. The program shared the cost of precision leveling of 84 fields totaling 6,439 acres. The largest acreage was in the Garwood Irrigation Division,

followed by Lakeside and Gulf Coast. All program projects were funded by a combination of funds: 50 percent cost share from the Natural Resource Conservation Service (NRCS)'s Environmental Quality Incentive Program (EQIP); 30 percent funding from the Ag Fund; and the remaining 20 percent from producers. The average area of a leveled field was 75 acres.

Since inception, the HB 1437 Ag Fund has contributed \$486,975 out of a total cost of \$1,631,319. All of the applications submitted in 2006 and 2007 that met the first priority criteria were funded. The priority criteria can be found in the HB1437 Application Guidelines on http://www.hb1437.com.

Division	Fields Leveled	Acres Leveled	Total Cost	HB 1437 Share
Garwood	48	3,475	\$847,641	\$251,871
Lakeside	32	2,698	\$738,998	\$221,700
Gulf Coast	4	266	\$44,680	\$13,404
Total	84	6,439	\$1,631,319	\$486,975

Table 2. 2006-2007 Acres Leveled and Grants Awarded

Figures 4 and 5 show the locations of the leveled fields in the Garwood, Lakeside and Gulf Coast irrigation divisions. The combined acreage of HB 1437 leveled fields represents less than 2 percent of the estimated 345,230 acres historically irrigated.

In-Division Conservation Projects

There was no in-division conservation project activity during 2007. LCRA owned irrigation operations are referred to as "divisions" because they are not technically independent districts. The timing of the in-Division conservation will be re-evaluated in 2008 based on the revised water demands from BRA.

Conservation Monitoring and Measurement

Accurate water conservation estimates are critical to water availability estimates necessary to comply with the "no net loss" requirement for water transfers. A major goal for 2007 was to develop a technically sound water conservation monitoring plan that could be integrated, and implemented, within the normal business practices of the LCRA irrigation divisions.

The plan for estimating water conservation factors for the HB1437 program will be based upon a statistical comparison of water use in fields leveled to EQIP standards versus water use in other non-leveled fields. The decision to analyze existing data instead of intensively studying a small number of "test" fields was based on recommendations from the LCRA SAWS Water Project Water Savings Verification and Monitoring Report (December 2007).

To verify this concept, staff analyzed water use data from the Lakeside Irrigation Division for 2006. Preliminary results from this analysis show that the difference in water use between the HB1437 fields and other fields closely approximates the conservation factor (0.75 ac-ft of water saved per acre leveled) currently used to estimate the supply of HB1437 water. The conservation monitoring plan calls for the development of separate conservation factors for each irrigation division.

A major challenge in implementing a HB1437 conservation monitoring program is that only two of the three LCRA irrigation divisions currently volumetrically measure water delivered to fields. Historically, the Garwood Division did not measure water at individual fields, yet this division has the highest level of participation in the HB 1437 grant program (fifty-four percent of the acres leveled).

To address this condition, staff has implemented a limited water measurement program in several sections of the Garwood Irrigation Division. In 2007 staff conducted an initial test of the measurement program at 12 Garwood fields totaling 1,465 acres. Unfortunately, these measurements proved to be unreliable due to unquantifiable water use in neighboring fields and the frequency of when water measurements were taken. This issue will be addressed in 2008 (see section 5.1.3).

During 2007, staff implemented a program to develop accurate field maps. The program will digitize into a GIS layer the fields in a division and identify if it is a HB1437 field, its production status, and other water use information. All 2006 fields are mapped; mapping of 2007 fields is in progress.





136 Urbanization of Irrigated Land and Water Transfers

Water Conserved and No Net Loss

LCRA Board Policy 501 states that no net loss occurs when the average annual volume of HB 1437 water transferred is equal to or less than the sum of the average annual volume of conserved water, returned water and developed water.

The current HB 1437 program plan relies exclusively on conserved water; production through developed water and/or returned water is not part of the short term plan, but may be added if BRA's demand for water or conservation performance estimates change.

<u>Water Conserved.</u> The volume of conserved water produced is calculated by multiplying the number of acres leveled times a conservation factor for precision leveling. Results from field studies at the Texas A&M's Texas Agricultural Experiment Station (TAES) in Eagle Lake support a conservation factor of 0.75 acre-ft of water conserved per acre leveled. A conservation savings verification program is in development to refine the conserved water calculations. A leveled field must be in production to receive conservation credit; conservation credit for fallowing is not allowed. In 2006, 2,769 acres were leveled conserving an estimated 2,077 acre-feet of water. (2,769 acres x 0.75 = 2,077 acre-feet of water), and in 2007, 3,670 acres were leveled conserving an estimated 2,753 acre-feet of water (3,670 acres x 0.75 = 2,753 acre-feet of water conserved).

No Net Loss Status

Table 3 summarizes the 2005-2007 no net loss volume statistics. It shows compliance with the definition of no net loss and that 2,077 and 2,629 acre-feet of HB 1437 water was available for transfer in 2006 and 2007 respectively. Water transferred is HB1437 water transferred to Williamson County. In 2006 and 2007, 860 and 1120 acre-feet respectively was projected to be transferred. There was no HB1437 water transferred during 2006 or 2007.

				Vol. of HB 1437 Water			
Year	Vol. Conserved	Vol. Developed	Vol. Returned	Total Vol Available	Forecasted Demand	Actual Transferred	Net Loss
2005	0	0	0	0	600	0	0
2006	2,077	0	0	2,077	860	0	0
2007	2,753	0	0	2,753	1,120	0	0
2008	3,000*	0*	0*		1,380		

Table 3. No Net Loss Summary, acre-feet

Planned

AGRICULTURAL WATER CONSERVATION FUND

The HB 1437 Agricultural Water Conservation Fund (Ag Fund) was established by the HB 1437 legislation and funds LCRA's portion of current water conservation projects. It is an interest bearing, reserve fund recorded in a separate account titled HB 1437 Agricultural Water Conservation Fund. The fund was started in February 2002.

Income to the fund is derived from the annual conservation charge provision incorporated into the HB 1437 water sales contract with BRA. The current charge is 25 percent and is applied to both reserved water and delivered water. Conservation charge income is deposited into the Ag Fund in February of each year. The fund is reduced by HB1437 program expenditures approved by the LCRA Board and replenished each year with the annual surcharge. In 2007, the LCRA Board approved authorization to spend \$500,000 in 2008. Figure 6 illustrates that yearly expenditures for the last two years are slightly under yearly income.



Agriculture Fund Expenditure Calculations Through December 2007

Figure 6. Agricultural Fund Income and Expenditures

PROGRAM OUTLOOK

The 2008 program consists of four areas of effort: continue the grant program and costshare on-farm conservation projects; review and update the HB1437 implementation plan to account for new demand projections for HB1437 water; implement and refine the conservation verification program for the Garwood Division, and meet with the Agricultural Water Conservation Fund Committee.

2008 Program Activities

The program plan for 2008 consists of three components, on-farm conservation, indivision conservation and conservation monitoring and measurement.

<u>On-farm Conservation Project.</u> In 2008, the program will expand the 2006-2007 grant program for precision leveling projects to take advantage of existing but uncompleted EQIP contracts, as well as any new EQIP contracts. Based on discussions with local farmers, staff estimates that grant applications for as much as 5,400 acres of precision leveling projects are possible in 2008. If realized, these estimates will exceed the \$400,000 budget for grants in 2008, possibly prompting for the first time, use of the program's lottery system for awarding grants.

EQIP remains a popular program for producers due to the availability of funds and its flexible contract terms. Producers holding EQIP contracts are allowed up to 10 years to complete the work. Results from the first two years of the grant program indicate that the additional 30 percent cost-share from HB 1437 encourages producers with existing EQIP contracts to complete the contracted work.

In 2005, NRCS reported that only 10 percent of the awarded EQIP contracts had been completed. This backlog of funded, but uncompleted, projects provides a reservoir of low-cost conservation projects. However, as shown in Table 4, this is changing.

The NRCS now reports that, as of September 2007, slightly more than 50 percent of the awarded EQIP contracts have been completed, and since April 2005, another 10,000 acres of EQIP contracts have been added. These changes indicate strong support for EQIP and the positive effect HB1437 is having on the implementation of water conservation projects.

	1	,	
County	Contracted	Installed	Remaining
Colorado	17,645	8,785	8,860
Wharton	12,725	7,285	5,440
Matagorda	954	257	697
Total	31,324	16,327	14,997

Table 4. Summary of Contracted and Applied EQUIP Precision Leveling Acreage, as of
September, 2007.

<u>Update Implementation Plan.</u> In 2008, staff will initiate an engineering study to update the short term implementation plan and reassess the types and timing of new conservation projects. The current short-term plan includes constructing eight control-gates plus an instrumentation system in one of the irrigation divisions. This project has been delayed because of the revised water demand projections from BRA. A long term plan will also need to be developed to meet BRA water demands beyond 2012.

<u>Conservation Monitoring and Measurement Study</u>. Staff has reviewed on-going LCRA-SAWS water project technical studies and in particular has incorporated recommendations from the Water Savings and Monitoring Verification Report with data gathered from the HB 1437 program to design a HB1437 water conservation monitoring and measurement program for each division. This program is now underway and will continue to be refined in 2008.

Under this conservation program, a measurement study is now being implemented in the Garwood Irrigation Division, the only division where field water use is not measured. In 2008, fields watered by two entire canal reaches will be controlled by the division and farmers will have to contact LCRA to take water. This procedure is like that used in both the Lakeside and Gulf Coast Divisions. This will enable division staff to accurately measure 1,500 acres of leveled and non-leveled fields. Staff will be installing pipe walks and walk bridges to allow access to measurement boxes and to facilitate accurate measurements. The 2008 phase of this measurement project is scheduled to be completed in March 2008.

<u>Water Contract Conditions.</u> Long-term planning for the HB1437 program may be affected because of the 2011 cancellation provision in the LCRA-BRA water contract and the LCRA San Antonio Water System Water Project (LSWP) agreement. These limitations will become important in the next few years when high cost in-division projects are planned, when Williamson county customers begin to develop projects to deliver HB1437 water and when decisions on the future of the LSWP are made.

The LSWP agreement allows the project to use conserved water from strategies used in the HB1437 program, and provides reimbursement funds to the HB1437 Agricultural Conservation Fund. Unfortunately, the replacement of this water with new non-LSWP strategies may be more costly, and take longer to implement, than those strategies used to initially develop the HB1437 water.

In 2007, the Brushy Creek Regional Utility Authority was formed to develop a multiphase regional water supply project to deliver water from Lake Travis to the cities of Round Rock, Leander, and Cedar Park. In January, 2008 the Texas Water Development Board approved a loan of \$309,755,000 to the Brushy Creek Regional Authority to fund the project. This loan and the formation of the utility authority signals the beginning of a significant capital investment by the City of Round Rock to develop the infrastructure necessary to deliver its 21,000 ac-ft/yr share of HB1437 water. Assuming the water for the City of Round Rock will be provided under the BRA contract for HB1437 water, a long term implementation plan will require significantly more water than that provided by the existing implementation plan.

An additional consideration is the time and expense required to implement in-division conservation projects. Typically, these projects are 100 percent funded by the Ag Fund, take longer to implement than the precision leveling projects, and are not easily scalable from one year to the next. Therefore, in 2008 staff will explore with BRA its future plans for the HB 1437 water contract.

<u>Program Oversight and Communication</u>. A large part of the HB 1437 implementation study was a public input process to involve various stakeholders in the framework and conservation strategies of the HB 1437 program. Since the grant program began in 2006, yearly updates have been provided about the program to farmers through annual farmer advisory meetings in each division and individual contact with division staff. During 2008, staff will consult with county judges to have Ag Advisory Committee members reappointed and work with the Brazos River Authority to initiate efforts to organize and charter a Williamson County advisory committee. The 2007 HB 1437 annual report is available on LCRA's website, and staff will continue to update the website as a part of on-going conservation communication efforts.